AMITY UNIVERSITY
RAJASTHAN

Syllabus Revision

Amity Institute of Biotechnology (AIB)

Master of Technology (Biotechnology)

Programme Code: MTB

Duration – 2 Years Full Time

Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2021-23 Batch

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PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

July, 2021

PROGRAMME OVERVIEW

Biotechnology in the present scenario is helping by showing advancement in diagnosis of a disease by helping us to move forward from primitive Symptomatic Treatment to modern Molecular Treatment along with rapid organization and analysis of biological data possible (Bioinformatics), Marine and aquatic applications of Biotechnology used to improve cleanup of toxic spills, improve yields of fisheries (Blue Biotechnology), Agricultural use of Biotechnology, heading towards the production of crops in not only good quantity but also with good quality (Green Biotechnology), Medicine including designing of organisms to produce antibiotics and the engineering of genetic cures through genomic manipulation (Red Biotechnology), Exemplified by the designing of an organism to produce useful chemicals, use of enzymes as industrial catalysts (White Biotechnology).

In view of above Amity University Rajasthan running Bachelors, Master and Ph.D biotechnology programs to fulfill the demand of various biopharmaceutical and biotechnological industries. All these programs course curriculum and structure have been designed in consultation with various pharmaceutical, biotechnological and dairy industry experts to meet the demand and supply of technical qualified personals. The course curriculum covering the major part of advanced biotechnological process, bioprocess and downstream technology, enzyme technology, separation technology, immunology, virology, genetics, molecular modeling drug design, biopharmaceuticals, pharmaceutical biotechnology, and bioinformatics in relation to the industry requirements.

The MSc. programme in Biotechnology seeks to provide education and training, empower students with technical skill-set, create capacities and build career opportunities in four key domains of biotechnology namely:

- Research and Development (Academic & Research Institutions and Industrial Sectors)
- Biotechnology Industries, Breweries, Pharmaceutical & Food Industries
- Forensic, Diagnostics Centers and Regulatory agencies
- Data handlings, Coding and Clinical research

This is achieved through a combination of interdisciplinary curricula as well as intensive laboratory work. Through its unique pedagogical methods, the academic programme allows transferability of acquired skills in domains unrelated to biotech sectors. Students are expected to have both specialized knowledge and practical experience for addressing contemporary problems in both academic and industrial setting.

Program Learning Outcomes (PLO):

The objective of the programme is to highlight the role played by biotechnology in modern society and its relevance to sustainable development. It seeks to provide the following:

PLO-I	**:**	Graduates will be able to identify, analyze and understand problems related to biotechnology engineering and finding valid conclusions with basic knowledge in biotechnology engineering with special emphasis on optimization and scale up.
PLO-II	**:**	Graduates will be able to design and develop solution to biotechnology engineering problems by applying appropriate tools while keeping in mind safety factor for healthy environmental & society.
PLO-III	**:**	Solve organizational problems arising from a legal and technology framework and products, exhibit professionalism, ethical attitude to become an entrepreneur.
PLO-IV	**:**	Identify, evaluate and assess risks and payoffs in monetary and non-monetary terms and Ability to work with multidisciplinary subjects in industries and research.

Credit Summary Sheet

M. Tech. Biotechnology					
Semester	**CC**	**DE**	**VA**	**OE**	**Total**
1	19	3	4	-	26
2	20	3	4	3	30
3	20	3	4	3	30
4	30	-	-	-	30
Total	**89**	09	12	06	**116**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective

Program Structure

M. Tech. Biotechnology: **I Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MTB101	Advanced Biochemistry & Metabolic Regulation	CC	3	-	-	3
MTB102	Advanced Microbial Biotechnology	CC	3	1	-	4
MTB103	Advanced Bioinformatics	CC	3	-	-	3
MTB104	Cellular and Molecular Biotechnology	CC	3	-	-	3
MTB121	Advanced Biochemistry & Metabolic Regulation Lab	CC	-	-	2	1
MTB122	Advanced Microbial Biotechnology Lab	CC	-	-	2	1
MTB123	Advanced Bioinformatics Lab	CC	-	-	2	1
MTB124	Cellular and Molecular Biotechnology Lab	CC	-	-	2	1
AND001	ANANDAM-I	CC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MTB130	Instrumentation in Biotechnology	DE	3	-	-	3
MTB131	Biosafety, Bioethics & IPR	DE				
MTB132	Industrial Safety & Hazards	DE				
BCS 111	Communicational Skills - I	VA	1	-	-	1
BSS111	Behavioural Science I (Self Development and Interpersonal Skills)	VA	1	-	-	1
FLT 111 FLG 111 FLS 111 FLC 111	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
NCVA	-	NCVA	-	-	-	-
	TOTAL					**26**

M. Tech. Biotechnology**: II Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MTB201	Enzymology & Protein Engineering	CC	3	-	-	3
MTB202	Bioprocess & Fermentation Technology	CC	3	-	-	3
MTB203	Advanced Immunotechnology	CC	3	-	-	3
MTB204	Advance Biostatistics and Scientific Writing	CC	3	-	-	3
MTB205	Advanced Medical Biotechnology	CC	3	-	-	3
MTB221	Enzymology & Protein Engineering Lab	CC	-	-	2	1
MTB222	Bioprocess & Fermentation Technology Lab	CC	-	-	2	1
MTB223	Advanced Immunotechnology Lab	CC	-	-	2	1
AND002	ANANDAM-II	CC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MTB230	Environmental Biotechnology	DE	3	-	-	3
MTB231	Entrepreneurship development in Biotechnology	DE				
MTB232	Pharmaceutical Technology & Biotechnology	DE				
OE	Open Elective -I	OE	3	-	-	3
BCS 211	Communicational Skills - II	VA	1	-	-	1
BSS211	Behavioural Science – II (Behavioral Communication and Relationship Management)	VA	1	-	-	1
FLT 211 FLG 211 FLS 211 FLC 211	Foreign Language - II French German Spanish Chinese	VA	2		-	2
	TOTAL					**30**

M. Tech. Biotechnology: **III Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MTB301	Bioprocess Plant Design	CC	3	-	-	3
MTB302	Downstream Processing	CC	3	-	-	3
MTB303	Nanobiotechnology	CC	3	-	-	3
MTB304	Recombinant DNA Technology	CC	3	-	-	3
MTB305	Genomics & Proteomics	CC	2	-	-	2
MTB322	Downstream Processing Lab	CC	-	-	2	1
MTB323	Nanobiotechnology Lab	CC	-	-	2	1
MTB324	Recombinant DNA Technology Lab	CC	-	-	2	1
MTB325	Genomics & Proteomics Lab	CC	-	-	2	1
AND003	ANANDAM-III	CC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MTB330	Advanced Food Technology	DE	3	-	-	3
MTB331	Tissue Engineering	DE				
MTB332	Drug Discovery & Development	DE				
OE	Open Elective-II	OE	3	-	-	3
BCS 311	Communicational Skills - III	VA	1	-	-	1
BSS311	Behavioral Science III (Leading Through Teams)	VA	1	-	-	1
FLT 311 FLG 311 FLS 311 FLC 311	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

M. Tech. Biotechnology: **IV Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MTB460	Major Project /Dissertation	CC	-	-	-	30
	TOTAL					**30**

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED BIOCHEMISTRY AND METABOLIC REGULATION	**MTB101**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	aware of the metabolic pathways
CLO 2	able to identify and solve problems related to biochemical disorders
CLO 3	Able to understand cell metabolism and its applications in various sectors.
CLO 4	N/A

B. SYLLABUS

Module I: Protein Structure
Chemical basis of life: Miller-Urey experiment, abiotic formation of amino acid oligomers, composition of living matter; Water – properties of water, essential role of water for life on earth pH, buffer, maintenance of blood pH and pH of gastric juice, pH optima of different enzymes (pepsin, trypsin and alkaline phosphatase), ionization and hydrophobicity, emergent properties of biomolecules in water, biomolecular hierarchy, macromolecules, molecular assemblies; Structure-function relationships: amino acids – structure and functional group properties, peptides and covalent structureof proteins, elucidation of primary and higher order structures, Ramachandran plot, evolution of protein structure, protein degradation and introduction to molecularpathways controlling protein degradation, structure-function relationships in model proteins like ribonuclease A, myoglobin, hemoglobin, chymotrypsin *etc.*; basic principles of protein purifcation; tools to characterize expressed proteins; Protein folding: Anfnsen's Dogma, Levinthal paradox, cooperativity in protein folding, free energy landscape of protein folding and pathways of protein folding, molten globulestate, chaperons, diseases associated with protein folding, introduction to molecular dynamic simulation.

Module II: Glycobiology
Sugars-mono, di, and polysaccharides with specific reference to glycogen, amylose and cellulose, glycosylation of other biomolecules- glycoproteins and glycolipids; lipids- structure and properties of important members of storage and membrane lipids; lipoproteins.

Module III: Structure andfunctions of DNA,RNA and Lipids
Self-assembly of lipids, micelle, biomembrane organization - sidedness and function; membrane bound proteins - structure, properties and function; transport phenomena;nucleosides, nucleotides, nucleic acids - structure, a historical perspective leading up tothe proposition of DNA double helical structure; difference in RNA and DNA structureand their importance in evolution of DNA as the genetic material.

Module IV: Bio-energetics
Bioenergetics-basic principles; equilibria and concept of free energy; coupled interconnecting reactions in metabolism; oxidation of carbon fuels; recurring motifs inmetabolism; Introduction to GPCR, Inositol/DAG//PKC and Ca++ signaling pathways;glycolysis and gluconeogenesis; reciprocal regulations and non-carbohydrate sourcesof glucose; Citric acid cycle, entry to citric acid cycle, citric acid cycle as a source ofbiosynthetic precursors; Oxidative phosphorylation; importance of electron transfer inoxidative phosphorylation; F1-F0 ATP Synthase; shuttles across mitochondria; regulationof oxidative phosphorylation; Photosynthesis – chloroplasts and two photosystems;proton gradient across thylakoid membrane.

Module V:Role of vitamins& cofactorsin metabolism
Calvin cycle and pentose phosphate pathway; glycogen metabolism, reciprocal control
of glycogen synthesis and breakdown, roles of epinephrine and glucagon and insulin inglycogen metabolism;
Fatty acid metabolism; protein turnover and amino acid catabolism.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Lehninger, A. (2013). Principles of Biochemistry, 6th Ed., Nelson and Cox.
- Mathews, Van Holde & (2012).Ahern Biochemistry. 4th Edition.

References:

- Smith, E. L., Hill, R. L. Lehman, I. R. Lefkowitz, R. J. Handler, P. & White, A. (1983). Biochemistry 7th Ed. McGraw-Hill Book Company.
- Berg, J. M., Tymoczco, J. L. & Stryer, L. (1990). Biochemistry, 3rd Ed., W.H. Freeman and Company.
- Voet, D. V. & Voet, J. G. (2010). Biochemistry, 4th Ed. Wiley
- Conn, E. E. & Stumph, P. K. (1987).Outlines of Biochemistry, John Wiley & Sons.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED MICROBIAL BIOTECHNOLOGY	**MTB102**	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain general principals and scope of microbiology and diversity of microorganisms
CLO 2	Illustrate clear concepts on bacterial cell structure, function, genetics, growth and pathogenesis
CLO 3	Demonstrate critical analytical and lab skills in microbiology
CLO 4	Evaluate microorganisms for different biotechnological applications

B. SYLLABUS

UNIT I: HISTORY AND SCOPE
History and scope of microbial biotechnology, Microbial biodiversity and its use, Bergey's manual of systemic bacteriology, Microbial Genetics, Isolation, Strain improvement, Identification, Preservation and Maintenance of Industrial Microorganisms. Fermenter parts and components; Media for industrial fermentation; Sterilization.

UNIT II: MICROBIAL METABOLITES & FERMENTED FOOD PRODUCTION
Production of microbial enzymes and its applications, Industrial Bioproducts– microbial synthesis of organic acids (Citric acid, acetic acid,), alcohol (ethanol), antibiotics production (penicillin), Bacteriocins, vitamin(B12) and amino acid(glutamic acid, Tryptophan), Fermented beverages (wine, Beer, Cider) , Fermented food (soy sauce/cheese/Kefir/Sauerkraut), LABs & Fermented Dairy products, Probiotics , single cell proteins.

UNIT III: Agricultural Microbial Technology
Microbial Bio-fertilizers and Biopesticides,Biocontrol, Bioherbicides. Large-scale production of microbial inoculants and Biofertilizer Technology for agriculture.

Unit 4: Environmental Biotechnology
Microbes in bioremediation and biodegradation, Lignocellulosic waste degradation, Microbes in waste water treatment and SWM, microbial ore leaching and mineral recovery, oil recovery, Microbes as alternative energy sources by microbial fuel cells and biofuels. Marine microbial metabolites and biopolymer production

Unit 5: Medical Microbiology
Microbial Pathogenesis, Methods of isolation and detection of pathogenic microorganisms; Biosensors, Production of vaccine, Hormones, antibiotics& AMR.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Pelczar, M.J., Chan, E.C.S. & Kreig, N.R. (2001). Microbiology 6th Ed. Tata McGraw Hill.
- Prescott, L.M. (2014). Microbiology, 9th Ed. McGraw by Hill Higher Education.

References:

- Stanier, R.Y., Ingraham, J.L., Wheelis M.L. & Painter, P.R. (2005). General Microbiology, 5th Ed. McMillan,
- Atlas, R.M. (1997). Principles of Microbiology 2nd Ed. WMT Brown Publishers.
- VanDemark, P.J. & Batzing, B.L. Menlo Park (1987). *The microbes: an introduction to their nature and importance*, Benjamin/Cummings Publishing Co.
- Tortora, G. J., Funke, B. R. and Case, C.L. (1994).Microbiology 5th Ed. Benzamin Cummings Inc. California.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED BIOINFORMATICS	**MTB103**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological datasets at various database and will understand the data attributes with information stored in it.
CLO 2	Create new projects by applying various tools to correct the existing data interpretation issues by applying computational methods.
CLO 3	Apply these data sources and software for investigation of novel biological problems
CLO 4	Develop new protocols and methods for biological discoveries.

B. SYLLABUS

Module I: Biological databases
Database concepts; Introduction to Data types and source; Protein Sequence and Structural Databases; Nucleic acid databases; Genome databases; Specialized Databases; Protein databases- UniProt, Structure databases– PDB and MMDB. Clinically relevant drug-drug interactions databases; Information retrieval from Biological databases: Entrez system, TCGA data bases, Bioportal.
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Module II Sequence Analysis
Biological background for sequence analysis; Sequence alignment: Global, Local, Pairwise and Multiple sequence analysis; Algorithm for alignments; Scoring Matrices-Pam And Blosum
Gap Penalties, Filtering, Position Specific Scoring Matrices, Internet Resources Tools for Sequence alignment .

Module III Phylogenetic Analysis
Phylogenetic trees: Phylogenetic representations, Definition and description, various types of trees, Methods of phylogenetic analysis: Distance method (UPGMA, The Neighbour Joining, The Fitch/Margoliash method) and Character-based methods (Maximum Parsimony, Maximum Likelihood). Tree evaluation and Comparison of Phylogenetic Trees obtained using DNA seq. Vs. protein seq. Vs. Full genomes. Softwares for phylogenetic analysis

Module IV Insilico Structure prediction of protein and docking
Protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification databases- CATH and SCOP; structure prediction in proteins-Secondary and Tertiary structure prediction. Structure Visualization tools -RASMOL, PyMoL SWISS-PDB Viewer. Docking of Molecules- Types of Docking and softwares.

Module V EST- Gene Prediction
ESTs – construction, databases, Basics of clustering, application of ESTs, Gene Prediction and Functional classification. Genome Anatomy, Genome Comparison, Genome Analysis, Gene Expression Analysis and databases for profile data. Basics of NGS and its platforms.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Sensen, C.W. (2002). Essentials of Genomics and Bioinformatics, John Wiley and Sons.
- Mount, D.W. (2004). Bioinformatics: Sequence and Genome Analysis. 2nd Ed., Cold Spring Harbor Laboratory Press.
- Baxevanis, A.D. and Ouellette, B.F.F (2009). Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley – Interscience
- Harshawardhan P. Bal, Bioinformatics Principles and Applications, Tata McGraw-Hill Publishing Company Ltd.
- Bioinformatics Basics: Applications in Biological Science and Medicine- Hooman Rashidi, Lukas K. Buehler

References:

- Gusfield, D. (1997). Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, Cambridge University Press
- Heijne, G. Von and Heijne, G. Von (1987). Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by Academic Press.
- Pevzner, P.A. (2000). Computational Molecular Biology: An Algorithmic Approach by MIT Press
- Doolittle, R.F., Abelson, J.N, & Simon, M.I. (1996). Computer Methods for Macromolecular Sequence Analysis, Academic press
- Waterman, M. (1995). Introduction to Computational Biology: Maps, Sequences and Genomes, 1st Ed, Chapman and Hall.

Course Name	Course Code	L:T:P	Credit	Semester
CELLULAR AND MOLECULAR BIOTECHNOLOGY	**MTB104**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the organization of biomembranes, membrane trafficking, cell signaling molecules, and signal transduction pathways
CLO 2	Describe different stages of cell division and cell cycle check points
CLO 3	Describe DNA replication, recombination, repair, and mutations
CLO 4	Apply the knowledge of gene expression in biotechnology

B. SYLLABUS

Module I

Membrane transport/Cell Cycle - Mechanisms for transport of small molecules across the membrane, including simple diffusion, facilitative diffusion, primary and secondary active transport, action of ionophores. Cell cycle and the events associated with each stage, control of the cell cycle and the proteins involved; know the role of the cyclins and cyclin-dependent kinases, cell cycle checkpoints, methods for synchronizing the cell cycle in cell populations.

Module II

Intracellular Signaling I - define growth, growth factor, growth factor receptor, mitogen, receptor, effector, second messenger, action of hormones and other biologically active agents that act via receptors in the nucleus and/or cytoplasm. Intracellular Signaling II - the intracellular signaling cascades triggered by hormone binding to these receptor, G proteins signalling, the action of Ca 2+ and diacylglycerol as second messengers.

Module III

Replication of DNA, Role of DNA polymerases & proteins involved in DNA replication, Compare and contrast eukaryote and prokaryote DNA replication, telomeres, telomerase and altered telomerase function in aging and disease.

Recombination & Repair: Mutations and types of site mutations: substitution, transition, transversion, insertion, deletion, tautomer, frameshift and nonsense mutation. Repair mechanisms: dimer repair, excision repair, mismatch repair, trans-lesion repair, and recombinational repair.

Module IV

Transcription - RNA transcription and the proteins required for each step, maturation of the RNA transcript derived from a eukaryotic gene, structure of prokaryote and eukaryote promoter and the function of promoter sequences, inhibitors of prokaryote and eukaryote transcription and their mechanisms of action. Concept of operon, inducer, operator and polycistronic transcript, expression of the lac operon and trp operon in *E. coli*, catabolite repression, leader peptide and attenuator site, enhancer and transcription factors, four common DNA-binding motifs found in transcription factors, mRNA stability and alternative splicing in gene expression

Translation-Genetic code and the concept of colinearity of the gene and protein, components required for translation, basic steps involved in initiation, elongation, and termination of protein translation, inhibitors of protein translation. Compare and contrast the spatial and temporal differences in prokaryotic and eukaryotic transcription and translation

Module V

TAIR and EMBL and their role in bioinformatics analysis of the gene function. Changing landscapes of sequencing technologies (Sanger, Next Generation Sequencing [NGS], and Third-Generation Sequencing (also known as long-read sequencing) for whole genome sequencing of microbes, plants, and animals. Different techniques (DNA Microarrays, RNA Seq, Northern analysis, the GUS reporter system (β-glucuronidase), and quantitative real time PCR [qRT-PCR]) used for detecting and quantifying the expression of the genes (transcripts levels) in response to the growth and development and/or biotic and/or abiotic stresses, functional genomics by forward (Ethyl methane sulphonate [EMS] mutants) and reverse (T-DNA and RNAi-mediated gene silencing) genetic approaches, micro-RNA (miRNA) mediated post-transcriptional regulation of gene expression, post-translational modifications (SUMOylation, phosphorylation, glycosylation, ubiquitination, nitrosylation, and methylation), epistatic gene interactions, molecular basis of epigenetics, applications of the CRISPR-Cas9 system for DNA-free genome editing in plants and animals, and country-specific ethical and social concerns related to the use of Genetically Modified (GM) agronomically important crop species.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Albert, B. (2002). Molecular Biology of the Cell 4th Ed., Garland Science New York.
- Darnell, L. and Baltimore (2012). Molecular Biology, Mac Millan
- Watson et al., (2013). Molecular Biology of the gene, 7th Ed., Pearson.

References:

- Lewis, B. (2003). Genes VIII, Benjamin Cummings.
- Goodenough, U. W. (1984). Genetics 2nd Ed. Saunders (W.B.) Co Ltd.
- Swanson, C. P., Merz, T. & Young, W.J. (1981). Cytogenetics, Prentice Hall
- Berg, J. M., Tymoczco, J. L. & Stryer, L. (2002). Biochemistry, 3rd Ed. W.H. Freeman and Company, ,
- Brown, T.A. (1990). Genomes 2nd Ed. Oxford: Wiley-Liss,

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED BIOCHEMISTRY AND METABOLIC REGULATION -Lab	**MTB121**	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	aware of the metabolic pathways
CLO 2	able to identify and solve problems related to biochemical disorders
CLO 3	Able to understand cell metabolism and its applications in various sectors.
CLO 4	N/A

B. SYLLABUS

Module I: Proteins
Identification of protein by Biuret test, quantitation of protein by Bradford method, Separation of proteins by SDS-PAGE, Enzyme: Determination of serum alkaline phosphatase activity
Ammonium Sulfate precipitation, Dialysis of the purifed protein solution against 60% glycerol as a demonstrationof storage method, Afnity Chromatography

Module II: Nucleic Acid
Biochemical estimation of DNA, RNA. Separation of DNAsamples on Agarose gel.
Carbohydrate: Color reactions of different type of carbohydrates, Biochemical estimation of blood sugar
Lipids: Blood Cholesterol estimation.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED MICROBIAL BIOTECHNOLOGY –Lab	**MTB122**	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain general principals and scope of microbiology and diversity of microorganisms
CLO 2	Illustrate clear concepts on bacterial cell structure, function, genetics, growth and pathogenesis
CLO 3	Demonstrate critical analytical and lab skills in microbiology
CLO 4	Evaluate microorganisms for different biotechnological applications

B. SYLLABUS

Module 1: Basic Microbiological Techniques (Isolation, Identification and Enumeration of Microbes)

1. Basic and specialized media preparation & Pure culture techniques
2.Isolation, Characterization (Micro, Macro & Biochemical) & Enumeration of microorganisms from soil/air/water: Bacteria, Fungi and Actinomycetes.
3. Anaerobic culture techniques
4. Growth pattern analysis of Bacteria and fungi and Effect of various intrinsic & Extrinsic factors

Module 2: Advanced Microbial Biotechnological Techniques

5.**Agricultural Microbiology:** Isolation of nitrogen fixers (Rhizobium/Azotobacter), PGPR/ PSB/PSF
6. **Environmental Biotechnology:** Estimation of coliforms by MPN in water, Determination of BOD & COD of effluent
7. **Medical Microbiology:** Antibiotic Senstivity Testing, Identification of food pathogen
8. **Food Microbiology:** Microbiological QA Parameters, Preparation of Fermented food& Beverage (Sauerkraut/ Yogurt/Wine), Organic acid production (Citric acid) by Solid state/ submerged fermentation.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED BIOINFORMATICS –Lab	**MTB123**	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological datasets at various database and will understand the data attributes with information stored in it.
CLO 2	Create new projects by applying various tools to correct the existing data interpretation issues by applying computational methods.
CLO 3	Apply these data sources and software for investigation of novel biological problems
CLO 4	Develop new protocols and methods for biological discoveries.

B. SYLLABUS

Module I
Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein

Module II
Local and Global Alignment- concepts Pair wise sequence alignment, multiple sequence alignment Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm

Module III
Motif and pattern searching, Structure prediction, Protein structure classification resources, Structure superposition tools, Energy minimization and simulated annealing

Module IV
Phylogenetic prediction and analysis

Module V
Docking small molecules/peptides in active site of protein. Use of automated docking procedures. Free energy calculation.

Module VI
Finding transcription regulatory signals

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
CELLULAR AND MOLECULAR BIOTECHNOLOGY –Lab	**MTB124**	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge particularly in cell biology, and molecular biology.
CLO 2	Isolation of the DNA, chloroplast and chromoplast from the prokaryotic and eukaryotic cell system.
CLO 3	Critically and quantitatively analyze scientific data, either their own original data or the published data of others.
CLO 4	Define a specific hypothesis and design an experiment to test it.

B. SYLLABUS

1. Isolation of genomic DNA from prokaryotic and Eukaryotes
2. Isolation of plasmid.
3. Study of apoptosis by TUNEL method
4. Isolation of cell organelles by ultracentrifugation.
5. Study of in vitro transcription.
6. Study of DNA repair mechanism
7. Site-directed mutagenesis**.**
8. Sterile and element-contamination-free hydroponic system for the growth of model plant species for studying the stress-mediated spatio-temporal changes in the gene expression.
9. Quantitative real time PCR (qRT-PCR) for the analysis of gene expression.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
INSTRUMENTATION IN BIOTECHNOLOGY	**MTB130**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To demonstrate an understanding of the theory, proper operation, maintenance and applications of common analytical laboratory instruments, including equipment for centrifugation, electrophoresis, spectrophotometry, and chromatography.
CLO 2	To demonstrate qualitative and quantitative analytical skills with various instruments using common biotechnology laboratory protocols.
CLO 3	Students will develop critical thinking skills relevant to biotechnology by performing experiment and relevant data analysis, troubleshooting of experiments and equipment and become familiar with safe laboratory practices, able to identify unsafe conditions and taking corrective action, learning proper handling and disposal techniques for hazardous materials.
CLO 4	Students will begin to gain laboratory independence by cleaning and preparing items for the lab and preparing biological and/or chemical materials, as well as other items used in experiments.

B. SYLLABUS

Module I: Ultracentrifugation
Sedimentation equilibrium and sedimentation velocity methods, Analytical and Preparative centrifuges, application of density gradient and differential centrifugation.

Module II: Gel electrophoresis
Agarose and Polyacrylamide, Two-dimensional electrophoresis, Isoelectric focussing, Capillary electrophoresis, Pulse-field gel electrophoresis, Immunoelectrophoresis.

Module III
TLC gas chromatography, gel filtration, ion-exchange chromatography, affinity chromatography and HPLC, FPLC.

Module IV
UV and visible Spectroscopy, Spectrofluorimetry, Atomic absorption spectrophotometry, Mass Spectrometry, Infrared Spectroscopy, MALDITOF, Nuclear Magnetic Resonance and Electron Spin Resonance Spectroscopy, Magnetic Resonance Imaging. X -Ray diffraction.

Module V
Optical and Electron Microscopy, Transmission and Scanning Electron Microscopy, Tunneling Electron Microscopy, Polarization and Fluorescence microscopy.
Radio tracers, GM Counter, Proportional and Scintillation Counters, Autoradiography, Radio-immunoassay.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Wilson, K. & Walker, J. (2000). Practical Biochemistry, Principles & Techniques 5th Ed. Cambridge University Press.
- Friefelder, D. (1982). Physical Biochemistry: Applications to Biochemistry and Molecular Biology 2nd Ed. W. H. Freeman

References:

- Hoppert, M. (2005). Microscopic Techniques in Biotechnology, Wiley-Blackwell.
- Venn, R. F. (2002). Principles and Practice of Bioanalysis 1st Ed. Taylor and Francis, London.
- Van Impe, J.F.M., Vanrolleghem, P. A. & Iserentant, D. M. (1998). Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, Springer Science + Business media
- Glusker, J.P. & Trueblood, K.N. (1985).Crystal Structure Analysis: a primer by Oxford University Press.
- Rhodes, G. (1993).Crystallography Made Crystal Clear: A Guide for Users of Macromolecular Models, Academic Press Inc.
- Gunter, H. (1992).NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, Wiley India Pvt. Limited.
- Van Holde, K. E., Johnson, W. C. & Ho, P. S. (2006). Principles of Physical Biochemistry" by Prentice Hall

Course Name	Course Code	L:T:P	Credit	Semester
BIOSAFETY, BIOETHICS & IPR	**MTB131**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the matter that the particular subject matter comes in the ambit of copyright/patent or not and we can get the right into this regard or not.
CLO 2	Create his mind that what is innovation and what are the inventive step and industrial use of subject matter that could be patentable.
CLO 3	Apply for patent/copyright before the appropriate authority
CLO 4	Develop your knowledge regarding infringement of your right. Students will come to know that what the act is amount to infringement and what are the remedies available against such infringement.

B. SYLLABUS

Module-1:
Intellectual Property: Patents, Trademarks, Copyright, Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of GMOs,IPs of relevance to Biotechnology and Case Studies; Agreements and Treaties, Indian Patent Act 1970 & recent amendments.
Module-2:
Patents and Concept of Prior Art: Types of patent applications, Ordinary, PCT, Conventional, Divisional and Patent of Addition; Specifications: Provisional and complete; Forms and fees, Invention in context of "prior art".
Module-3:
Patent Filing Procedures: National & PCT filing procedure; Time frame and cost; Status of the patent applications filed; Precautions while patenting–disclosure/non-disclosure; Patent licensing and agreement Patent infringement.
Module-4:
Biosafety: Introduction to Biological Safety Cabinets; Biosafety Levels of Specific Microorganisms; Biosafety guidelines:Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, applications in food and agriculture; Environmental release of GMOs; Risk Analysis, Risk management and communication; National Regulations and relevant International Agreements,Cartegana Protocol.
Module-5:
Bioethics: Ethical implications of biotechnological products and techniques, Social and ethical implications of biological weapons.

Evaluation:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Books Recommended:
Text books:
1. Deepa Goel &Shomini Parashar IPR, Biosafety and Bioethics, Pearson Education India, (2013)
2. Anupam Singh Intellectual Property Rights and Bio-Technology Biosafety and Bioethics, Narendra Publishing House, (2012)
Reference books:
1. BAREACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., (2007)
2. Kankanala C., Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd., (2007)

Course Name	Course Code	L:T:P	Credit	Semester
INDUSTRIAL SAFETY AND HAZARDS	**MTB132**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate different types of hazards and prevention methods.
CLO 2	Create plant layout as per site selection based on safety measures and industrial hygiene.
CLO 3	Apply prevention methods to control occupational diseases.
CLO 4	Develop a framework for management according to philosophy and need for Industrial safety keeping in view of various applicable laws and suggest Government for implementation.

B. SYLLABUS

Module I: Hazards
Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II: Psychology and Hygiene
Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation. Industrial noise.

Module III: Occupational diseases and control
Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments. Safety in chemical operations and processes.

Module IV: Management
Safety organization – safety committee – safety education and training. Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety.

Module V: Laws
Factory Act. ESI Act, Environmental Act. Workment - comperation Act. Advantages of adopting safety laws.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Allocation. Van vostrand Reinhold Company, New York.
- Anonymous (1972). Guide for Safety in the Chemical Laboratory , 2nd Ed., Van Nostrand Reinhold Co., Litton Educational Publishing, Inc., New York
- Fawcett, H.H. & Wood, W.S. (1982). Safety and Accident Prevention in Chemical Operation, 2nd Ed. John Wiley and sons, New York.

References:

- Industrial Safety and Laws by Indian School of Labour Education, Madras.

Course Name	Course Code	L:T:P	Credit	Semester
Communication Skills -I	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel of formal communication.
CLO 4	Develop and empower self with the power of Words.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Self introduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioural Science I (Self Development and Interpersonal Skills)	**BSS111**	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO 2	Manage your emotions and feelings more effectively to have the impact that you need
CLO 3	Develop the way that you regulate and control your emotions
CLO 4	Learn about your behavioral preferences to become more self-awareness
CLO 5	Develop and build your emotional intelligence.

B. SYLLABUS

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behavior
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A

Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

Course Name	Course Code	L:T:P	Credit	Semester
FRENCH – I	FLT 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN – I	FLG 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Course Contents:
Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to<**
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book:First 10 LessonsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977
References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – I	FLS 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:

Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – I	FLC 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-I	**AND001**	0:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
ENZYMOLOGY AND PROTEIN ENGINEERING	**MTB201**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand various aspects of protein structure and engineering including rational design and directed evolution.
CLO 2	Identify key experimental processes required for engineering a protein, and knowledge of how to apply them to solve specific biochemical problems.
CLO 3	Investigate and explain heterologous expression of proteins and also techniques for protein design.
CLO 4	Describe the various screening techniques used for selection and/or screening of novel protein variants with improved properties.

B. SYLLABUS

Module I: Enzymes
Introduction, Nomenclature, Mechanism of Catalysis, Catalysis in organic media, Enzyme regulation, Allosteric enzymes

Module II : Enzyme Kinetics
Enzyme kinetics, Thermodynamics of enzyme reactions, Enzyme inhibition. Multisubstrate reaction

Module III: Immobilization
Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects

Module IV: Protein Engineering
Protein engineering of enzyme : Rational and directed evolution , Mutational effect on engineered proteins, Engineered proteins; Structure function design for protein design

Module V:
Enzyme expression systems
Protein expression in bacterial, mammalian, insect systems. Biotransformations, Concept of bioreactors
Biotechnological applications of enzymes
Enzyme utilization in industry, Ribozymes, Abzymes, Inteins, Cold adapted enzymes.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Enzymology T. Devasena (2010) Oxford publications
- Protein Engineering: Principles and Practice 1st Edition Jeffrey L. Cleland and Charles S. Craik
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- **Protein Engineering: Technology and Application** (2013) Tomohisa Ogawa InTech Open
- Protein Engineering and Design Sheldon J. Park, Jennifer R. Cochran 2009 CRC Press

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Enzyme Kinetics: Behavior and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc

Course Name	Course Code	L:T:P	Credit	Semester
BIOPROCESS AND FERMENTATION TECHNOLOGY	**MTB202**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Function at a technically competent level in Biotechnology industries
CLO 2	Design and develop biological processes and products required to become an entrepreneur
CLO 3	Critically analyse lacunae in bioprocesses and solve problems of bioprocesses in industry
CLO 4	N/A

B. SYLLABUS

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Media formulation sterilization, thermal death kinetics, batch and continuous sterilization system. Sterilization of Industrial Media, Air and Fermenter

Module II

Transport phenomena in bioprocess – Mass transfer, mass transfer co-efficient for gases and liquids. Rate of oxygen transfer. Determination of oxygen transfer coefficient. Rheological properties of intermedium. Biological heat transfer, Heat transfer coefficients.

Bioprocess control and monitoring variables such as temperature, agitation, pressure etc.

Module III

Kinetics of microbial growth, substrate utilization and product formation Batch, Fed-batch, CSTR types of reactors – CSTR, tower, airlift, bubble column, packed bed, immobilized cells, Control and monitoring, online and off-line control, Computers in bioprocess control systems.

Module IV

Industrial production of enzymes: cellulase, amylase, protease; organic acids: citric acid, acetic acid, lactic acid; ethanol, biomass, antibiotics: classification, penicillins, tetracyclins, chloramphenicol; vitamins: B_{12}, riboflavin, fermented dairy products.

Ethanol: Production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. po wer alcohol – definition, uses, merits and demerits of various technologies for its production.

Antibiotics: Classification, penicillin, tetracycline, streptomycin, cephalosporin. Various penicillin as precursor and 'R' – side chain, penicillianase, 6-APA, pencillin production, harvest and recovery, uses of various forms etc.

Streptomycin: Chemical structure, production, harvest and recovery, uses by-product of streptomycin fermentation etc.

Module V Biomass: Bakers and distillers yeast production using various raw materials, "bio" factors for growth, Crabtree effect, harvesting, different forms and uses.

What are mushroom, different forms of common mushroom production from agro based raw materials and uses.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

***Text*:**

- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers

***References*:**

- Biochemical Engineering, Bailley and Ollis.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED IMMUNOTECHNOLOGY	**MTB203**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate whole range of areas targeted towards bringing about solutions to various diseases that increase human morbidity and mortality.
CLO 2	Create Explain, debate and demonstrate to lay audiences the application of immune techniques to solve the problems of society.
CLO 3	Prevent human diseases, diagnose them early and also find solutions (therapeutic) that can manage the medical problem
CLO 4	Develop strategies of immunological diseases and control measure of human and animal health

B. SYLLABUS

Module I: Introduction
Concept of immunity- Innate and acquired, Active and Passive immunity, Cell mediated and Humoral immunity, Primary and secondary immune response, Clonal nature of Immune Response.

Module II:
Immune system: Central and peripheral immune system
Primary lymphoid organs: Thymus and Bone marrow, T and B cell development
Secondary lymphoid organs: Spleen, lymphnode and MALT
Ectopic lymphoid tissues
Hematopoiesis, Cells of the immune system- Eosinophils, Neutrophils, Basophils, B and T-lymphocytes, macrophages, Null cells, dendritic cells, Mast cells.
Receptors: BCR and TCR, Fc receptor

Module III:
Nature and biology of Antigen: Immunogen vs. Antigen, factors affecting immunogenicity, Hapten and carriers, Adjuvants, Super antigens
Antibody structure in relation to function and antigen-binding; Types of antibodies and their structures: isotypes, allotypes, idiotypes. Monoclonal antibodies: production and applications, Generation of antibody diversity,

Module IV
MHC: Structure of MHC class I, II & III, exogenous and endogenous antigen presentation by MHC, MHC restriction, Self-tolerance in relation to MHC.
Autoimmunity and autoimmune diseases, Role of MHC in autoimmune diseases
Transplantation immunology, immunosuppressive therapy, tissue typing, immunologically privileged sites.

Module V
Complement system
Vaccines
Tumor immunology
Concept of inflammation and hypersensitivity
Antigen - antibody interaction based diagnostics: agglutination and precipitation, ELISA, RIA, IFA

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:
Text:

Owen J., Punt J., and Stranford Sharon (2013): Kuby's Immunology, 7th Edition, Macmillan higher education, New York. ISBN-13: 978-1-4292-1919-8.
Delves P., Martin S., Burton D. and Roitt I.(2006): Roitt's Essential Immunology, 11th Edition, Blackwell Publishers, Oxford.
References:
•. Abbas AK, Lichtman AH, Pillai S (2010) Celllular and Molecular Immunology,6th Edition, Saunders Elsevier, ISBN:978-0-8089-2411-1

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCE BIOSTATISTICS AND SCIENTIFIC WRITING	**MTB204**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Research methodology and scientific writing in biotechnology, nanotechnology and environmental sciences.
CLO 2	Understanding the basics of research methodologies for carrying out research work
CLO 3	Understanding of the components of scientific writing of the research and review papers
CLO 4	Understanding of the relevant selection of the journals for communication of the manuscripts

B. SYLLABUS

UNIT-I

Research Formulation - Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem - Literature review - Primary and secondary sources - reviews, treatise, monographs-patents - web as a source - searching the web - Critical literature review - Identifying gap areas from literature review - Development of working hypothesis.

UNIT-II

Research design and methods - Research design - Basic Principles- Need of research design - Features of good design - Important concepts relating to research design - Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan - Exploration, Description, Diagnosis, Experimentation. Determining experimental and sample designs.

UNIT-III

Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection - Sampling Methods, Sampling Errors - Data Processing and Analysis strategies - Hypothesis-testing - Generalization and Interpretation.

UNIT-IV

Quantitative Methods: Data presentation, statistical analysis and interpretation of data, types of analysis, simple regression analysis, correlation, coefficient of determination, (r2), z-test, t-test, ANOVA, Chi.square test, multi-variate analysis of data, multiple regression. Computer Application : Role of computer in research, data organization, software selection and its applications, solving problems by using scientific software and tools, sample programmes for analysis of data.

UNIT-V

Reporting and scientific writing: Structure and components of scientific reports, types of report, research paper report, review paper report, technical reports and thesis. Thesis writing - different steps and software tools (LaTeX.) in the design and preparation of thesis, layout, structure (chapter plan) and language of typical reports, Illustrations and tables, bibliography, ,referencing and footnotes. Oral presentation - planning, software tools, creating and making effective presentation, use of visual aids, importance of effective communication. Selection of scientific journal based on indexing with Web of Science, Scopus etc., communication of manuscript with journals, revision in manuscripts.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- C. R. Kothari, Research Methodology: Methods & Techniques, Wishwa Publication
- . D K Bhattacharyya, Research Methodology, Excel Books
- Loraine Blaxter, Christina Hughes, Molcolm Tight, How to Research, Viva Books Pvt. Ltd.
- Research papers / web articles in the field of research methodology.

References:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee .Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S. Chand & Co.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED MEDICAL BIOTECHNOLOGY	**MTB205**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop the theoretical and empirical concepts of disease diagnosis for a successful career in Biotechnology and allied industries.
CLO 2	Demonstrate the principles and applications of diseases therapy to solve the problems of society
CLO 3	Apply the concepts & techniques for the identification of diseases and associated risks and make progress efficiently towards solutions for real world problems
CLO 4	Develop the research skills in preparation for a career in the biosciences industry or academic research from Biotechnology and thereby produce recommendations for sustainable development

B. SYLLABUS

Module I

Diagnostic tools and Procedures: Immunological Approaches to Detect Protein Biomarkers of Disease; DNA-Based Approaches to Disease Diagnosis, Detecting RNA Signatures of Disease; Cell culture diagnostics-based approach; Biochemical investigation in disease conditions. Radio-imaging techniques – EEG, Xray, Ultrasonography, CT scan, Electromyography, Magnetic resonance imaging.

Module II

Biochemical test: Clinical significance of biochemical tests and their role in the diagnosis and monitoring of disease, Clinical characteristic of disease. Different biochemical test using protein and enzyme markers and their interpretation. Kidney Function test: Glomerular Filtration Tests , Serum Creatinine (S-Crea) and Derived Calculations, Serum Cystatin C, Creatinine Clearance, Tubule Function Test , Biochemical Tests for Liver Diseases: Tests of hepatocyte integrity Tests of bile duct system and the canalicular pole of hepatocytes, Tests measuring protein synthesis by the liver, Analytes measuring the transport and excretory capacity of the liver, Tests measuring to the metabolize endogenous and xenogenous Substances, blood sugar test, hormone assay, Newborn Screening etc. Biochemical tests on different bacteria different biochemical compounds.

Module -III

Source of infection: Identification of disease agents, Mode of spread of infections- Skin, wound & burn, alimentary tract, blood infection, laboratory infection, nosocomial infections, infections in immune-compromised patients etc., Epidemiology-epidemics, pandemics and endemics disease. Control measure of microbial diseases-public health control methods. Hygiene regulations, population screening for disease.

Module IV

Clinically important Pathogens -Mode & Mechanism of Infection, diagnosis, treatment & Prevention of Viruses -Influenza virus and Corona viruses; Hepatitis viruses- A, B, C and E, gastroenteritis virus -Rotavirus, Adenovirus, Acute encephalitis viruses- Dengue, Japanese Encephalitis Virus, Herpes Virus and Chikungunya. Clinically important bacteria- Staphylococci, Streptococci, Pneumococcus, and Mycobacteria; Clinically important fungal infection- Aspergillosis, Mucormycosis (Black fungus) and Candidiosis etc. Clinically important Protozoan's and Helminthes infections- Amebiasis, Malaria & cysticercosis.

Module V

Disease and therapy Disease: Types, Causes, Symptoms, diagnosis and treatment of genetic Diseases, Diabetes, Cardiovascular disease, Cancer, Neurogenetic disorders, Liver diseases and Chronic respiratory diseases. Treatment products from recombinant and non-recombinant organisms, Interferons, Antisense therapy, Gene therapy, Types of gene therapy and Immunotherapy; Modes of action of major groups of antimicrobial agents.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text:

- Marshall, W J, Clinical Chemistry, 3rd edition, Mosby, 1997.
- Harper's Biochemistry K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw Hill/ Appleton and Lange

***References*:**

- Sudbery, P. Human molecular genetics. Addison Wesley Longman (1998)
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Principles of Physical Biochemistry, K.E. Van Holde, W.C. Johnson, Prentice Hall

Course Name	Course Code	L:T:P	Credit	Semester
ENZYMOLOGY AND PROTEIN ENGINEERING -Lab	**MTB221**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop practically skills to apply various methods used for protein structure prediction
CLO 2	Investigate key experimental processes required to evaluate protein solubility, precipitation and protein degradation.
CLO 3	Demonstrate different software used for structure visualization of protein.
CLO 4	Understand and observe the expression and purification of proteins

B. SYLLABUS

1. Purification of Enzyme by ammonium sulphate fractionation.
2. Effect of Temperature and pH on enzyme activity.
3. Plot of enzyme kinetic graphs
4. Enzyme immobilization
5. Cloning and expression of protein
6. Effect of mutation on protein: In silico studies

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Course Name	Course Code	L:T:P	Credit	Semester
BIOPROCESS AND FERMENTATION TECHNOLOGY –Lab	**MTB222**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to various culture methods
CLO 2	Process operation and control and monitoring of bioprocess at lab scale
CLO 3	Calculation of growth rates,yields,Death kinetics etc.
CLO 4	N/A

B. SYLLABUS

Module I
Isolation of industrially important micro organisms for microbial processes.

Module II
Determination of Thermal Death Point and Thermal death time of micro organisms for design of a sterilizer

Module III
Determination of growth curve of a supplied micro organism and also determine substrate degradation profile and to compute specific growth rate and growth yield from the data obtained.

Module IV
Comparative studies of ethanol production using different substrates.

Module V
Production of single cell protein

Module VI
Production and estimation of alkaline protease

Module VII
Sauer Kraut fermentation

Module VIII
Use of alginate for cell immobilization

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED IMMUNOTECHNOLOGY -Lab	**MTB223**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the fundamentals of Immunology
CLO 2	Demonstrate awareness about principles of immune function
CLO 3	Express knowledge of antigen antibody interactions and the use of these interactions in disease diagnosis
CLO 4	Explain immunization

B. SYLLABUS

Module I
Blood film preparation and identification of cells, Differenial leucocyte count, Total leucocyte count, preparation of serum and plasma.

Module II
Lymphoid organs and their location in mice

Module III
Ouchterlony Double diffusion Test, Immunoelectrophoresis, ELISA:- DOT or SANDWICH

Module IV
Purification of IgG through affinity chromatography

Module V
Agglutination based tests: WIDAL Test, Identification of blood group

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ENVIRONMENTAL BIOTECHNOLOGY	**MTB230**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge about environment issues due to municipal and hazardous industrial waste and discuss methods of waste treatment.
CLO 2	Gain a detailed understanding of different clean energy resources and biofuels for sustainable environment and use of microbes for application in bioremediation of environment
CLO 3	Discuss about cleaner agricultural practices and concept of biofertilizers and biopesticides
CLO 4	Explain about toxic effects of environmental pollutants and discuss about statutory requirements/legislations for good environment management and their compliance

B. SYLLABUS

Module I

Treatment of municipal wastes and industrial effluents (Physico-Chemical, biological analysis of waste water), Rr. Sec and test waste water treatment sludge treatment and disposal treatment of wastes from paper, textile, dairy, petrochemical and pharmaceutical industry .

Module II

Bioremediation and phytoremediation of toxic compounds like pesticides, hydrocarbons, polymers, surfactants, biotransformation and bioaccumulation

Module III

Renewable and non-renewable energy resources, clean fuel technology, biofuels.

Module IV

Biofertilizers and biopesticides – a cleaner agricultural practice, concept of N_2 - fixation, azolla, cyanobacteria, Rhizobium and VAM as biofertilizers.

Module V

Biomining – microbe assisted microbial leaching, bioaccumulation and bio sorption
Biosensors and biomarkers for ecotoxicity measurement, EIA and Environmental audit.
Principles in ecotoxicology; animal toxicity tests; statistical concepts of LD_{50}; dose-effect and dose response relationship; frequency response and cumulative response; Biological and chemical factors and influence toxicity; global dispersion of toxic substance; dispersion and circulating mechanisms of pollutants; Aquatic toxicity testes; statistical tests; response of planktons to toxicants; EC_{50};

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

***Text*:**

- Environmental Biotechnology – Concepts and Applications, Hans-Joachim Jordening and Jesef Winter
- Introduction to Environmental Biotechnology, Milton Wainwright

***References*:**

- Waste Water Engineering, Metcalf and Eddy. Publisher: Tata McGraw hill
- Agricultural Biotechnology, S.S. Purohit
- Environmental Microbiology: Methods and Protocols, Alicia L. Ragout De Spencer, Jonh F.T. Spencer Principles of Environmental Engineering, Gilbert Masters

Course Name	Course Code	L:T:P	Credit	Semester

ENTREPRENEURSHIP DEVELOPMENT IN BIOTECHNOLOGY	**MTB231**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the principles and functions of management
CLO 2	Understand types of organizations, staff appraisal, training and development process
CLO 3	Understand the entrepreneurial process ,preparation of business plan
CLO 4	Understand the entrepreneurial motivation, traits and development

B. SYLLABUS

Module-I

BIO ENTERPREUNERSHIP: Introduction to bio-business, from the Indian context, SWOT analysis of bio-business. Entrepreneur, Creativity & Entrepreneurial personality and Entrepreneurship in Biotechnology, pillars of bio-entrepreneurship and major start-ups in Biotechnology, Concept and theories of Entrepreneurship, Entrepreneurial traits and motivation, Nature and importance of Entrepreneurs, Government schemes for commercialization of technology (eg. Biotech Consortium India Limited).

Module-II

PROJECT MANAGEMENT: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal.

Module-III

BIOTECH ENTERPRISES: Desirables in start-up, Setting up Small, Medium & Large scale industry, Quality control in Biotech industries, Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.

Module-IV

BUSINESS DEVELOPMENT IN BIOTECHNOLOGY: Factors affecting biotech business: (finance, infrastructure, equipment, manpower, resources, project location, end product, quality issues, etc) Basic principles and practices of management – Definition, concepts and application; Organization types, coordination, control and decision making in management

Module-V

ENTREPRENEURSHIP OPPORTUNITY IN INDUSTRIAL BIOTECHNOLOGY: Business opportunity, Essential requirement, marketing strategies, schemes, challenges and scope-with case study- Pollution monitoring and Bioremediation for Industrial pollutants, Pesticides, Herbicides etc. Integrated compost production- microbe enriched compost. Bio pesticide/insecticide production. Fermented products-probiotic and prebiotics. Stem cell production, stem cell bank, contract research. Production of monoclonal/polyclonal antibodies, Single cell protein and secondary metabolite production. Contact research in microbial genomics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggested Book:

1. Dynamics of Entrepreneurial Development and Management by Vasant Desai, Himalaya Publishing House, 2005.
2. Science Business: The Promise, the Reality, and the Future of Biotech by Gary P. Pisano Harvard Business School Press: 2006.
3. Innovation and entrepreneurship in biotechnology: Concepts, theories & cases by D. Hyne & John Kapeleris, 2006
4. Principles of Management P. C.Tripathi, P.N. Reddy Tata McGraw Hill Fifth Edition, 2012
5. Bio Entrepreneurship development-A resource book by BCIL, Govt of India 2018.

Course Name	Course Code	L:T:P	Credit	Semester
PHARMACEUTICAL TECHNOLOGY and BIOTECHNOLOGY	**MTB232**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Pharmaceutical technology and biotechnology in the development and validation of different pharmaceutical dosage forms
CLO 2	Understanding of Pharmaceutical Dosage Forms & New Drug Delivery Systems
CLO 3	Understanding of Biotechnology based Pharmaceutical products.
CLO 4	Understanding of pharmaceutical industrial process.

B. SYLLABUS

Pharmaceutical Technology:

Module –I:
Introduction to Physical Pharmaceutics – Metrology, Calculations and Posology.
Pharmacopoeias & Formularies: IP,BP,USP
Packaging of Pharmaceuticals: Polymer Science and Applications, Formulations and Development, Packaging
Particulate Technology: Particle Size, Size reduction, Size Separation, Powder Flow and Compaction
Unit Operations: Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, Sterilization, and Drying
Module-II
Pharmaceutical Dosage Forms & New Drug Delivery Systems:
Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. Various route of drug administration.
Drug delivery systems: transdermal, parenteral, oral, mucosal, ocular, buccal, rectal and pulmonary delivery. Novel formulation approaches for better delivery of biotechnology derived drugs, such as reverse micelles, liposomes, microemulsions and microencapsulation.
Pharmaceutical Biotechnology:
Module III
Immunity & Immunological preparations.
Introduction about Immunity, Types of Immunity, Immunological preparations, Classification of Immunological preparations, Bacterial & Viral Vaccinces, Method of preparation using animals, Alternative method using eggs, Diagnostic preparations containing bacterial toxins, Preparation containing antibodies used to produce passive immunity.
Blood & blood Products:
Module-IV
Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, fibrin foam, plasma substitutes: ideal requirements, PVP, dextran.
Module-V
Pharmaceutical Biotechnology based drug Products:
Introduction, Method of Preparation and Use of :Activase, Humulin,Streptokinase Humatrope, Hepatitis B vaccine.
Introduction, Method of Preparation and Use of : Penicillins, streptomycins, tetracyclines, vitamin B12 & ethanol.

Evaluation:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

1. Daan J. A. Crommelin and Robert D. Sindelar, (2014). Pharmaceutical Biotechnology, 3rd Ed. Informa Healthcare USA, Inc.
2. Chandrakant Kokate, Pramod H.J and S.S. Jalalpure, (2012). Textbook of Pharmaceutical Biotechnology, Elsevier Health Sciences.
3. Vyas S.P and Dixit V.K. (2007) Pharmaceutical Biotechnology 1stEd.CBS Publishers & Distributors.

Course Name	Course Code	L:T:P	Credit	Semester
COMMUNICATION SKILLS – II	BCS 211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Recognize the mannerisms and methodology of Interview.
CLO 4	N/A

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioural Science – II (Behavioral Communication and Relationship Management)	BSS211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO 2	Identify the effects of behaviour on interpersonal communication
CLO 3	Demonstrate a range of effective interpersonal communication skills
CLO 4	Use assertiveness and interpersonal skills in the workplace team
CLO 5	Utilise effective communication skills to build strong relationships
CLO 6	Develop, implement and promote effective communication techniques

B. SYLLABUS

Module I: Behavioral Communication
Scope of Behavioral Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioral Communication in relationship management
Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts
Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate
Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication
Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

Course Name	Course Code	L:T:P	Credit	Semester
FRENCH - II	FLT 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN – II	FLG 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Content:
Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977
References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – II	FLS 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:
Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:
Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – II	FLC 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-II	**AND002**	0:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

7. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
8. The group member shall write his/her name at the end of the blog.
9. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
10. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
11. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
12. For the topic chosen by the group, students are recommended to cover the following points:
    g) Current scenario (Regional, national and international level as applicable)
    h) Future predictions
    i) Duty of the government
    j) Government policies (related to the topic), if any
    k) Duty of public
    l) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

4. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
5. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
6. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
BIOPROCESS PLANT DESIGN	**MTB 301**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the application of chemical engineering principles
CLO 2	To understand the unit operation to bioprocess system
CLO 3	To understand the principles of disciplines of mechanical, electrical and industrial engineering to design a completely economically optimal process using living or subcomponent of cells
CLO 4	N/A

B. SYLLABUS

Module I
Introduction; General design information; Mass and energy balance; Flow sheeting; Piping and instrumentation.

Module II
Materials of construction for bioprocess plants; Mechanical design of process equipment; Vessels for biotechnology application.

Module III
Design of bioreactors; Design considerations for maintaining sterility of process streams processing equipment; Selection and specification of equipment for handling fluids and solids; Selection, specification design of heat and mass transfer equipment used in bioprocess industries

Module IV
Design of facilities for cleaning of process equipment used in biochemical industries; Utilities for biotechnology
production plants; Process economics

Module V
Bioprocess validation; Safety Considerations; Case studies.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:
- Process Plan Layout and Piping Design, E. Bausbacher, R. Hunt, Prentice Hall PTR.
- Chemical Engineering, R.K. Sinnott, J.M. Coulson and J.F. Richardsons, Butterworth- Heinemann.
- Applied Process design for Chemical and Petrochemical Plants, E. E. Ludwig, Butterworth- Heinemann.

References:
- Chemical Engineers Handbook, R.H. Perry and D.W. Green, McGraw- Hill.
- Plant Design and Economics for Chemical Engineers, M. Peters and K. Timmerhaus.

Course Name	Course Code	L:T:P	Credit	Semester
DOWNSTREAM PROCESSING	**MTB 302**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the basic techniques of downstream processing.
CLO 2	Demonstrate awareness about Filtration, Dialysis, Electrophoresis, crystallization & drying
CLO 3	Express knowledge of Chromatographic techniques of bioseparations
CLO 4	Analyze and design the necessary steps for downstream processing of bioproducts

B. SYLLABUS

Module I
Characteristics of Bioproducts, Conditioning of broth, Mechanical separation, Filtration, Centrifugation, Cell disruption techniques, Protein precipitation and separation.

Module II
Aqueous - two-phase extraction; Adsorption-desorption processes; Membrane based separation: Dialysis, Electro dialysis, Micro filtration, Ultra filtration.

Module III
Chromatographic methods of separation based on size, charge, reverse phase, hydrophobic interactions, and biological affinity, HPLC, FPLC, MS-LC, Gas chromatography.

Module IV
Electrophoresis, principle, types on the basis of support media, 1D, 2D gel electrophoresis, continuous and capillary electrophoresis.

Module V
Crystallization, Drying, Case studies.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Bioseparations: Downstream Processing for Biotechnology, P.A. Belter et al, John Wiley and Sons Inc.

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Bioseparations: Principles and Techniques, Sivasankar, Prentice-Hall
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Biotreatment, Downstream Processing and Modelling (Advances in Biochemical Engineering/ Biotechnology, Vol 56), T. Scheper et al, Springer Verlag
- Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher
- Downstream Processing, J.P. Hamel, J.B. Hunter and S.K. Sikdar, American Chemical Society
- Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society

Course Name	Course Code	L:T:P	Credit	Semester
NANOBIOTECHNOLOGY	**MTB 303**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand different nanostructured materials.
CLO 2	Understand the working principle of the instruments used in characterizing the nanomaterials.
CLO 3	Understand the applications and societal implications of nanomaterials.
CLO 4	N/A

B. SYLLABUS

Module I: Introduction to Nanotechnology

Overview of nanotechnology developments, different nanostructured materials,variousrules governing the health and safety standards related to the use of chemicals and nanomaterials, the physical environment required for working with nanomaterials.

Module II: Investigation and manipulation of nanomaterials

Construction, working principal and applications of electron microscopies, scanning probe microscopies, optical microscopies, Fourier transform infrared spectroscopy,X-ray photoelectron spectroscopy andX-ray diffractionfor nanosciences and technology.

Module III: Nanostructures for medicinal applications

Overview of nanobiotechnology and nanomedicine with future perspectives. Biological barriers to nanocarrier-mediated delivery of therapeutic and imaging agents, nanoparticle contrast agents for molecular magnetic resonance imaging, micro- and nanoscale control of cellular environment for tissue engineering. Nanotechnology in cancer.

Module IV: Societal implications of Nanoscience

From the first industrial revolution to the nano revolution, implications of Nanoscience and nanotechnology on Society, Nano policies, Nano arms race, public perception and public involvement in the nano discourse, Harnessing nanotechnology for economic and social development.

Module V:Nanomaterials and Toxicity

Toxicity – nanoparticles in the environment – Health threats- nanomaterials and biotoxicity –Iron oxide – Titanium dioxide-dark studies –UV irradiation- In vivo - In Vitro and cytotoxicity studies.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Books:

- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiley 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christof M. Niemeyer, Wiley 2007, ISBN: 978-3-527-31673-1.
- Nano: The essentials - Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7 / 0071548297.

Course Name	Course Code	L:T:P	Credit	Semester
RECOMBINANT DNA TECHNOLOGY	**MTB 304**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand various aspects of recombinant DNA Technology and its applications.
CLO 2	Identify key experimental processes required for gene cloning, expression and purification of recombinant proteins.
CLO 3	Investigate and explain different vectors and enzymes required in genetic engineering
CLO 4	Understand various sequencing methods available for gene sequencing.

B. SYLLABUS

Module I

Basic tools, specialized enzymes and specialized cloning vectors (e.g. Antarctic Phosphatase), Specialized cloning vectors (e.g. TOPO, TA, Gateway)

Module II: Gene isolation

Expression libraries and their screening, Techniques for analysis of genomic libraries (e.g. 3' RACE, 5' RACE, chromosome walking, chromosome jumping), T-DNA and transposon mediated gene traps

Module III: Heterologous gene expression (bacteria and yeast)

Advances in engineering of genes (codon optimization, translational enhancers, mRNA stabilizing factors), vectors (targeting signals, selection markers, purification and solubility tags) and hosts for overexpression and analysis

Module IV: Studying gene regulation and control

In-vitro transcription translation, run-on assays, protein-protein and protein-DNA interactions, promoter characterization, differential display. Manipulation of gene expression: Genome wide mutagenesis, gene silencing, RNAi, aptamers, constitutive and tissue specific promoters, expression enhancing elements, terminator technology

Module V:

Automation and robotic advances in RDT

DNA & protein isolation (alternatives to conventional methods) and sequencing (example from Human Genome Project and other sequencing projects), PCR machines, imaging and gel documentation

Laboratory, industrial and environmental applications of RDT

High throughput research, disease diagnosis and cure, forensics, DNA vaccines, drug discovery, maintaining genetic diversity, transgenic technology, marker-free GMOs

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Recombinant DNA by J.D. Watson et al., W.H. Freeman and Company
- Recombinant DNA Technology by T. A. Brown
- Principles of Gene Manipulation: An Introduction to Genetic Engineering by R.W. Old and S. B Primrose, Blackwell Science Inc

References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA by B.R. Grick and J.J. Pasternak, ASM Press
- Molecular and Cellular Cells Methods in Biology and Medicine by P.B. Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- "Milestones in Biotechnology: Classic Papers on Genetic Engineering" by J.A. Bavies and W.S.
- Reznikoff, Butterworth Heinemann.
- "Gene Expression Technology" by D.V. Goeddel in Methods in Methods in Enzymology, Academic
- Press Inc.
- "DNA Cloning: A Practical Approach" by D.M. Glover and B.D. Hames, IRL Press.

Course Name	Course Code	L:T:P	Credit	Semester
GENOMICS AND PROTEOMICS	**MTB 305**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhance understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of proteins
CLO 4	N/A

B. SYLLABUS

GENOMICS

Module I: Introduction to Genomics
Contents of genomes, Molecular markers, Bioinformatics for the analysis of sequence data.

Module II: Transcriptomes
Genome expression; RNA Contents,
Strategies for large-scale sequencing projects. The structure, function and evolution of the human genome. The
human genome project. Human disease genes.

PROTEOMICS

Module III: Introduction to proteomics
Protein structure**:** secondary structural elements, super-secondary structure, domains, mechanisms of protein folding, tertiary folds. Formation of oligomers. Protein solubility and interaction with solvents and solute. The activity of protein. Protein engineering principles.

Module IV
Fundamental methods used in proteomics, Relationship between protein structure and function. Post
translational protein modification. Protein - protein interaction.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:
- Genomes II, T.A. Brown
- Recombinant DNA (Second edition) , James D. Watson and Mark Zoller.

References:
- A primer of genome Science, Greg Gibson and Spencer V. Muse.
- Gene cloning and DNA analysis – An introduction (fourth edition), T.A. Brown.

Course Name	Course Code	L:T:P	Credit	Semester
DOWNSTREAM PROCESSING LAB	**MTB 322**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the basic techniques of downstream processing.
CLO 2	Demonstrate awareness about Filtration, Dialysis, Electrophoresis, crystallization & drying
CLO 3	Express knowledge of Chromatographic techniques of bioseparations
CLO 4	Analyze and design the necessary steps for downstream processing of bioproducts

B. SYLLABUS

Module I
Conventional filtration and membrane based filtration

Module II
Protein precipitation and recovery

Module III
Aqueous two-phase separation

Module IV
Ion exchange chromatography

Module V
Gel Permeation chromatography

Module VI
Electrophoresis

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
NANOBIOTECHNOLOGY LAB	**MTB 323**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will able to understand the physical laws active in the nano-range and as they differ from those in the micro-range.
CLO 2	Students will able to explain the principles and background to nanotechnology.
CLO 3	Students will come to understand the principles and characterization techniques.
CLO 4	Students can able to design he different type of nanoparticles, able to characterize with different techniques and used those nanoparticles in different biological applications.

B. SYLLABUS

1. Demonstration about occupational health and safety (OHS) or workplace health and safety (WHS) in nanotechnology.
2. Preparation of aqua regia, its handling and role in washing glass-wares for metal nanoparticles synthesis.
3. Surface plasmon resonance (SPR) properties of silver nanoparticles synthesised by plant extracts.
4. Optimization of temperature for metal nanoparticles preparation using biological molecules.
5. Investigation of UV-Vis spectroscopic feature of metal nanoparticles developed after temperature optimization.
6. Construction of bimetallic nanoparticles and their studies on their optical properties.
7. Interaction of nanoparticles with biological cells (Haemolysis or antimicrobial potential of metal nanoparticles).
8. Preparation of polymeric film for nanomedicine applications.
9. Functionalization of nanoparticles with drug or fluorescent molecules and confirmation of functionalization.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
RECOMBINANT DNA TECHNOLOGY LAB	**MTB 324**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop practically skills to apply various methods used for DNA isolation
CLO 2	Investigate key experimental processes required for gene cloning.
CLO 3	Demonstrate different methods of bacterial transformation.
CLO 4	Understand and observe the results of gene amplification and restriction digestion.

B. SYLLABUS

1. Preparation and Transformation of competent cells by $CaCl_2$ method.
2. Restriction digestion
3. Ligation
4. Southern hybridization
5. Western blotting
6. RFLP
7. PCR

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
GENOMICS AND PROTEOMICS LAB	**MTB 325**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhance understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of proteins.
CLO 4	N/A

B. SYLLABUS

1. Gene finding tools and Genome annotation
2. Comparison of two given genomes
3. Micro array and Micro array data analysis
4. Inference of protein function from structure
5. Two-hybrid methods

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED FOOD TECHNOLOGY	**MTB 330**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the role and scope of food technology in biotechnology
CLO 2	To understand the knowledge and skills in food chemistry, food microbiology
CLO 3	To understand the safety, quantitative skills in food technology
CLO 4	To understand the engineering and processing, marketing and consumer research in food technology

B. SYLLABUS

Module I
Processing and preservation technologies used in food industry: heating, drying, and baking, irradiation (infrared, microwave and radio frequency), concentration, freezing, chemical preservation, chilling, fermentation, a combination of those technologies.

Module II
Pre and post-harvest technologies for extension of storage life and better handling and transportation of fresh fruits and vegetables, to sustain freshness and reduce
spoilage.

Module III
Development of environment - friendly packaging materials based on product characteristic and performance
properties packaging materials, and finished package forms, process schedules for thermal processing of foods in cans, glass, tin-free steel and aluminum containers, and retortable pouches based on heat penetration studies and sterilization value.

Module IV
Starter culture, prebiotics, probiotics - their use as flavor enhancer and diseases/ infection combats, application
in production of cheese, butter, ice-cream, yoghurt, application in biomedical research, e.g. recombinant LABs as vaccine; modified milk proteins.

Module V
Production of SCP (Single cell protein), baker's yeast, brewing industry, application of transgenic plants in food production, transgenic fish, transgenic poultry.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:
- Food technology by Fraziar.
- Food Microbiology, 2nd edition by Adams and Moss.

References:
- Introduction to food Biotechnology. Green, Perry Johnson 2002. CRC Press, Boca Raton Florida.
- Food Biotechnology- Techniques and application. Gauri S. Mittal 1992. Technomic Publishing Co., Inc., Lancaster.

Course Name	Course Code	L:T:P	Credit	Semester
TISSUE ENGINEERING	**MTB 331**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the design and functional assessment of bioengineered tissue substitutes
CLO 2	To understand the Strategies for engineering tissues with a load-bearing function will be of particular focus
CLO 3	To understand the Strategies to study cell-surface and cell-cell interactions to physical stimuli
CLO 4	To understand the bioreactors, biological scaffolds and 3D cell-tissue constructs will be explored through recent papers

B. SYLLABUS

Module I: Fundamentals of tissue engineering
Basic definition, History, Concepts and overview, Principles and components, current scope of development; use in therapeutics and in vitro testing

Module II: Engineering materials
Scaffolds: Functions, Types (ECM-like Scaffolds, Tissue-Derived Scaffolds, Fibrin Gel, Natural Sponge; Injectable Scaffolds, Elastic Scaffolds, Inorganic Scaffolds Composite Scaffolds). Biomaterials: properties, cellular adhesion, surface modifications. Polymers (Natural such as Protein and Polysaccharides; Synthetic such as Poly(α-hydroxyacids, Hydrogels and Polyurethanes), Composite.

Module III: Cell Sources:
Fundamental properties of cells, autologous, allogeneic, syngeneic, and xenogeneic cells, and genetically engineered cells, Stem and progenitor cells. Cell Extraction, Biomolecules /synthetic ECM: Growth Factors (Representative Growth factors), Delivery of Growth factors

Module IV: Tissue Culture & Engineering Design Aspects
Biomechanics aspects of tissue engineering: application of physical forces, Principles of Scaffold Design – Material considerations, 2 D cell expansion, 3D Tissue Architecture and Function Transport considerations, Bioreactors, Cell seeding and metabolism considerations, Design of Polymeric Scaffolds,
Interface Biology – Biocompatibility/Immunogenicity.

Module V: Case Studies
Musculoskeletal Tissue Engineering, Cardiovascular Tissue Engineering, Neural Tissue Engineering, Visceral Tissue Engineering. Other Key Issues and Emerging Areas of Interest: Nanobiotechnology, Ethical Issues, FDA and Regulatory Issues, Tissue Engineering Market

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

***Text*:**
- Frontiers in Tissue Engineering (ISBN 0080426891), Patrick, Mikos, McIntire, Pergamon
- Principles of Tissue Engineering (ISBN 0124366309), Lanza, Langer, Vacanti, Academic Press

***References*:**
- **Tissue Engineering: Engineering Principles for the Design of Replacement Organs and Tissues** By W. Mark Saltzman; Published Oxford University Press US, 2004, pp 523
- Tissue engineering Fundamentals and Applications By Yoshito Ikada, Published Elsevier, 2006, pp 469
- Tissue Engineering Methods & Protocols (ISBN 0896035166, Morgan and Yarmush, Humana Press.

Course Name	Course Code	L:T:P	Credit	Semester
DRUG DISCOVERY & DEVELOPMENT	**MTB 332**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand of Drug discovery & development general process
CLO 2	Understand of Drug development considerations
CLO 3	Understand of Drug Receptor theories in relation to drug development
CLO 4	Understanding of Rational Drug Design in Drug discovery and development process

B. SYLLABUS

Module: I

Drug discovery & development:

General Introduction of drug design and development, Strategies for Target Identification and validation, Lead Identification and Optimization, Pre-Clinical Research and Clinical Research & Pharmacovigilance.

Module: II

Drug development considerations:

Introduction to Pharmacology, Sources of drugs, Dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and dependence, Pharmacogenetics.

Module: III

Pharmacokinetics:

Pharmacokinetic, Pharmacodynamic and Toxicological considerations in drug development, Physiochemical properties of drugs in relations to their biological activity, Rout of drugs administrations, Various types of dosage formulations, Stability of drugs.

Module: IV

Drug Receptor Theories:

Principles of drug action, Mechanisms of drug action, Drug-receptor interactions, Types of drug targets, G-Protein coupled receptor, Ion Channels, Ligand Gated Ion Channels, Enzymatic drug receptor and Transducer mechanisms, Dose response relationship, Factors modifying drug action.

Module: V

Rational Drug Design:

Introduction, Types of drugs design: Legand based, Structure based, Rational drug discovery, Computer Aided drug design, De novo drug design methodologies.

Structure activity relationships in drug design, Statistical techniques behind QSAR, Molecular descriptors 3D QSAR and COMFA, Molecular modeling, Molecular docking and dynamics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggested Books:

- New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.
- Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
- Biopharmaceutics & Pharmacokinetics by DM Brahmankar & SB Jaiswal, Published by Vallabh Prakashan; 3rd Edition 2012.
- Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd

Course Name	Course Code	L:T:P	Credit	Semester
COMMUNICATION SKILLS - III	**BCS311**	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	Learn about the importance of interviews, etiquette.
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume
Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioral Science III (Leading Through Teams)	**BSS311**	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept.
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groups sociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO 5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

B. SYLLABUS

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles
Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team
Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication
Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams
Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

Organizational Behaviour, Davis, K.

- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Course Name	Course Code	L:T:P	Credit	Semester
FRENCH – III	**FLT311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Unité 3 La science au quotidien Page : 40-61 Leçons 7, 8 & 9

Contenu Lexical:

1. L'heure
2. Les jours de la semaine
3. Les mois de l'année
4. Les matières et types de cours
5. Les spécialitésscientifiques.
6. L'annéeuniversitaire
7. Les nationalités
8. Les noms de pays
9. Les métiers scientifiques
10. Les chiffres de 69 à l'infini
11. Quelquesunités de mesure
12. Quelquestermesscientifques
13. Les termes de l'exposition
14. Les expression familières pour accepter une invitation.

Contenu Grammatical:

1. Finir, commencer au présent
2. Les prepositions de temps
3. Féminins et masculine des noms de métiers scientifiques
4. Les adjectifs de nationalité.
5. Le future proche
6. Les adjectifs demonstratives
7. Le but: pour + infinitive
8. Le register familier

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN - III	**FLG311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents
Vocabulary:

- Furniture
- Days and months name
- Time vocabulary like 15 min, quarter, minute, seconds.
- Adjectives use to describe furniture.

Grammar:

- Past participle of verb had
- Usage of negation like **not = nicht; kein= not a single.**
- Preposition of time.
- Use of adjective in sentences.
- Introduction and use of separable verbs

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: First 10 LessonsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – III	**FLS311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:
Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – III	**FLC311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME:Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-III	**AND003**	0:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues

CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

13. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
14. The group member shall write his/her name at the end of the blog.
15. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
16. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
17. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
18. For the topic chosen by the group, students are recommended to cover the following points:
    m) Current scenario (Regional, national and international level as applicable)
    n) Future predictions
    o) Duty of the government
    p) Government policies (related to the topic), if any
    q) Duty of public
    r) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

7. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
8. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
9. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
PROJECT	**MTB 460**	0:0:0	24	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To carry out the real time research project
CLO 2	To understand the research methodology to carry out the research project
CLO 3	To understand the research paper publications of research work
CLO 4	To understand the project work report writing

B. SYLLABUS

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to

section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References/ Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality
Draw Conclusions

Examination Scheme: Evaluation will be done by external examiner

Project Report	50
Viva Voce	50
Total	**100**

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Master of Science (Food Technology)

Programme Code: 121314

Duration – 2 Years Full Time

Programme Structure, Curriculum & Scheme of Examination with Choice Based Credit System (CBCS)

2021

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Credit Summary Sheet

	M. Sc. Food Technology					
Semester	**CC**	**DE**	**VA**	**OE**	**NTCC**	**Total**
1	17	3	4	-	2	26
2	18	3	4	3	2	30
3	18	3	4	3	2	30
4	30	-	-	-	-	30
Total	**84**	**09**	**12**	**09**	**6**	**116**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

List of Open Electives from M. Sc. Food Technology						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
From M. Sc. Food Tech. –II Sem.						
MSD203	Functional Foods and Nutraceuticals	CC	3	-	-	3
From M. Sc. Food Tech.–III Sem.						
MSD 303	Food Safety and Quality Management	CC	3	-	-	3

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Program Structure

M. Sc. Food Technology: I Semester						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSD101	Advance Fermentation Technology	CC	3	0	-	3
MSD102	Advance Food Chemistry and Nutrition	CC	3	-	-	3
MSD103	Instrumental Methods of Food Analysis	CC	3	1	-	4
MSD104	Advance Food Processing andPreservation Technology	CC	3	1	-	4
MSD121	Advance Fermentation Technology (Lab)	CC	-	-	2	1
MSD122	Advance Food Chemistry and Nutrition (Lab)	CC	-	-	2	1
MSD123	Instrumental Methods of FoodAnalysis (Lab)	CC	-	-	2	1
AND001	AANANDAM I	NTCC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MSD130	Cold Chain Management	DE	3	-	-	3
MSD131	IPR & Food regulatory affairs	DE				
MSD132	Industrial Safety & Hazards	DE				
BCS 111	Communicational Skills – I	VA	1	-	-	1
BSS111	Self-Development and Interpersonal Skills – I	VA	1	-	-	1
FLT 111 FLG 111 FLS 111 FLC 111	Foreign Language – I French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**26**

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

M. Sc. Food Technology: II Semester						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSD201	Meat, Fish and Poultry processing Technology	CC	3	1	-	4
MSD202	Advance Cereal Processing	CC	3	-	-	3
MSD203	Functional Foods and Nutraceuticals	CC	3	-	-	3
MSD204	Advance Biostatistics for Food Technologists	CC	3	-	-	3
MSD205	Advance Food Engineering	CC	3	-	-	3
MSD221	Meat, Fish and Poultry processingTechnology Lab	CC	-	-	2	1
MSD222	Advance Cereal Processing Lab	CC	-	-	2	1
AND002	AANANDAM II	NTCC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MSD230	Advance Flavor Chemistry and Technology	DE	3	-	-	3
MSD231	Food Rheology and texture	DE				
MSD232	Advance Nanotechnology and its Applications in Food Industry	DE				
MSD233	Research Methodology and Scientific Writing	DE				
OE	**Open Elective –I**		3	-	-	3
BCS 211	Communicational Skills - II	VA	1	-	-	1
MSD001	Community Nutrition	NCVA	-	-	-	-
BSS211	Self-Development and Interpersonal Skills - II	VA	1	-	-	1
FLT 211 FLG 211 FLS 211 FLC 211	Foreign Language – II French German Spanish Chinese	V A	2		-	2
	TOTAL					**30**

Note: After completion of the End Term Examination the students must compulsorily undergoIndustrial Training of 6 weeks. The evaluation of this training would be carried out in III sem.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

M. Sc. Food Technology: III Semester						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSD301	Processing of Foods of Plant Origin	CC	3	1	-	4
MSD302	Novel Food Packaging Technology	CC	2	-	-	2
MSD303	Food Safety and Quality Management	CC	3	-	-	3
MSD304	Advance Dairy Technology	CC	3	1	-	4
MSD305	Industrial training report	CC	-	-	-	2
MSD321	Processing of Foods of Plant Origin Lab	CC	-	-	2	1
MSD322	Novel Food Packaging Lab	CC	-	-	2	1
MSD 333	Advance Dairy Technology Lab	CC	-	-	2	1
AND003	AANANDAM III	NTCC	-	-	-	2
DE Electives: Student has to select 1 course from the list of following DE electives						
MSD330	Food Business Management	DE	3	-	-	3
MSD331	Food Toxicology	DE				
MSD332	Process Equipment Design and Plant Layouts	DE				
OE	**Open Elective-II**	**OE**	3	-	-	3
BCS 311	Communicational Skills - III	VA	1	-	-	1
BSS311	Self-Development and Interpersonal Skills - III	VA	1	-	-	1
FLT 311 FLG 311 FLS 311 FLC 311	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

M. Sc. Food Technology: IV Semester						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSD460	Major Project /Dissertation	CC	-	-	-	30
	TOTAL					**30**

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Program Learning Outcomes of Master of Science in Food Technology Program

1. After completion of M.Sc. program, students will be having knowledge and skills of the technological and science base for the production, processing, and preservation of foods.
2. Students will be able to elaborate methods to modify and control food quality and safetyby means of chemical, microbiological and sensory analysis techniques.
3. Students will be capable to provide high-level research-based solution to food security problems by manipulating the Farm to fork multi-disciplinary approach.
4. Students will be able to choose and design technologies for the industrial manufacture of food products, with due regard to raw materials, energy, economics, and sustainabilityin the system of industrial food technology and nutrition.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Fermentation Technology	MSD 101	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to various culture methods
CLO 2	Understanding of fermenter designs
CLO 3	Process operation and control and monitoring at industrial level

B. SYLLABUS

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Major agro-industrial waste products used for fermentation, Media formulation sterilization, thermal death kinetics, batch and continuous sterilization system. Modern strain improvement techniques, Sterilization of Industrial Media, Air andFermenter.

Module II

Transport phenomena in bioprocess – Mass transfer, mass transfer co-efficient for gases and liquids. Rate of oxygen transfer. Determination of oxygen transfer coefficient. Rheological properties of inter-medium. Biologicalheat transfer, Heat transfer coefficients. Bioprocess control and monitoring variables such as temperature, agitation, pressure, pH etc.

Module III

Kinetics of microbial growth, substrate utilization and product formation Batch, Fed-batch, CSTR types of reactors– CSTR, tower, airlift, bubble column, packed bed, immobilized cells, Control and monitoring, online and off-line control, Computers in bioprocess control systems. Solid state and submerged fermentation process.

Module IV

Industrial production of enzymes and biomolecules: cellulase, amylase, protease; organic acids: citric acid, acetic acid, lactic acid; ethanol, biomass, antibiotics: classification, penicillins, tetracyclins, chloramphenicol; vitamins: B12, riboflavin, Production by batch, continuous and fed batch techniques, isolation, purification and characterization of biomolecules from fermentation media and storage.

Module V

Biomass: Bakers and distillers yeast production using various raw materials, "bio" factors for growth, Crabtree effect, harvesting, different forms and uses. What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Fermented milk products – Production, purification and packaging of Curd, Cheese, acidophilus milk, Yoghurt, Kefir, Single cell protein (SCP) production. Probiotics andprebiotics; Fermented foods based on milk, meat, and vegetables; Fermented beverages.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. F Stanbury, Allan Whitaker, Stephen J Hall, Principles of Fermentation Technology, Peter, Aditya TextPvt. Ltd.
2. Casida,Industrial Microbiology, New Age International
3. Prescott and Dunn, Industrial Microbiology, C.B.S. Publishers
4. J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton, Industrial Microbiology: An Introduction,Michael Blackwell Science Ltd
5. Bailley and Ollis, Biochemical Engineering, McGraw Hill Education
6. Humphrey, Principles of Biochemical Engineering, Wiley-VCH.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Food Chemistry and Nutrition	MSD 102	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get knowledge about chemical processes in food.
CLO 2	Understand various constituents in foods.
CLO 3	Understand role of water as solvent in food systems.
CLO 4	Understand various facts about nutrition

B. SYLLABUS

Module I

Definition and importance of major food constituents, Importance of water in food, Phases of water, Role of water as a solvent in food systems, Concept of water activity and moisture migration.

Module II

Carbohydrates, proteins and lipids: classification, nomenclature, physical, chemical and functional properties and their structural correlations; Major types of starch, Process of starch gelatinization, Process of staling, Modified starches and other polysaccharides used in foods.

Module III

Lipids as emulsifiers, Amino acid and protein interaction, External factors that influence protein systems in foods,Protein modification, Fat replacers; Properties of minerals, vitamins, pigments, flavor components, Interaction of constituents in food systems; Changes during storage and processing; Browning reactions in foods. Auto- oxidation of lipids and rancidity.

Module IV

Food groups and their typical composition; essential nutrients- sources, functions, deficiency

diseases; requirements and recommended dietary allowances; digestion, absorption, transport and metabolism of nutrients in human system

Module V

Food allergy and intolerance, Allergens, toxins and anti-nutritional factors in foods

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. F Stanbury, Allan Whitaker, Stephen J Hall, Principles of Fermentation Technology, Peter, Aditya TextPvt. Ltd.
2. Belitz HD. Food Chemistry. Springer Verlag.
3. DeMan JM, Principles of Food Chemistry. AVI.
4. Fennema OR,Food Chemistry.Marcel Dekker.
5. Meyer LH, Food Chemistry.CBS.
6. Swaminathan M, Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Instrumental Methods of Food Analysis	MSD 103	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain general principals and scope of food analysis instruments
CLO 2	Illustrate clear concepts on working principles of analytical instruments
CLO 3	Demonstrate critical analytical and lab skills in food analysis
CLO 4	Evaluate sample preparation techniques for different food applications

B. SYLLABUS

Module I

Sampling techniques; Water activity, its measurements and significance in food industry

Module II

Spectroscopic techniques using UV/Vis, fluorescence, atomic absorption spectroscopy, polarimetry, refractometry (Application in Food Industry)

Module III

Chromatographic techniques: Adsorption, column, partition, affinity, ion exchange, size exclusion, GC, GLC, HPLC, HPTLC, GCMS, LCMS and significance in food industry.

Module IV

Electrophoresis, solid phase extraction, isoelectric focusing.

Module V

Immunoassay techniques; biosensors; Enzyme linked immunosorbent assay (Application in Food Industry)

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. James CS (1998). Analytical chemistry of foods, Blackic Acad, UK.
2. Winton, AL (1999). Techniques of food analysis, Allied Science Publication, New Delhi.
3. Suzanne Nielson S (2003) Food analysis, Kluwer Academic Press, New York.
4. Winton AL (1999) Techniques of food analysis, Allied Science, Official methods of analysis, Association of official analytical chemist USA.
5. Song, DWS (1996) Mechanism and theory in food chemistry Champasian and Hall Inc. New York.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance in Food Processing and Preservation	MSD 104	4:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Gives idea about how food process in industry**
CLO 2	**Learn the various techniques used food industry.**
CLO 3	**Understand the concept of working equipment's used in food industries**

B. SYLLABUS

Module I

Modeling of Microbial Food Spoilages: Microbial growth dynamics models, partial differentiation equation models, application of models in thermal preservation, Concept, mechanism of microbial destructions, equipments.

Module II

Membrane Technology: Introduction to pressure activated membrane processes, performance of RO/UF and NFand industrial application

Module III

Supercritical Fluid Extraction: Property of near critical fluids (NCF), solubility and efficiency of NCFextraction, equipment and experimental techniques used in NCF extraction and industrial application.

Use of Microwave Energy in Foods: Theory of microwave heating, dielectric properties of food materials, working principle of magnetron, microwave blanching, sterilization and finish drying

Module IV

Hurdle Technology: Types of preservation techniques and their principles, concept of hurdle technology and itsapplication.

High Pressure Processing of Foods: Concept of high pressure processing, quality changes, effects of pressure on microorganisms and its application in food processing

Module V

Ultrasonic in Food Processing: Properties and generation of ultrasonic, ultrasonic imaging, application of ultrasonics as an analytical tool and processing techniques.

Newer Techniques in Food Processing: Application of technologies of high intensity light, pulse electric field, ohmic heating, smart packaging, fortification.

Nanotechnology: Principles, mechanism and applications in foods.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. James CS (1998). Analytical chemistry of foods, Blackic Acad, UK.
2. Winton, AL (1999). Techniques of food analysis, Allied Science Publication, New Delhi.
3. Suzanne Nielson S (2003) Food analysis, Kluwer Academic Press, New York.
4. Winton AL (1999) Techniques of food analysis, Allied Science, Official methods of analysis, Association of official analytical chemist USA.
5. Song, DWS (1996) Mechanism and theory in food chemistry Champasian and Hall Inc. New York.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Fermentation Technology (Lab)	MSD 121	0:0:1	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Introduction to various culture methods**
CLO 2	**Understanding of fermenter designs**
CLO 3	**Process operation and control and monitoring at industrial level**

B. List of Practical's:

1. Determination of protein in given food sample using UV spectrophotometer.
2. Preparation of culture media for cultivation of specific microorganism
3. Isolation of microbes from air, soil and water samples
4. Identification by Simple staining.
5. Identification by differential Gram staining.
6. Identification by Lacto phenol cotton blue staining
7. Biochemical test – Indole test, methyl red test, voges proskaeur test, citrate utilization, starchhydrolysis, protease, catalase test and oxidase test
8. Identification of microbes in water samples
9. Standard plate count
10. Presumptive and confirmed coli form test
11. BOD and COD

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EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Principles of Fermentation Technology, Peter F Stanbury, Allan Whitaker, Stephen J Hall, Aditya Text Pvt. Ltd.
2. Industrial Microbiology, Casida, New Age International
3. Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Food Chemistry and Nutrition (Lab)	MSD 122	0:0:1	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get knowledge about chemical processes in food.
CLO 2	Understand various constituents in foods.
CLO 3	Understand role of water as solvent in food systems.

B. List of Practical's:

1. Determination of moisture and ash content
2. Determination of protein and fat content
3. Determination of rancidity of oil
4. Determination of minerals (Ca, P, Fe)
5. Estimations of reducing and total sugars
6. Estimations of starch and crude fibre content
7. Determination of calorific value of foods.
8. Determination of BMI & BMR of subject.
9. Case studies for diagnosis of nutritional deficiencies / disorders in human beings.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Suzanne Nielson S (2003) Food analysis, Kluwer Academic Press, New York.
2. Winton AL (1999) Techniques of food analysis, Allied Science, Official methods of analysis, Association of official analytical chemist USA.
3. Song, DWS (1996) Mechanism and theory in food chemistry Champasian and Hall Inc. New York

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Instrumental Methods of Food Analysis (Lab)	MSD 123	0:0:1	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Understanding the basic principle of analytical instruments**
CLO 2	**Learning the precautions to be taken while operating the instruments**
CLO 3	**Demonstrate critical analytical and lab skills in food analysis**

B. List of Practical's:

1. Determination of protein in given food sample using UV spectrophotometer.
2. Detection of food adulteration in food sample using nanotechnology based colorimetric methods.
3. Detection of glucose in given food sample using lateral flow based strips.
4. Estimation of water activity in food sample using water activity meter.
5. Determination of viscosity using viscometer.
6. To determine the color using lovibond tintometer.
7. Demonstration of HPLC and GLC.
8. Demonstration of Flame photometer.
9. Demonstration of electrophoresis.

EXAMINATION SCHEME:

IA			**EE**			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Suzanne Nielson S (2003) Food analysis, Kluwer Academic Press, New York.
2. Winton AL (1999) Techniques of food analysis, Allied Science, Official methods ofanalysis, Association of official analytical chemist USA.
3. Song, DWS (1996) Mechanism and theory in food chemistry Champasian and Hall Inc. New York

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Aanandam	AND001	0:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

INTRODUCTION

Aanandam is a credited subject that aims to instill **the joy of giving** and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact on society
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence and Efficiency

AANANDAM: COMMUNITY SERVICE

- Community service programs are very effective for students' **personal** and **social**, ethical, and **academic** development. These effects depend on the characteristics of the programs chosen
- Involvement of students in community work has an impact on development of student **skills**, **creativity, critical thinking,** and **innovative powers. Passion and Positivity** are basic requirements for Community service
- They would **examine social challenges** /problems, **assess the needs** of the community, **evaluate** previous implemented projects, and **think of further solutions**
- They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities.

BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

- Apply their knowledge and skills to solve specific community problem
- Learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- Make new friends, expand social network, and boost social skills and mental health.
- Obtain employment
- Be useful to society as it will protect them against stress, frustration, and depression

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ABOUT AANANDAM COURSE

Students are expected to engage in:

- An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)
- **Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.**
- **It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules**.
- Two credits for a project in each semester
- 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

- Do at least one individual act of goodness each day and Record this act in a dedicated diary/register
- Share this dedicated diary/register in a 30-minute**Anandamperiod** with the mentor and share your experience with the class
- Students in **Semester scheme** must take up one Group Community Service Project per semester
- Students in **Annual scheme** must take up two Group Community Service Projects per year
- Take one Group Community Service Project from **August to November**
- Take one Group Community Service Project from **January to April**
- The students must take photographs to document their work
- The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
- The students may submit newspaper cuttings

- The students must participate in the **Aanandam Day** by displaying charts of their Group Community Service Project
- They can make power point presentations of their project which will help them get better grades

ROLE OF FACULTY MENTOR

- The mentor will **maintain a register** wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
- Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The **act will not be evaluated** - just if it was recorded or not.(**Be suggestive not judgmental)**
- In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
- The mentor will divide the class for the Group Community Service Project and record it in a register.**8-12 students can form a group** for project work.
- The students will opt the project of their choice.
- The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
- The mentor will guide the students to write the Group Community Service Project Report.
- Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spread sheet

ROLE OF DIRECTOR/HOIS

- Allot one period of half an hour for Aanandam course
- Assign all faculty members as mentors for this period of half an hour for students
- Each faculty will have one class to mentor

- Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.
- To coordinate the **Aanandam Day** activities.
- To organize **Aanandam Day** in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefitof students (to motivate and inspire them for community service).
- Photographs of the **Aanandam Day** should be displayed in department and these should be uploaded in the gallery of University web page on HTE portal
- A **Project Assessment Committee** (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

- **Director/HoIs**
- **One person from community**
- **Departmental Aanandam Coordinator**
- **Project Mentors (1 to 7 or more members)**

The number of mentors can vary depending on the number of projects and students in each department.

- University level PAC to be formed for university colleges and departments
- State level PAC to be formed at Commissionerate level for universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- Literacy programs, in today's digital age many organizations/individuals might also need help with email and websites
- Livelihood projects
- Time giving activities to adopted communities (awareness regarding Govt. programmes) sports like yoga, meditation, drills, and physical exercises in adopted areas
- Activities on arts and culture such as restoration of traditional art and culture and monuments.
- Understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers
- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- Help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out

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Details of Activities performed are to be given with date

- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non-government bodies they collaborate with, if any
- Photographs of **Display charts** or **ppt/video** prepared while presentation on the group community service in the **Aanandam Day** must be submitted along with the report
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

- **Project Assessment Committee** will assess the Group Community Service Project Report
- Submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- Presentation of the project report
- Impact on society and the course outcome results

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Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video **(max.10 marks)**
- Photographs of Students' participation and involvement of community **(max.10 marks)**
- Problem solving and challenging issues addressed/innovation **(max. 30 marks)**

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs

Grading Marks

C grade =32 hrs

B grade>32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

AWARD AND RECOGNITIONDEPARTMENT, UNIVERSITY AND STATE LEVEL

- Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.
- The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education for contesting the state level award

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- State Level Project Assessment Committee will evaluate projects received from all the universities (one each).
- A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

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Course Name	Course Code	LTP	Credit	Semester
Cold Chain Management	MSD 130	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a sound understanding of the important role of cold chain management in today's business environment
CLO 2	Become familiar with current cold chain management trends and apply the current supply chain theories, practices and concepts utilizing case problems and problem-based learning situations
CLO 3	Demonstrate the use of effective written and oral communications, critical thinking, team building and presentation skills as applied to business problems

B. SYLLABUS

Module I

Introduction to Frozen Food: Introduction to technology of cold chain management, Market demand, currentstatus and future scope of frozen foods. Cold chain integration and energy auditing.

Module II

Fundamentals of Freezing: Glass transitions in frozen foods and biomaterials, Microbiology of frozen foods, Thermo physical properties of frozen foods, Freezing loads and Freezing time calculation, Innovations in freezingprocess

Module III

Facilities for the Cold Chain: Freezing methods and equipment, Cold store design and maintenance, Transportation of frozen foods, Retail display equipment and management, Household refrigerators and freezers,Monitoring and control of the cold chain.

Module IV

Quality and Safety during cold chain: Quality and safety of frozen meat and meat product, Quality and safety of frozen poultry and poultry products, Safety and quality of frozen fish, shellfish, and related products, Quality and safety of frozen vegetables and fruits, Quality and safety of frozen dairy products, Quality and safety of frozenready meads, Quality and safety of frozen bakery products, Quality and safety of frozen eggs and egg products

Module V

Packaging of Frozen Foods: Introduction to frozen food packaging, Plastic packaging of frozen foods, Paperand card packaging of frozen foods, Packaging of frozen foods with other materials, Packaging machinery

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Quality of Frozen Foods, Erickson, M.C and Hung, Y.C International Thompson Publishing, Newyork
2. Handbook of Frozen Foods, Isabel Guerrero Legaretta
3. Handbook of Frozen Food Processing and Packaging, Second Edition, Da-Wen Sun, CRC press
4. Managing Frozen foods, Kennedy Chris J CBS, New Delhi.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
IPR & Drug Regulatory Affairs	MSD 131	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the matter that the subject matter comes in the ambit of copyright/patent or not and we can get the right into this regard or not.
CLO 2	Create his mind that what is innovation and what are the inventive step and industrial use of subject matter that could be patentable.
CLO 3	Apply for patent/copyright before the appropriate authority
CLO 4	Develop your knowledge regarding infringement of your right. Students will come to know that what the act is amount to infringement and what are the remedies available against such infringement.

B. SYLLABUS

Module I (Intellectual Property Rights-I)

Regulatory affairs and its importance. General Principles of Intellectual Property: Copyright, Trademark, Inventions-Patentable, Geographical Indications, Industrial Designs, Integrated Circuits, Trade Secrets. Patents: need of patents, major types of patents, international registration of patents, patent term and extension The Patents Act, 1970 – Salient features.

Module II (Intellectual Property Rights-II)

Organization: Intellectual Property Rights, World Trade Organization (WTO), World Intellectual Property Organization (WIPO), Paris Convention, Berne Convention, TRIPS Agreement, the DohaDeclaration, Patent Cooperation Treaty (PCT), Madrid Protocol.

Module III (Drug Regulatory Affairs-I)

New Drug Application: Steps involved in the development of new drug. New drug applications as per WHO guidelines and abbreviated NDA. Requirement and guidelines on clinical trials,

Investigational New Drug Application (IND).

Module IV (Drug Regulatory Affairs-II)

Generic Drug Products: Drug Regulations – IND and NDA, Drug Regulations – ANDA, Generic Drug Product Development, Generic Drug Product Approval, SUPAC. Introduction about GMP, cGMP, GLP, GCP, CDSCO, CPCSEA, US-FDA

Module V (Drug and Cosmetic Act)

Introductory drugs Jurisprudence: Drugs & Cosmetic Act & Rules

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Dr. N.S. Vyawahare and Sachin Itkar, (2011). Drug Regulatory Affairs, Nirali Prakashan
2. C.V.S. Subrahmanyam & J. ThimmaSetty, (2012). Pharmaceutical Regulatory Affairs, Vallabh Prakashan
3. Quality Assurance of Pharmaceutics Vol I & II (1999).WHO publications
4. WIPO website study material
5. Nair, Kanakkan Raghavan Gangadharan, and Ashok Kumar, (1994), Intellectual property rights. No. 1.Allied Publishers.
6. Cell, I. P. R. (2002), "Intellectual property rights."
7. Yan, Huang. (1996), "Intellectual property rights."

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Industrial Safety and Hazards	MSD 132	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate different types of hazards and prevention methods
CLO 2	Create plant layout as per site selection based on safety measures and industrial hygiene
CLO 3	Apply prevention methods to control occupational diseases.
CLO 4	Develop a framework for management according to philosophy and need for Industrial safety keeping in view of various applicable laws and suggest Government for implementation.

B. SYLLABUS

Module I

Hazards: Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II

Psychology and Hygiene: Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout.Industrial lighting and ventilation. Industrial noise.

Module III

Occupational diseases and control: Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments. Safety in chemical operations and processes.

Module IV

Management: Safety organization – safety committee – safety education and training.

Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety.

Module V

Laws: Factory Act. ESI Act, Environmental Act. Workment - comperation Act. Advantages of adopting safety laws.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Allocation. Vanvostrand Reinhold Company, New York.
2. Anonymous (1972). Guide for Safety in the Chemical Laboratory , 2nd Ed., Van Nostrand Reinhold Co.,Litton Educational Publishing, Inc., New York
3. Fawcett, H.H. & Wood, W.S. (1982). Safety and Accident Prevention in Chemical Operation, 2nd Ed. JohnWiley and sons, New York.
4. Industrial Safety and Laws by Indian School of Labour Education, Madras.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Communication Skills - I	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel of formal communication.
CLO 4	Develop and empower self with the power of Words.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Module I

Module I: Listening Skills

Effective Listening: Principles and Barriers Listening Comprehension on International Standards

Module II: Speaking Skills

Pronunciation and Accent, reading excerpts from news dailies & magazines Narrating Incident; Story telling. Extempore & Role Plays

Module III: Reading Skills

Vocabulary: Synonyms, antonyms, diminutives, homonyms, homophones Idioms & phrases

Foreign words in English

Module IV: Writing Skills

Writing Paragraphs Précis Writing Letter writing, Coherence and structure Essay writing

Module V: Activities

News reading, Picture reading, Movie magic, Announcements

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Working in English, Jones, Cambridge
2. Business Communication, Raman – Prakash, Oxford
3. Speaking Personally, Porter-Ladousse, Cambridge
4. Speaking Effectively, Jermy Comfort, et.al, Cambridge

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Behavioral Science - I	BSS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO 2	Manage your emotions and feelings more effectively to have the impact that you need
CLO 3	Develop the way that you regulate and control your emotions
CLO 4	Learn about your behavioral preferences to become more self-awareness
CLO 5	Develop and build your emotional intelligence

B. SYLLABUS

Module I: Understanding Self

Formation of self-concept, Dimension of Self, Components of self, Self-Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem, Characteristics of High and Low Self Esteem, Importance & need of Self Esteem, Self Esteem at work, Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI, Difference between IQ, EQ and SQ, Relevance of EI at workplace, Self-assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need for and importance of Emotions, Healthy and Unhealthy expression of emotions

Anger: Conceptualization and Cycle, Developing emotional and interpersonal competence

Self-assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes, Formation of Attitudes, Types of Attitudes, Effects of Attitude on Behavior, Perception, Motivation, Stress, Adjustment, Time Management, Effective, Performance, Building Positive Attitude

EXAMINATION SCHEME:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

SUGGESTED READINGS

1. Towers, Marc: Self Esteem, 1st Edition 1997, American Media
2. Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
3. Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
4. Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
5. Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
6. Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
7. Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
8. Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
9. Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
10. Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Community Nutrition	MSD001	0:0:0	0	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	The students will be able to describe the major causes and impact of communicable and non-communicable diseases and their pathology
CLO 2	The students will be able to understand the concept of Nutrition Security and get familiarized with the various approaches and strategies for combating malnutrition.
CLO 3	The students will be able to identify and monitor malnutrition and hunger in individuals and communities, using clinical, dietary, anthropometric and biochemical measures.
CLO 4	The student will be able to assess, monitor and evaluate the impact of public health programs.

B. SYLLABUS

Module I:

The student will be able to assess, monitor and evaluate the impact of public health programs. Concepts of nutrition, Nutritional Problems in India, Protein Energy Malnutrition, Vitamin A deficiency, Nutritional anemia, Chronic disease, iodine deficiency, eating disorder, National Nutrition Policy, Introduction, Aims of NNP, Nutrition policy instrument of NNP, Nutritional Assessment: Introduction, Definition, objectives, sampling technique, methods of assessment. Nutritional Assessment: Introduction, Definition, objectives, sampling technique, methods of assessment.

Module II:

Sampling Technique: - Introduction, Definition, objectives, identification of risk group, sampling techniques Sampling Technique: - Introduction, Definition, objectives, identification of risk

group, sampling techniques Methods of Nutritional Assessment: Introduction, Definition, objectives, direct assessment & indirect assessment Methods of Nutritional Assessment:

Module III

Introduction, Definition, objectives, direct assessment, Modern Methods of Improving Nutritional Quality Netraceuticals Functional foods Food Fortification Nutrient Supplementations: - Nutrition education themes and messages in nutrition and health. Education Antenatal Care Postnatal Care

EXAMINATION SCHEME:

Assessment task	**Length**	**Weight**	**Evaluation**
Assessment 1: Home assignment	30 min	N/A	Grades only
Assessment 2: Home assignment	60 min	N/A	Grades only
Assessment 3: Assignment and seminar	30 min	N/A	Grades only

SUGGESTED READINGS

1. Swaminathan M, Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.
2. Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
3. Michael.J.G,Barrie.M.M:Public health nutrition, Blackwell publishing,2005.
4. Reddy V, Prahlad RaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN,1993
5. Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co., New Delhi.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
French	FLT 101/111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Working in English, Jones, Cambridge
2. Business Communication, Raman – Prakash, Oxford
3. Speaking Personally, Porter-Ladousse, Cambridge
4. Speaking Effectively, Jermy Comfort, et.al, Cambridge

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German	FLG 101/111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to**<
- talk about gender, numbers and articles.

- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

1. Working in English, Jones, Cambridge
2. First 10 Lessons from Deutschals Fremdsprache -1A, IBH & Oxford, New Delhi, 1977
3. References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
4. Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
5. Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
6. Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013
7. http://www.duden.de/woerterbuch
8. Materials are given in form of photocopies if felt to be necessary
9. Speaking Personally, Porter-Ladousse, Cambridge
10. Speaking Effectively, Jermy Comfort, et.al, Cambridge

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS 101/111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:

Subject pronouns

Use of verbs SER/ESTAR/TENER in simple present tense

Use of regular AR /ER/IR ending verbs.

Llamarse y dedicarse

Simple Negativesenteses

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

SUGGESTED READINGS

1. Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha
2. Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
3. Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
4. Dictionaries for reference: Collins, www.wordreferences.com.
5. Essential materials are given in the form of photocopies.

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Course Name	Course Code	LTP	Credit	Semester
Chinese	FLC 101/111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪，家，住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha
2. Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
3. Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
4. Dictionaries for reference: Collins, www.wordreferences.com.
5. Essential materials are given in the form of photocopies.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Meat, Fish and Poultry Processing Technology	MSD 201	3:1:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain general principals and scope of meat processing and preservation
CLO 2	Illustrate clear concepts of hygiene and safe practices used in meat industry
CLO 3	Demonstrate the role of food technologists in maintaining the meat quality
CLO 4	Understand the techniques used in meat processing and preservation

B. SYLLABUS

Module I

Introduction: Overview of Meat, Fish and Poultry Industry in India; Structure, composition and nutritive value of meat, fish and poultry products

Module II

Meat Technology: Slaughter – house layout and management; Pre-slaughter practices for meat animals, pre- mortem and post-mortem examination; Scientific slaughter, handling and evaluation of carcass; Post-mortem changes and eating qualities of meat tissues, cutting and packaging meat; Refrigeration, freezing, canning and freeze drying of meat; curing and smoking of meat, changes during cooking of meat; prepared meat products likesalami, kebabs, sausages, sliced, minced, corned; intermediate moisture and dried meat products; meat plant hygiene – GMP and HACCP; Packaging of meat products.

Module III

Fish Technology: Types of fish; post-mortem changes; Handling storage and transportation of fish; Curing, smoking, drying, freezing and canning of fish and marine products, grading and preservation of shell fish; picklingand preparation of fish protein concentrate, fish oil and other

by products.

Module IV

Poultry Products: Pre-slaughter care and handling of birds; ante- and post – mortem examination of birds; Scientific slaughter; Preparation of poultry products and their preservation.

Module V:

Technology of Egg: Interior qualities of eggs- grading, handling, packaging and transportation; Functional properties of eggs; Microbial spoilage; Preservation and maintenance of eggs; Freezing, dehydration and picklingof eggs Whole egg powder, Egg yolk products, their manufacture, packaging and storage.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Jhari Sahoo, Textbook on Meat, Poultry and Fish Technology
2. NPCS Board of Consultants & Engineers, The Complete Technology Book on Meat, Poultry and Fish Processing.
3. Gracy, JF. Thornton's Meat Hygiene. ELBS Publishers, London

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Technology of Cereal, Pulses and Oilseeds	MSD 202	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic composition and structural parts of food grains.
CLO 2	Aware the importance of physico-chemical properties of food grains.
CLO 3	Understand the basics of milling operations for food grains.
CLO 4	Identify the problems associated with milling of grains and their solution.

B. SYLLABUS

Module I

Current status and future scenario of world wheat production and uses. Criteria of wheat quality– physical and chemical. Chemical composition of wheat grain and its relation to processing quality. Molecular basis of wheat grain hardness/softness. Wheat milling – general principle, cleaning, conditioning and milling systems. Flour streams and extraction rates. Criteria of flour quality. Functionality of wheat proteins, carbohydrates and lipids inbakery products.

Module II

Dough testing apparatus such as recording dough mixers. Bread making processes: functions of ingredients/additives such as fat, emulsifiers, oxidants, reducing agents, conditioners. Bread faults and remedies. Technology of biscuit, cake, cookie and cracker manufacture. Technology of pasta products.

Module III

Rice grain structure and chemical composition. Milling of rice: Modern rice milling unit operations – dehusking,paddy separation, polishing and grading. Factors affecting rice yield

during milling. By- products of rice milling and their utilization. Cooking quality of rice. Parboiling of rice- traditional and modern methods. Changes duringparboiling. Advantages and disadvantages of parboiling. aging of rice - quality changes; Rice convenience foods- precooked rice, canned rice, expanded rice, rice based infant food formulas, rice puddings and breads, rice cakes,rice noodles and fermented foods. processed products based on rice.

Module IV

Chemical, technological and nutritional aspects of sorghum, oats and millets. Coarse grain based processed foods.Wet and dry milling of corn. Corn products and their uses. Malting of barley steeping, germination and drying. Classification of malt products, nutritive value and food applications of malt. Extrusion technology.

Module V

Pulses: Composition and importance in Indian diet. Dal milling and processing of pulses. Antinutrients in pulses. protein concentrates and isolates; Oilseeds: Conditioning and oil extraction, significance of oil seeds processing in India, expeller pressing and solvent extraction of oil, oil refining. Processing of oils and fat.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Khatkar, B.S. (2010). Baking Science and Technology. Arihant Prakashan Pvt Ltd., New Delhi.
2. Khan, K. & Shewry, P. R. (2009). Wheat: Chemistry and Technology: St. Paul, U.S.A.
3. Champagne, E.T. (2004). Rice: Chemistry and Technology (3rd ed.): AACC, USA.
4. Dendy, D. A. V. & Dobraszczyk, B. J. (2001). Cereals and Cereal Products: Chemistry andTechnology: Aspen, Maryland.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Functional Foods and Nutraceuticals	MSD 203	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	The student will be able to recognize the structures of the major bioactive food constituents that are being incorporated into functional foods. Know their sources, solubility properties, stabilities, and how they are absorbed and metabolized.
CLO 2	The student will be able to recognize functional food products that are nutritionally logical, technically feasible, and that also follow regulatory guidelines.
CLO 3	The student will be able to identify the differences between a dietary supplement and a functional food/nutraceutical and the labeling/marketing around these substances.

B. SYLLABUS

Module I

Defining nutraceutical & functional foods, nature, type & scope of nutraceutical & functional foods. Nutraceutical & functional food applications and their health benefits, nutraceutical compounds and there classification based on chemical and biochemical nature with suitable and relevant description. Nutraceutical for special situation such as cancer, heart disease, stress, osteoporosis, hypertension etc.

Module II

Classifying nutraceuticals Organizational models for Nutraceuticals. Food source – Plant: Soya, olive oil, plant steroid, tea, grape vine, garlic, capsicum, dietary fiber and other fruits. Animal: Milk and products, meat, fish. Microbial probiotics. Cereal products as functional foods – oats, wheat bran, rice bran etc. Functional vegetable products, oil seeds and sea foods. Coffee, tea and other beverages as functional foods/drinks and their protective effects.

Module III

Regulation of dietary supplements – Types – in born errors of metabolism, - obesity, neurological disorder, diabetes mellitus, hypertension vitamin A deficiency, PEM Instant foods and formulas supplement soups, Herbaland functional food beverages and sports.

Module IV

Effect of processing, storage and interaction of various environmental factors on the potentials of such foods. Formulation of functional foods containing nutraceuticals – stability and analytical issues, labelling issues

Module V

Marketing and regulatory issues for nutraceutical & functional

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Jhari Sahoo, Textbook on Meat, Poultry and Fish Technology
2. Mazza. G. 1988. Functional foods – biochemical and processing aspects, Technomic Publ. Lancaster USA.
3. Kirk, R.S. 1999. Pearson's composition and analysis of foods. Wesley Longman Inc. California, USA.
4. Wildman, R.E.C. 2007. Handbook of nutraceutical & functional foods.
5. Official methods of analysis 2003. Association of official analytical chemist, USA.
6. Mary, K. Schmidl and Theodre, P. Labuza 2000. Essentials of Functional Foods, Culinary and Hospitality industry.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advanced Biostatistics For Food Technologists	MSD 204	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand elementary mathematical statistics including deriving simple results and solving problems.
CLO 2	To develop various concepts and techniques of statistics useful in business.
CLO 3	To develop the ability to analyze a problem, apply the appropriate statistical techniques for problem solving and interpret the results.
	To solve simple data-analytic problems by hand and also use computers for analyzing problems involving large datasets with the help of statistical software.

B. SYLLABUS

Module I

Measures of Central Tendency (Mean, Median, Mode), Measures of dispersion (Range, Mean Deviation, Standard Deviation, Quartile Deviation), combined mean and variance, covariance, Graphs (Bar Chart, Pie Chart, Box Plot, Histogram, Ogive, scatter plot)

Module II

Probability (Addition and Multiplication Theorem), Binomial, Poisson and Normal distribution. Correlation and linear regression. Measures of Central tendency; Dispersion, Swekness and Kurtosis; Binomial and Normal Distributions.

Module III

Inferential statistics: Formulation of Hypothesis (One-tailed & Two-tailed), Type I and Type II errors, power of atest, Significance of a test & P-value testing.

Module IV

Hypothesis Testing (students T-test, Z-test, x^2, F test, Chi-square test). Analysis of variance (ANOVA)

Module V

Applications of statistical methods using statistical software.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley andSons.
2. Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.
3. Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee. Publisher: Elsevier.
4. Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley andSons.
5. Statistical Methodology, S.P Gupta. Publisher: S. Chand & Co.
6. Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K.Visweswara Rao. Publisher: Jaypee Brothers.
7. Fundamentals of Mathematical Statistics, S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co.
8. Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Food Engineering	MSD 205	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To illustrate various aspects of food engineering.
CLO 2	To develop understanding about fluid flow and its applications.
CLO 3	To understand mechanism of heat transfer in food processing
CLO 4	To explain method of freezing process.

B. SYLLABUS

Module I

Introduction - System, Thermodynamic properties, Density, Concentration, Moisture Content, Temperature, Pressure, Enthalpy, Conservation of Mass, Laws of Thermodynamics- Zeroth Law, First Law of Thermodynamics, Second Law of Thermodynamics, Heat and Work.

Module II

Heat Transfer- Systems for Heating and Cooling, Plate Heat Exchanger, Tubular Heat Exchanger, Scraped- surface Heat Exchanger, Scraped-surface Heat Exchanger, Epilogue. Thermal Properties of Food- Specific Heat, ThermalConductivity and Thermal diffusivity. Thermal Diffusivity - Conductive Heat Transfer, Convective Heat Transfer and Radiation Heat Transfer. Microwave Heating- Dielectric Properties, Conversion of Microwave Energy into Heat, Microwave Oven, Microwave Heating of Foods.

Module III

Evaporation- Steam and its properties, vaporization, evaporation and boiling, external work and internal latent heat, Entropy and enthalpy, Types of Evaporators- Batch-Type Pan Evaporator, Natural Circulation Evaporators, Rising-Film Evaporator, Falling-Film Evaporator, Rising/Falling-Film Evaporator, Forced- Circulation Evaporator, Agitated Thin-

Film Evaporator. Vapor Recompression Systems- Thermal Recompression, Mechanical Vapor Recompression.

Module IV

Compressors- classification of air compressors, Types of Compressed Air in Food and Beverage Production- Contact, Non-Contact High-Risk, Non-Contact Low-Risk, challenges of compressed air use in the food and beverage industry, surging, chocking and stalling.

Module V

Refrigeration- Selection of a Refrigerant, Components of a Refrigeration System- Evaporator, Compressor, Condenser and Expansion Valve, Bell-coleman cycle. Freezing Systems- Indirect Contact Systems and Direct- Contact Systems. Frozen-Food Properties - Density, Thermal Conductivity, Enthalpy, Apparent Specific Heat and Apparent Thermal Diffusivity.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. R. Paul Singh and Dennis R. Heldman, "Introduction to Food Engineering", Academic Press.
2. Yunus A Cengel, "Heat and Mass Transfer", Mc Graw Hills.
3. D.S.Kumar, "Refrigeration and Air Conditioning", S.K. Kataria & Sons.
4. D.S.Kumar, "Thermodynamics", S.K. Kataria & Sons.
5. Cengel & Boles, "Thermodynamics", Tata McGraw Hill

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Meat, Fish and Poultry Processing Technology (Lab)	MSD 221	0:0:1	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic concept meat processing and explain role of livestock in Indian food industry
CLO 2	Explain the different techniques used in processing of meat products
CLO 3	Have knowledge of different analytical techniques used in food industry and laboratories for analytical purpose.

B. List of Practical's:

1. Preparation of meat cuts,
2. Determination of yield of meat
3. Preservation by dehydration of fish and meat
4. Canning and curing of meat
5. Freezing of meat / poultry / fish
6. Preparation of meat / poultry / fish products
7. Evaluation of external and internal quality of eggs
8. Grading, coating and thermos-stabilization of eggs
9. Visit to a slaughterhouse.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Processed Meats; Pearson AM & Gillett TA; 1996, CBS Publishers.
2. Meat; Cole DJA & Lawrie RA; 1975, AVI Pub.
3. Egg and poultry meat processing; Stadelman WJ, Olson VM, Shemwell GA & Pasch S; 1988, Elliswood Ltd.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Cereal Processing (Lab)	MSD 222	0:0:1	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic composition and structural parts of food grains.
CLO 2	Aware the importance of physico-chemical properties of food grains.
CLO 3	Understand the basics of milling operations for food grains
CLO 4	Identify the problems associated with milling of grains and their solution.
CLO 5	Know processing food grains into value added products.

B. List of Practical's:

1. Physico–chemical characteristics like test-weight, gluten content, etc
2. Milling of wheat
3. Milling characteristics of corn
4. Preparation of bread / test-baking
5. Preparation of buns / cakes / pizza, etc
6. Preparation of biscuits / cookies etc
7. Preparation of extruded products
8. Cooking quality of rice
9. Pre-treatment and milling of pulses
10. Extraction of oil from oilseeds
11. Preparation of breakfast cereals

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Altschul. Processed Plant Food Stuffs
2. Matz, MA. Cookie and Cracker Technology
3. Dubey, SC. Basic Baking: Science and Craft
4. Pyler, EJ. Baking Science and Technology
5. Scott. Flour Milling Process

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Aanandam	AND002	0:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Students are expected to engage in:

- An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)
- **Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.**
- **It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules**.
- Two credits for a project in each semester
- 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

- Do at least one individual act of goodness each day and Record this act in a dedicated diary/register

- Share this dedicated diary/register in a 30-minute**Anandamperiod** with the mentor and share your experience with the class
- Students in **Semester scheme** must take up one Group Community Service Project per semester
- Students in **Annual scheme** must take up two Group Community Service Projects per year
- Take one Group Community Service Project from **August to November**
- Take one Group Community Service Project from **January to April**
- The students must take photographs to document their work
- The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
- The students may submit newspaper cuttings
- The students must participate in the **Aanandam Day** by displaying charts of their Group Community Service Project
- They can make power point presentations of their project which will help them get better grades

ROLE OF FACULTY MENTOR

- The mentor will **maintain a register** wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
- Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The **act will not be evaluated** - just if it was recorded or not.(**Be suggestive not judgmental)**
- In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
- The mentor will divide the class for the Group Community Service Project and record it in a register.**8-12 students can form a group** for project work.

- The students will opt the project of their choice.
- The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
- The mentor will guide the students to write the Group Community Service Project Report.
- Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spread sheet

ROLE OF DIRECTOR/HOIS

- Allot one period of half an hour for Aanandam course
- Assign all faculty members as mentors for this period of half an hour for students
- Each faculty will have one class to mentor
- Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.
- To coordinate the **Aanandam Day** activities
- To organize **Aanandam Day** in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefitof students (to motivate and inspire them for community service)
- Photographs of the **Aanandam Day** should be displayed in department and these should be uploaded in the gallery of University web page on HTE portal
- A **Project Assessment Committee** (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Formation of Project Assessment Committee

- **Director/HoIs**
- **One person from community**
- **Departmental Aanandam Coordinator**
- **Project Mentors (1 to 7 or more members)**

The number of mentors can vary depending on the number of projects and students in each department.

- University level PAC to be formed for university colleges and departments
- State level PAC to be formed at Commissionerate level for Universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- literacy programs, in today's digital age many organizations/individuals might also need help with email and websites
- livelihood projects,
- time giving activities to adopted communities(awareness regarding Govt. programmes)sports like yoga, meditation, drills, and physical exercises in adopted areas
- activities on arts and culture such as restoration of traditional art and culture and monuments.
- understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers

- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society(the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non government bodies they collaborate with, if any
- Photographs of **Display charts** or **ppt/video** prepared while presentation on the group community service in the **Aanandam Day** must be submitted along with the report

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

- **Project Assessment Committee** will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome results

Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video **(max.10 marks)**
- Photographs of Students' participation and involvement of community **(max.10 marks)**
- Problem solving and challenging issues addressed/innovation **(max. 30 marks)**

EVALUATION: GRADES EQUIVALENCE

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Project Assessment Committee constituted will assess the projects

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs

Grading Marks

C grade =32 hrs

B grade>32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

AWARD AND RECOGNITIONDEPARTMENT, UNIVERSITY AND STATE LEVEL

- Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.
- The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education for contesting the state level award
- State Level Project Assessment Committee will evaluate projects received from all the universities (one each).
- A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Flavor Chemistry and Technology	MSD 230	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basics about essential oils, condiments, and spices.
CLO 2	Importance flavouring compounds in food industry.
CLO 3	Understand the basics of isolation and extraction of flavouring compounds.
CLO 4	Identify the legal consideration associated flavouring compounds.

B. SYLLABUS

Module I

Introduction: Status and scope of spice and flavour processing industries in India; Spices, Herbs and seasonings: sources, production, selection criteria; flavours: commercially available materials, classification on the basis of origin,physical characteristic.

Module II

Basics of flavour, smell, and taste sensation. Principal types of flavorings used in foods, natural flavoring substances,Flavour constituents from Onion, garlic, cheese, milk, meat, vegetables, fruits, Flavour constituents of wine, coffee, tea, chocolate, spices and condiments.

Module III

Nature-identical flavoring substances. Artificial flavoring substances. adulteration, Flavour emulsions, Flavours production in fermented foods, Off-flavours in foods. Flavour chemical components (buttery: Diacetyl, Acetylpropionyl, Acetoin, Banana: Isoamyl acetate, Bitter almond, Cherry: Benzaldehyde, cinnamon: Cinnamaldehyde, fruity: Ethyl propionate, etc.). Food acids their tastes and flavours (Glutamic acid salts, Glycine salts, Guanylic acid salts, acetic

acid, malic acid etc.).

Module IV

Sensory evaluation of flavours, selection of flavourist, flavours and legal issues, Methods of flavour extraction, isolation, separation; Distillation, solvent extraction, enzymatic extraction, static headspace, dynamic headspace etc.;Flavour web and flavor profile analysis.

Module V

Spices and flavour quality evaluation: Criteria for assessment of flavour quality; identification of natural food flavours; methods of flavour evaluation (chemical, instrumental, sensory). Principles and techniques of flavour encapsulation, types of encapsulations; Factors affecting stabilization of encapsulated flavour and their applications in food industry.Legal standards for flavouring materials and flavours.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Source book of flavor by Reineccius,G, CBS.
2. Handbook of Spices by Peter K.V.2001, Woodhead Publishers,UK.
3. Food Flavours by Morton,I.D., Macleod ,A.J, AVI Publishers.
4. Spices and Condiments by Pruthi, J.S., 1976, NBT India.
5. Spice Statistics by Spices Board 2007, GOI, Cochin.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Food Rheology and Texture	MSD 231	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	to provide theoretical and practical knowledge on rheology, colorimetry, calorimetry and food microstructure in order to supply the capability for right control procedures, during formulation, processing and preservation of liquid and solid foods.
CLO 2	acquisition and application of food science and technology knowledge on the food's physical and structural properties
CLO 3	Understanding The role of rheology in food quality control and new product development

B. SYLLABUS

Module I

Food rheology: definition, importance, scope, theoretical aspects; Food texture: definition and importance; types of stress and strain and viscosity.

Module II

Relevance of rheological properties of food and determination and measuring methods: destructive and non- destructive measurements, creep recovery and stress relaxation, dynamic mechanical tests, modeling food texture: introduction, factor affecting texture of foods, models to predict texture.

Module III

Rheological properties of fluid and semi-solid food: classification, factors affecting viscosity, flow of material- Newton's law of viscosity, viscous fluids (Newtonian fluids, non-Newtonian fluids), plastic fluids (Bingham plastic, non-Bingham plastic fluids), thixotropic behaviour, fluid

behavior in steady- shear flow: time dependent and time independent material function, viscosity measurement- capillary flow viscometers, orifice type viscometers, falling ball viscometers, rotational viscometers- concentric cylinder (coaxial rotational) viscometers, cone and plate viscometers, parallel plate viscometers, single-spindle viscometers (brookfield viscometer).

Module IV

Rheological properties of fluid food: deformation of material, viscoelastic behavior, Failure and glass transition in solid foods: failure in solid foods, glass transition of solids foods (measurement, factors affecting, importance), Texture of foods: compression, snapping bending, cutting shear, puncture, penetration, texture profile analysis, doughtesting instruments.

Module V

Scientific development of rheology in food industry, practical applications of rheological concepts in food products,measuring consumer perception of texture of food, Texture analyser and Texture profile analysis.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Rao, M. A., Rizvi, S. S. H. and Datta A. K. 2005. Engineering Properties of Foods: CRC Press.
2. Heldman, D. R. (2007). Food Process Engineering: AVI Publications.
3. Rao, M. A. (2007). Rheology of Fluid and Semisolid Foods: Principles and Applications (2 ed.): Springer,USA.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Nanotechnology and its Applications in Food Industry	MSD 232	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students are expected to understand the basic concepts, investigation tools, and fundamental issues of nanotechnology.
CLO 2	To understand self-assembly, scanning probe microscopy, organic/inorganic nanocomposites, DNA and protein chips.
CLO 3	To apply the nanotechnological approach in food safety and quality management

B. SYLLABUS

Module I

Basics of nanotechnology and nanostructures in food: Evolution of new technologies in the food sector, Public perception of nanotechnology food products, Nanomaterials for food applications-Nano-sized food ingredients and additives, Naturally occurring food nano substances and nanostructure.

Module II

Bioavailability - nanocrystalline food ingredients - nano emulsions - nano-engineered protein fibrils as ingredient building blocks, preparation of food matrices - concerns about using nanotechnology in food production

Module III

Nanotechnology in food processing and food safety and bio-security – Electrochemical sensors for food analysis andcontaminant detection.

Module III

Nanotechnology in food production: food and new ways of food production - efficient fractionation of crops efficientproduct structuring -optimizing nutritional values - applications

of nanotechnology in foods: sensing and encapsulation.

Module IV

Nanotechnology in food packaging: - physical properties of packaging materials - strength - barrier properties, light absorption – structuring of interior surfaces - antimicrobial functionality - visual indicators – quality assessment - foodsafety indication - product properties - information and communication technology - sensors - radiofrequency identification technology, risks - consumer and societal acceptance.

Module V

Nanotechnology in environmental and health effects: environmental pollutants in air, water, soil, hazardous and toxicwastes - application of nanotechnology in remediation of pollution in industrial and wastewater treatment – drinkingwater and air/gas purifications - the challenge to occupational health and hygiene, toxicity of nanoparticles, effects of inhaled nanosized particles, skin exposure to nanoparticles.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Brown, P and Stevens, K. 2006. Nanofibers and Nanotechnology in Textiles. Woodhead publication,London.
2. Jennifer K and Peter V. 2006. Nanotechnology in agriculture and food production, Woodrow WilsonInternational Center.
3. Lynn J., Frewer, Willehm Norde, R. H., Fischer and Kampers, W. H. 2011. Nanotechnology in the Agri-food sector, Wiley-VCH Verlag.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Research Methodology and Scientific Writing	MSD 233	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Research methodology and scientific writing in biotechnology, nanotechnology, and environmental sciences.
CLO 2	Understanding the basics of research methodologies for carrying out research work.
CLO 3	Understanding of the components of scientific writing of the research and review papers.
CLO 4	Understanding of the relevant selection of the journals for communication of the manuscripts.

B. SYLLABUS

Module I: Introduction

Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II: Research Methodology

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Computing skills for scientific research

Web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness.

Module IV: Scientific writing

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system).

Module V: Bibliometrics and Publication ethics

Bibliometrics (journal citation analysis, impact factor, h- index etc.), ethical scientific writing and Plagiarism.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Statistical Methods By S.P. Gupta
2. Research Methodology Methods and Techniques by C.R. Kothari
3. Statistics (Theory and Practice) by B.N. Gupta
4. Research Methodology Methods and statistical Techniques by Santosh Gupta
5. Scientific journals and magazines

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Communication Skills - II	BCS 211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Module I: Fundamentals of Communication

Role and purpose of communication: *7 C's of communication,* Barriers to effective Communication, Enhancing listening, Forms of Communication: one-to-one, informal and formal

Module II: Verbal Communication (Written)

Business Letter, Social correspondence, Writing resume and Job applications

Module III: Speaking skills

Conversational English, Guidelines to give an effective presentation, Activities to include: Presentations by students Just a minute

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Business Communication, Raman – Prakash, Oxford
2. Textbook of Business Communication, Ramaswami S, Macmillan
3. Speaking Personally, Porter-Ladousse, Cambridge

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Behavioral Science - II	BSS 211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO 2	Identify the effects of behaviour on interpersonal communication
CLO 3	Demonstrate a range of effective interpersonal communication skills
CLO 4	Use assertiveness and interpersonal skills in the workplace team
CLO 5	Utilise effective communication skills to build strong relationships
CLO 6	Develop, implement and promote effective communication techniques

B. SYLLABUS

Module I: Behavioral Communication

Scope of Behavioral Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioral Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles, Types of issues, Approaches, Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships, Conforming and Disconfirming Communication

Culturally Relevant Communication, Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication, Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel, Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR, Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

EXAMINATION SCHEME:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

SUGGESTED READINGS

1. Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
2. Julia T. Wood. Interpersonal Communication everyday encounter
3. Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
4. Harvard Business School, Effective Communication: United States of America
5. Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
French	FLT 201/211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

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1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
2. Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
3. Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German	FLG 201/111	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Vocabulary:

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)

- Possessive article

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Lesson 11 onwards from DeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977
2. Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
3. Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
4. SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
5. Dictionaries for reference: Studio D: Glossar A1 - Deutsch –Englisch, Cornelsen, 2013
6. http://www.duden.de/woerterbuch

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS 201/211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.

Grammar:

Use of SER/ESTAR/TENER/ HAY

Difference between Estar and Hay

Demonstrative pronouns

Interrogatives – what, which, why, how, who, when

Introduction of irregular verbs, Possessive pronouns

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

1. Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
2. Text &References:
3. Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
4. Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
5. Dictionaries for reference: Collins, www.wordreferences.com.
6. Essential materials are given in the form of photocopies.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chinese	FLC 201/211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

COURSE CONTENT

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs: 要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
3. Chinese Reader (HSK Based) book-I (suggested reading)
4. Practical Chinese Grammar for foreigners (suggested reading)

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Processing of Foods of Plant Origin	MSD 301	4:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get knowledge about post- harvest handling operations.
CLO 2	Understand various processing and preservation techniques used in food.
CLO 3	Get knowledge about processed fruit and vegetable products.
CLO 4	Understand various facts Food additives.

B. SYLLABUS

Module I

Introduction: Role and Status of Post-Harvest Technology, Fruits and vegetables as living products: Chemical composition; pre and post-harvest changes, maturity standards for storage, desirable characteristics of fruits and vegetable of processing. Pre-processing; Post harvest handling of fresh fruits and vegetables: Packaging, storage, transportation and marketing. Minimal processing.

Module II

Fruit and vegetable juices: Preparation of juice, syrups, squashes, cordials, and nectars; concentrations and drying ofjuice, packaging and storage and Concentrations and powders; fortified and soft drinks. Preservation by freezing: General methods for freezing of fruits and vegetables; problem relating to storage of frozen products.

Module III

Dehydration of fruits and vegetables: Methods; packaging, storage, Quality control Storage of fresh fruits and vegetables: Containers: tin, glass and other packaging materials used in fruits and vegetables preservations. Canning and bottling; Quality of raw materials, preparation of materials, syrups and brines, effect of canning and bottling on nutritive value, spoilage of

canned foods, detection and control.

Module IV

Pickles and chutneys: Preparation of various types of pickles-theory and practice; preparation of sauces and chutneys;problems relating to the shelf life of pickles and chutneys; quality control. Tomato products: Preparation of various tomato products, food standards and quality control. Pectin: Raw materials; processes and uses of pectin; products based on pectin manufacture and quality control.

Module V

Preservatives and additives used in fruit and vegetable preservation, Fermented fruit beverages (wine and vinegar). General methods of preparation, food standards and quality control. Utilization of waste from fruit and vegetables processing plant, Tea, Coffee and Cocoa Production and Manufacturing Technology of nonalcoholic beverages Practical Preparation of tomato products (Sauces, Soup, ketch up,) Preparation of marmalade, Pickles, Jam, Jelly andfruit candy. Determination of pectin and chemical preservatives in fruits and vegetables products.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Srivastava R.P. and Kumar S. Fruit and vegetable preservation: principles and practices. CBS publishers.
2. Morris, TN. Principles of Fruit Preservation. Biotech Books, Delhi.
3. Pantastico, E. B. Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits andVegetables. AVI Publishing Co. Inc, Westport.
4. Rydstm Heele, S, Post Harvest Physiology and Pathology of Vegetables. Marcel Dekker.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Novel Food Packaging Technology	MSD 302	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain various physical and chemical properties of packaging materials and their manufacturing process, through in-class discussions, electronic simulations and exam questions.
CLO 2	Communicate clearly about different type of packaging material and their functions, through independent written assignments and exam questions.
CLO 3	Appreciate the contributions of packaging material in increasing the shelf life of food products, through clicker questions, class discussion and exam questions.

B. SYLLABUS

Module I

Role of packaging in the food chain, active and intelligent packaging techniques, current use of novel packagingtechniques, oxygen, ethylene and other scavenging technologies.

Module II

Antimicrobial food packaging and factors affecting effectiveness of antimicrobial packaging, Non-migratorybioactive polymers (NMBP), Time-temperature indicators, use of freshness indicators in packaging.

Module III

Modified atmosphere packaging (MAP), Novel MAP applications for fresh prepared produce, effect of MAP on nutritional quality and microbial safety of MAP, Novel packaging and particular products, Legislative issues relatingto active and intelligent packaging, Recycling packaging materials, Green plastics for food packaging.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. A Raija 2003. Novel Food Packaging Techniques. Woodhead publishing in Food Science and TechnologyCRC Press.

2. Frank AP and Heather YP 1992. A Handbook of Food Packaging. Springer Science.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Food Safety and Quality Management	MSD 303	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding Food safety and quality parameter and management.
CLO 2	Develop in depth knowledge of food safety standards and quality management in food system
CLO 3	Knowledge of Indian and global food safety scenario

B. SYLLABUS

Module I

Introduction: Concept of food safety and quality, Food adulteration and contamination, Responsibility of food safety. Indian Scenario of Food Safety, Recent food safety issues at national and international level

Module II

Food safety Hazards and Food borne diseases: Food safety hazards (Biological, Chemical and Physical Hazards), Food borne diseases, Food spoilage, food poisoning, food infections, prevention of Food safety hazards through Hazards Analysis and Critical Control Point (HACCP) and Good Practices

Module III

Food safety regulation in India : Introduction to Food Safety Act - 2006 and Food safety and Standards Authority of India, Food safety standards regulations 2011, Food Surveillance, Food Recall, PFA, FPO, MMPO, MPO, BIS, AGMARK standard.

Module IV

International food safety regulatory framework: International Organization for Standardization

(ISO), Codex, ISOstandards (ISO 22000, 9000, 14000), US Food and Drug Administration and Food Safety at European Union, Harmonization of Food Safety Regulations

Module V

Initiatives of FSSAI: Eat Right India, FoSTaC, Food Fortification, Detect Adulteration with Rapid Test (DART), Clean Street Food, BHOG (Blissful Hygienic Offering to God), Food Safety on Wheels, Food Smart Consumer, Codex, Diet for Life etc.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Make it safe: a guide to food safety, CSIRO Food and Nutritional Sciences Publisher.
2. Richard Lawley, Laurie Curtis & Judy Davis. (2008). The Food Safety Hazard Guidebook. RSC Publisher.Cambridge, UK.
3. Cynthia A. Roberts (2001). The food safety information handbook. CRC. New, Delhi.
4. https://fssai.gov.in/

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Dairy Technology	MSD 304	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the physical and chemical properties of milk and milk products
CLO 2	Describe the different treatments of milk such heating, homogenization, centrifugation, agitation filtration, concentration, and fermentation
CLO 3	Prepare/manufacture different dairy products such as cream, butter, ghee, yoghurt, cultured milk, ice cream and cheese using simple and industrial techniques

B. SYLLABUS

Module I

Present status of milk & milk products in India and abroad; market milk. -Composition of milk of various species, quality evaluation and testing of milk, procurement, transportation and processing of market milk. Physicochemical properties of milk. Pasteurization, sterilization, homogenization and UHT processing of milk. Cleaning & sanitization of dairy equipment, Special milks such as flavoured, sterilized, recombined & reconstituted toned & double toned.

Module II

Membrane processing of milk: types of membranes, principle of operation, applications of reverse osmosis, ultrafiltration and microfiltration. Technology of cream production: Cream separator; Ripening of cream; Types of butter, composition and production methods, nutritive value, defects - their causes and prevention. Production of butter, oil / ghee. Technology of milk powders (WMP, SMP): composition, nutritive value, process of manufacture, defects - their causes and prevention, Instantization of milk powder.

Module III

Technology of Milk products: Cheese- classification, composition, nutritive value, process of manufacture of cheddar,mozzarella, cottage and processed cheese, defects - their causes and

prevention. Frozen milk products (Ice cream) - composition, nutritive value, process of manufacture, defects (their causes and prevention). Indigenous milk products: khoa, rabri, channa, paneer, shrikhand, milk-based sweets etc. Utilization of milk industry by- products- importance/need and food applications.

Module IV

Technology of fermented milk products: Methods for manufacture, packaging, storage and marketing, i.e., dahi, cultured butter milk, yoghourt, acidophilus milk, kumiss, kefir, etc.

Module V

Milk and milk products standards and legislations in India, Grading of milk and criterion of grading. Dairy plant sanitation- hygiene in dairy industry, different types of cleansing and sanitizing agents, their applications, cleaning systems (cleaning in place, central cleaning system, self-contained cleaning system). Newer concepts in dairy products- cream powder, sterilized cream, butter spread, butter powder, cheese spread, caseinates, WPC, lactose powder.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Sukumar, De. 1980. Outlines of Dairy Technology: Oxford University Press, Delhi.
2. Byron, H. W., Arnold, H. J. and John, A. A. 1987. Fundamentals of Dairy Chemistry (2nd ed.): CBS, Delhi.
3. Wong, N. P. 1988. Fundamentals of Dairy Chemistry (3rd ed.): VNR, New York.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Industrial Training Evaluation	MSD 305	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To gain practical knowledge of industrial protocols and processes
CLO 2	To learn the in-plant managements of industrial activities.
CLO 3	To learn report writing and result presentation

Before Industrial Training

- To apply for a suitable Industrial Training, submit an application form through the Officer (Training/ Training and placement) to the organization concerned one semester before the Industrial Training Programme commences.
- Submit one copy of the offer letter for the Industrial Training to the Head of the department or Faculty coordinator (Industrial Training). Students are not allowed to change their Industrial Training after obtaining the approval and confirmation from the industry.
- To complete the Industrial Training placement process within the specified time based on the Industrial TrainingProgramme schedule.
- To ensure that the Industrial Training is not performed in a family-owned company so as to avoid conflict of interest.

During Industrial Training

Before Industrial Training

- To apply for a suitable Industrial Training, submit an application form through the Officer (Training/ Training and placement) to the organization concerned one semester before the Industrial Training Programme commences.
- Submit one copy of the offer letter for the Industrial Training to the Head of the

department or Faculty coordinator (Industrial Training). Students are not allowed to change their Industrial Training after obtaining the approval and confirmation from the Industry.

- To complete the Industrial Training placement process within the specified time based on the Industrial TrainingProgramme schedule.
- To ensure that the Industrial Training is not performed in a family-owned company so as to avoid conflict of interest.

During Industrial Training

When the training of the student in a particular department/ section/ shop of an industry is completed, he / she should write departmental report. Report should include description of the department/ Section/ Shop, the processes and procedures followed in it. Individual items of equipment, special attachment, indigenously adopted tools should be described. Personnel & any other human resource features should be highlighted. Drawings, sketches, specification of equipment, used, should be given wherever essential. The report should also contain entire studies & discussions carried out by the students in addition to what he/ she has observed during his / herday to day work. The departmental report should be signed by the student and also by his officer-in-charge of that department/ section/ shop.

The report must include the following:

1. The basic history/introduction of the industry.
2. The sequence of operations followed/ systems introduced for the production.
3. The layout of various workshop/floors or the labs and admin section of the industry.
4. The major equipment used for the production/ computer configuration required for the loading theused software's.
5. The infrastructure available.

6. The movement of material (raw, semi-finished and finished product), not applicable in case ofsoftware industry.
7. The formulation of 3 to 4 practical problems.
8. Data required for formulating the problems.
9. Analysis of the data, steps required and commands used in case of software industry.
10. Suggestions made based on the analysis of the data.
11. Recommendations.
12. Certificate from the industry for the period of training undergone.
13. The final report must be at-least 25 to 30 pages for the student undergoing 45 days training. In case no. ofstudents undergoing training in the same industry are more than one, each student will prepare his/ her report separately.

The Layout Guidelines for the Project File & Project Report

1. A4 size Paper
2. Font: Arial (10 points) or Times New Roman (12 points) Line spacing: 1.5
3. Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

FORMAT OF INDUSTRIAL TRAINING REPORT

The following titles must be incorporated in the final industrial training report:

- Preface/Acknowledgement
- Certificate with Signatures and Seal of the Industry Person
- Contents/Index
- Introduction about the Industry
- Training Schedule
- Work Done / Observations
- Specific Assignment / Project Handled
- Learning after Training
- Summary

EVALUATION THROUGH SEMINAR PRESENTATION

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

The students will present his report though seminar, which will be held by an expert committee constituted by the concerned department as per norms of the institute. The evaluation through seminar presentation will be based on the following criteria.

1. Quality of material presented.
2. Effectiveness of presentation.
3. Depth of knowledge and skills.

Upon completion of these programmes, students are expected to demonstrate the following graduates' attributes:

1. Engineering Knowledge
2. Problem analysis
3. Design/ development of solutions
4. Conduct investigations of complexproblems
5. Modern tool usage, The engineer and society
6. Individual and Team Work
7. Communication and Project Management and Finance.

EXAMINATION SCHEME:

Components	Dissertation	Viva-voce	Total
Weightage (%)	50	50	100

SUGGESTED READINGS

1. Industrial Microbiology by Brinton M miller & Warren Litsky. MGH.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Processing of Foods of Plant Origin (Lab)	MSD 321	0:0:1	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get knowledge about post- harvest handling operations.
CLO 2	Understand various processing and preservation techniques used in food.
CLO 3	Get knowledge about processed fruit and vegetable products.

B. List of Practical's:

1. Canning of fruits and cut-out test for canned fruits
2. Canning of vegetables and cut-out test for canned vegetables
3. Dehydration of fruits / vegetables and evaluation of dried products
4. Freezing of fruits / vegetables and evaluation of frozen products
5. Preparation of jam / jelly / marmalade / preserve and its evaluation
6. Preparation of fruit beverage and its evaluation
7. Preparation of fruit chutney / pickle and its evaluation
8. Preparation and evaluation of tomato sauce / ketchup
9. Testing of vinegar
10. Minimal processing of fruits / vegetables.
11. Preparation of cheese, candy and preserve
12. Visit to food processing industry

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/ Spotting	Practical Record	Viva
15	10	05	35	15	10	10

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

SUGGESTED READINGS

1. Food Preservation and Processing, Manoranjan Kalia & Sangita Sood.
2. Food Science, N. N. Potter, C B S Publishers & Distributors.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Novel Food Packaging (Lab)	MSD 322	0:0:1	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain various physical and chemical properties of packaging materials
CLO 2	Communicate clearly about different type of packaging material and their functions,
CLO 3	Appreciate the contributions of packaging material in increasing the shelf life of food products

B. List of Practical's:

1. Identification of different type of packaging material and testing of properties of different packaging materials (paper, plastic, biodegradable, glass and metal)
2. Study of symbols and labels used on food packages and study of intelligent packaging
3. Vacuum packaging and nitrogen filled packaging
4. Form-fill- seal packaging
5. Retort pouching
6. Determination of changes in packaged foods
7. Development of biodegradable package
8. Preparation and application of edible coatings
9. Comparative evaluation of different packages for foods
10. Estimation of shelf life of food under different packaging materials.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

1. Sukumar, De. 1980. Outlines of Dairy Technology: Oxford University Press, Delhi, India
2. Rangappa, K. S. 1975. Indian Dairy Products. Asia Publishing House, Bombay, India

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Advance Dairy Technology Lab	MSD 323	0:0:1	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Acquaintance with knowledge on processing of milk in variety of milk products and to understand the chemistry of milk and milk products.
CLO 2	Knowledge about the preservation of milk through high temperature treatment.
CLO 3	Hands on proximate analysis of milk and milk products.

B. List of Practical's:

1. Sampling of milk, platform tests
2. Determination of specific gravity, milk fat, SNF and TS percentage in milk
3. Cream separation and standardization of milk and cream
4. Preparation of toned/humanized/fortified/reconstituted/flavoured milk
5. Preparation and grading of butter
6. Preparation of cheese
7. Preparation of channa and paneer
8. Preparation of Khoa / ghee
9. Preparation of ice-cream
10. Preparation of indigeneous milk product – shrikhand / kalakand / milk-cake
11. Visit to a dairy plant producing condensed milk / milk powder

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

SUGGESTED READINGS

3. Sukumar, De. 1980. Outlines of Dairy Technology: Oxford University Press, Delhi, India
4. Rangappa, K. S. 1975. Indian Dairy Products. Asia Publishing House, Bombay, India
5. Marshall, R.T. 1992. Standard Methods for the determination of Dairy Products. 16th ed.Publ. American Public Health Association.
6. https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/MILK_AND_MILK_PRODUCTS.pf

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Food Business Management	MSD 330	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate knowledge of the laws that relate to the use of materials in foods and the operation of food plants and the federal, state and local level
CLO 2	Identify and apply the principles of food plant operation and management
CLO 3	Manage operations and resources in a food processing plant

B. SYLLABUS

Module I

Introduction: Introduction to marketing and management. Marketing concepts and marketing systems and its functions. Link between agriculture and food industry, Introduction to marketing boards, co-operatives and others. Market liberalization, its role, strategies, impact and economics.

Module II

Marketing management, strategies, planning and control: Introduction to strategy, policy, planning and control. Marketing planning process, monitoring and evaluation. International Marketing and International Trade;Composition & direction of Indian exports; International marketing environment; Exports-Direct exports, indirect exports, Licensing, Joint Ventures, Direct investment & internationalization process; Deciding marketing Programme; Product, Promotion, Price, Distribution Channels; Deciding the Market Organization; World Trade Organization (WTO).

Module III

New product development and buyer behavior: Need, objectives and process for new product development. Factors impact buyer behavior and market segmentation. Commodity and its marketing, stages and challenges incommodity marketing, product and its definitions, product line, brand, product management models.

Module IV

Pricing management, channel management and physical distribution: Objectives, strategies, types and decisions of commodity, breakeven analysis, pricing, cost, revenue and supply relationship. Channel management, middleman and their role, distribution channels, concept and its technological advancements. Warehouse, inventory, logistics and transport management.

Module V

Marketing communication, research, cost and margins: Nature, objectives and factors of marketing communication. Advertisement, sales promotion, sales force, agents, promotions and budget for communication of commodity. Purpose and steps involved in market research. Objectives and structure of marketing cost and margins.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. David D. Van Fleet, Ella W. Van Fleet, and GeorgeJ. Seperich. (2014), Agribusiness: Principles ofManagement.Cengage Learning, New York.
2. Freddie Barnard, Jay Akridge, Frank Dooley, John Foltz (2012). Agribusiness Management. Fourthedition, Routledge, New York.
3. I.M. Crawford. (1997). Agricultural and food marketing management. Food and Agriculture Organization of the United Nations. Rome.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Aanandam	AND003	0:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

INTRODUCTION

Aanandam is a credited subject that aims to instill **the joy of giving** and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus- Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact on society
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence and Efficiency

AANANDAM: COMMUNITY SERVICE

- Community service programs are very effective for students' **personal** and **social**, ethical, and **academic** development. These effects depend on the characteristics of the programs chosen
- Involvement of students in community work has an impact on development of student **skills**, **creativity, critical thinking,** and **innovative powers. Passion and Positivity** are basic requirements for Community service
- They would **examine social challenges** /problems, **assess the needs** of the community, **evaluate** previous implemented projects, and **think of further solutions**
- They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities.

BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.

- obtain employment
- be useful to society as it will protect them against stress, frustration, and depression

ABOUT AANANDAM COURSE

Students are expected to engage in:

- An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)
- **Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.**
- **It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules**.
- Two credits for a project in each semester
- 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

- Do at least one individual act of goodness each day and Record this act in a dedicated diary/register
- Share this dedicated diary/register in a 30-minute**Anandamperiod** with the mentor and share your experience with the class
- Students in **Semester scheme** must take up one Group Community Service Project per semester
- Students in **Annual scheme** must take up two Group Community Service Projects per year
- Take one Group Community Service Project from **August to November**
- Take one Group Community Service Project from **January to April**
- The students must take photographs to document their work

- The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
- The students may submit newspaper cuttings
- The students must participate in the **Aanandam Day** by displaying charts of their Group Community Service Project
- They can make power point presentations of their project which will help them get better grades

ROLE OF FACULTY MENTOR

- The mentor will **maintain a register** wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
- Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The **act will not be evaluated** - just if it was recorded or not.(**Be suggestive not judgmental)**
- In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
- The mentor will divide the class for the Group Community Service Project and record it in a register.**8-12 students can form a group** for project work.
- The students will opt the project of their choice.
- The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
- The mentor will guide the students to write the Group Community Service Project Report.
- Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spread sheet

ROLE OF DIRECTOR/HOIS

- Allot one period of half an hour for Aanandam course
- Assign all faculty members as mentors for this period of half an hour for students
- Each faculty will have one class to mentor
- Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.
- To coordinate the **Aanandam Day** activities
- To organize **Aanandam Day** in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefitof students (to motivate and inspire them for community service)
- Photographs of the **Aanandam Day** should be displayed in department and these should be uploaded in the gallery of University web page on HTE portal
- A **Project Assessment Committee** (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

- **Director/HoIs**
- **One person from community**
- **Departmental Aanandam Coordinator**
- **Project Mentors (1 to 7 or more members)**

The number of mentors can vary depending on the number of projects and students in each department.

- University level PAC to be formed for university colleges and departments
- State level PAC to be formed at Commissionerate level for Universities

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PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- literacy programs, in today's digital age many organizations/individuals might also need help with email and websites
- livelihood projects,
- time giving activities to adopted communities(awareness regarding Govt. programmes)sports like yoga, meditation, drills, and physical exercises in adopted areas
- activities on arts and culture such as restoration of traditional art and culture and monuments.
- understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers
- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- help plant a community garden, help out at a children's camp

THE PROJECT REPORT

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The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society(the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non government bodies they collaborate with, if any
- Photographs of **Display charts** or **ppt/video** prepared while presentation on the group community service in the **Aanandam Day** must be submitted along with the report
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

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- **Project Assessment Committee** will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome results

Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video **(max.10 marks)**
- Photographs of Students' participation and involvement of community **(max.10 marks)**
- Problem solving and challenging issues addressed/innovation **(max. 30 marks)**

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs

Grading Marks

C grade =32 hrs

B grade>32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

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AWARD AND RECOGNITIONDEPARTMENT, UNIVERSITY AND STATE LEVEL

- Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.
- The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education for contesting the state level award
- State Level Project Assessment Committee will evaluate projects received from all the universities (one each).
- A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Food Toxicology	MSD 331	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Regarding the most important contaminants in food, toxicology of various food additives and contaminants and their sources.
CLO 2	Explain what food safety involves and which contaminants are of relevance.
CLO 3	Explain risk analysis, assessment and management related to food safety and which organizations are involved in these processes nationally and internationally.

B. SYLLABUS

Module I

Definition of toxicology and food toxicology, scope and diversity of food toxicology, Biological factors that influence toxicology, General principle of toxicology: phases of toxicological effects and dose-response relationship, Types of membrane transport. Categories of toxicology. classification of food toxicants, methods used in safety evaluation-risk assessments.

Module II

Toxicants and allergens in foods derived from plants, animals, marine, algae & mushroom; Microbial toxins; Food Poisoning; Food borne infections and disease. Factors that influence toxicity: Diet and Biotransformation: effect of micronutrient changes; effect of macronutrient changes, Gender and Age, Species, Potential toxic effects of normal dietary constituents

Module III

Determination of toxicants in foods: Qualitative and Quantitative analyses of toxicants in foods; Biological determination of toxicants: acute toxicity, genetic toxicity, subchronic toxicity and chronic toxicity

Module IV

Toxicants found in the foods with their adverse effects, mode of action and clinical symptoms: Bacterial toxins; animal and plant toxins; toxicity of nutrients; toxins from fungi adverse effects; mode of action and clinical symptoms,; food borne viruses and factors that increase the risks of food borne infections; sea food toxins and poisoning, Food toxicology aspects of pesticides and industrial contamination, food additives: colour, flavour, preservatives, antioxidants and sweeteners agents, Toxicants formed during food processing (nitrosamines, acrylamide, benzene, dioxins and furans; persistent organic pollutants).

Module V

Epidemiology in food and nutritional toxicology, Food safety assessment: compliance with regulations, emergingfood safety issues in a modern world

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Deshpande SS.2002. Handbook of food toxicology. CRC Press.
2. Shibamoto T and Bjeldanes LF. 2009. Introduction to Food Toxicology Second Edition. Food Scienceand Technology International Series.
3. Stanley T Omaye. 2004. Food and Nutrition Toxicology. CRC Press.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Communication - III	BCS 311	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Module I: Mechanics and Semantics of Sentences

Writing effective sentencesStyle and Structure

Module II: Developing writing skills

Inter - office communication: Business Letter; E mails; Netiquette Intra – office communication: Memos, Notices, Circulars, MinutesReport Writing

Module III: Business Presentations

Planning, design and layout of presentation Information Packaging, Audience analysisAudio visual aids, Speaking with confidence Case Studies

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

1. Chemical Engineers' Handbook. McGraw Hill Book Co. Inc, New York.
2. Krishnaswamy, N, Creative English for Communication, Macmillan

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science - III	BSS 311	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept.
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groups sociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO 5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

B. SYLLABUS

Module I: Teams: An Overview

Team Design Features: team vs. group

Effective Team Mission and Vision

Life Cycle of a Project Team

Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry

Patterns of Interaction in a Team

Sociometry: Method of studying attractions and repulsions in groups

Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building

Types and Development of Team Building

Stages of team growth

Team performance curve

Profiling your Team: Internal & External Dynamics

Team Strategies for organizational vision

Team communication

Module IV: Team Leadership & Conflict Management

Leadership styles in organizations

Self Authorized team leadership

Causes of team conflict

Conflict management strategies

Stress and Coping in teams

Module V: Global Teams and Universal Values

Management by values

Pragmatic spirituality in life and organization

Building global teams through universal human values

Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

EXAMINATION SCHEME:

Components	**SAP**	**JOS**	**FC/MA/CS/HA**	**P/V/Q**	**A**
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

SUGGESTED READINGS

1. Organizational Behaviour, Davis, K.
2. Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
3. LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
4. Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
5. J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
6. Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Major Project /Dissertation	MSD 460	30:0:0	30	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Experience in conducting independent project work
CLO 2	Articulation of project and research methodology for identified problem
CLO 3	Report writing and presentation.

B. SYLLABUS

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the useof advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts shouldbe critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be takenin its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in

as part of theproject;

- Any activities planned but not yet completed as part of the project, or as a future initiative directly resultingfrom the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor'sName.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of theproject, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in detailsincluding modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail whatis readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smoothflow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations shouldalso be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and anyproblem that have arisen that may be useful to document for future reference.

- **References/ Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically onthe author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

NITROGEN FIXATIONPLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of theproject and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain informationExecution of Research

Data Analysis

Analyse Quantitative/ Qualitative

informationControl Quality

Draw

Conclusions

Components	Dissertation	Viva-voce	Total
Weightage (%)	50	50	100

Master of Science (Biotechnology)

Programme Code: MSB

Duration – 2 Years Full Time

Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2021-23 Batch

AMITY UNIVERSITY
R A J A S T H A N

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

May, 2020

PROGRAMME OVERVIEW

Biotechnology in the present scenario is helping by showing advancement in diagnosis of a disease by helping us to move forward from primitive Symptomatic Treatment to modern Molecular Treatment along with rapid organization and analysis of biological data possible (Bioinformatics), Marine and aquatic applications of Biotechnology used to improve cleanup of toxic spills, improve yields of fisheries (Blue Biotechnology), Agricultural use of Biotechnology, heading towards the production of crops in not only good quantity but also with good quality (Green Biotechnology), Medicine including designing of organisms to produce antibiotics and the engineering of genetic cures through genomic manipulation (Red Biotechnology), Exemplified by the designing of an organism to produce useful chemicals, use of enzymes as industrial catalysts (White Biotechnology).

In view of above Amity University Rajasthan running Bachelors, Master and Ph.D biotechnology programs to fulfill the demand of various biopharmaceutical and biotechnological industries. All these programs course curriculum and structure have been designed in consultation with various pharmaceutical, biotechnological and dairy industry experts to meet the demand and supply of technical qualified personals. The course curriculum covering the major part of advanced biotechnological process, bioprocess and downstream technology, enzyme technology, separation technology, immunology, virology, genetics, molecular modeling drug design, biopharmaceuticals, pharmaceutical biotechnology, and bioinformatics in relation to the industry requirements.

The MSc. programme in Biotechnology seeks to provide education and training, empower students with technical skill-set, create capacities and build career opportunities in four key domains of biotechnology namely:

- Research and Development (Academic & Research Institutions and Industrial Sectors)
- Biotechnology Industries, Breweries, Pharmaceutical & Food Industries
- Forensic, Diagnostics Centers and Regulatory agencies
- Data handlings, Coding and Clinical research

This is achieved through a combination of interdisciplinary curricula as well as intensive laboratory work. Through its unique pedagogical methods, the academic programme allows transferability of acquired skills in domains unrelated to biotech sectors. Students are expected to have both specialized knowledge and practical experience for addressing contemporary problems in both academic and industrial setting.

Program Learning Outcomes (PLO):

The objective of the programme is to highlight the role played by biotechnology in modern society and its relevance to sustainable development. It seeks to provide the following:

PLO-I	**:**	Apply the theoretical and empirical methods of Biotechnology to questions at the frontier of knowledge for a successful career in Biotechnology and allied industries.
PLO-II	**:**	Explain, debate and demonstrate to lay audiences the application of Biotechnology to solve the problems of society.
PLO-III	**:**	Build teams that work collaboratively and make progress efficiently towards solutions for real world projects.
PLO-IV	**:**	Evaluate and explain the potential impacts, including risks of large scale engineering projects from Biotechnology and thereby produce recommendations for sustainable development.

Credit Summary Sheet

M. Sc. Biotechnology					
Semester	**CC**	**DE**	**VA**	**OE**	**Total**
1	19	3	4	-	26
2	20	3	4	3	30
3	20	3	4	3	30
4	30	-	-	-	30
Total	**89**	09	12	06	**116**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective

List of Open Electives from M.Sc Biotechnology						
From M.Sc Biotech						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSB230	Environment Biotechnology	CC	3	-	-	3
MSB331	Tissue Engineering	CC	3	-	-	3

M. Sc. Biotechnology: **I Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSB101	Biochemistry & Metabolic Regulation	CC	3	-	-	3
MSB102	Advanced Microbiology	CC	3	1	-	4
MSB103	Bioinformatics	CC	3	-	-	3
MSB104	Cell & Molecular Biology	CC	3	-	-	3
MSB121	Biochemistry & Metabolic Regulation Lab	CC	-	-	2	1
MSB122	Advanced Microbiology Lab	CC	-	-	2	1
MSB123	Bioinformatics Lab	CC	-	-	2	1
MSB124	Cell & Molecular Biology Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
MSB130	Instrumentation in Biotechnology	DE	3	-	-	3
MSB131	Biosafety, Bioethics & IPR	DE				
MSB132	Industrial Safety & Hazards	DE				
BCS111	Communicational Skills – I	VA	1	-	-	1
BSS111	Behavioural Science I (Self Development and Interpersonal Skills)	VA	1	-	-	1
FLT111 FLG111 FLS111 FLC111	Foreign Language – I French German Spanish Chinese	VA	2	-	-	2
AND001	ANANDAM-I	CC	-	-	-	2
NCVA	-	NCVA	-	-	-	-
	TOTAL					**26**

M. Sc. Biotechnology: **II Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSB201	Advanced Plant Biotechnology	CC	3	-	-	3
MSB202	Advanced Animal Biotechnology	CC	3	-	-	3
MSB203	Advanced Structural Biology	CC	3	-	-	3
MSB204	Advance Biostatistics and Scientific Writing	CC	3	-	-	3
MSB205	Medical Biotechnology	CC	3	-	-	3
MSB221	Advanced Plant Biotechnology Lab	CC	-	-	2	1
MSB222	Advanced Animal Biotechnology Lab	CC	-	-	2	1
MSB223	Advanced Structural Biology Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
MSB230	Environment Biotechnology	DE	3	-	-	3
MSB231	Entrepreneurship development in Biotechnology	DE				
MSB232	Pharmaceutical Technology & Biotechnology	DE				
OE	Open Elective II	OE	3	-	-	3
BCS211	Communicational Skills – II	VA	1	-	-	1
BSS211	Behavioural Science – II (Behavioral Communication and Relationship Management)	VA	1	-	-	1
FLT211 FLG211 FLS211 FLC211	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
AND002	ANANDAM-II	CC	-	-	-	2
	TOTAL					**30**

M. Sc. Biotechnology: **III Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSB301	Bioprocess and Industrial Biotechnology	CC	3	-	-	3
MSB302	Molecular Genetics and Developmental Biology	CC	3	-	-	3
MSB303	Enzyme Technology & Immunology	CC	3	-	-	3
MSB304	Recombinant DNA Technology	CC	3	-	-	3
MSB305	Genomics & Proteomics	CC	2	-	-	2
MSB321	Bioprocess and Industrial Biotechnology Lab	CC	-	-	2	1
MSB323	Enzyme Technology & Immunology Lab	CC	-	-	2	1
MSB324	Recombinant DNA Technology Lab	CC	-	-	2	1
MSB325	Genomics & Proteomics Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
MSB330	Advanced Food Technology	DE	3	-	-	3
MSB331	Tissue Engineering	DE				
MSB332	Drug Discovery & Development	DE				
OE	Open Elective III	OE	3	-	-	3
BCS311	Communicational Skills - III	VA	1	-	-	1
BSS311	Behavioral Science III (Leading Through Teams)	VA	1	-	-	1
FLT311 FLG311 FLS311 FLC311	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
AND003	ANANDAM-III	CC	-	-	-	2
	TOTAL					**30**

M. Sc. Biotechnology: **IV Semester**						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
MSB460	Major Project /Dissertation	CC	-	-	-	30
	TOTAL				**-**	**30**

Course Name	Course Code	L:T:P	Credit	Semester
Biochemistry And Metabolic Regulation	MSB101	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Biochemistry majors will be able to demonstrate an understanding of fundamental biochemical principles, such as the structure/function of biomolecules, metabolic pathways, and the regulation of chemical and molecular processes that occur in and between cells.
CLO 2	Biochemistry majors will gain proficiency in basic laboratory techniques in both chemistry and biology, and be able to create the scientific method to the processes of experimentation and hypothesis testing.
CLO 3	Students in the Biochemistry major will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums.
CLO 4	Develop your research skills in preparation for a career in the biosciences industry or academic research.

B. SYLLABUS

Module I
Structure of Biomolecules, Metabolism of Carbohydrates, Lipids, Proteins, Amino acids and Nucleic acids.

Module II
Photosynthesis in Microorganisms; Role of chlorophylls, carotenoids and phycobilins; Calvin cycle; Chemolithotrophy; hydrogen- iron-nitrite-oxidizing bacteria; nitrate and sulfate reduction; methanogenesis and acetogenesis; Bacterial fermentations.

Module III: Modes of Regulation
Different levels of regulation - protein synthesis/degradation, allosteric regulation, reversible covalent modification, proteolytic processing, Requirements for ATP in synthesis and degradation cycle, Reversibility of the different methods of regulation, Consequences of misregulation

Module IV: Regulation of metabolic pathways
Glycolysis/glycogenolysis, Phosphogluconate/Citric Acid Cycle, Oxidative Phosphorylation, Fatty acid oxidation, Fatty Acid Biosynthesis, Amino Acid Oxidation.
Module V:
Regulation of Metabolism for the production of Primary and Secondary Metabolites with case studies.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Lehninger, A. (2013). Principles of Biochemistry, 6th Ed., Nelson and Cox.
- Mathews, Van Holde & (2012).Ahern Biochemistry. 4th Edition.

References:

- Smith, E. L., Hill, R. L. Lehman, I. R. Lefkowitz, R. J. Handler, P. & White, A. (1983). Biochemistry 7th Ed. McGraw-Hill Book Company.
- Berg, J. M., Tymoczco, J. L. & Stryer, L. (1990). Biochemistry, 3rd Ed., W.H. Freeman and Company.
- Voet, D. V. & Voet, J. G. (2010). Biochemistry, 4th Ed. Wiley
- Conn, E. E. & Stumph, P. K. (1987).Outlines of Biochemistry, John Wiley & Sons.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED MICROBIOLOGY	MSB102	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the structure of bacteria, the nutritional and physical requirements for bacterial growth and explain the dynamics of bacterial growth, evolution of bacteria and molecular taxonomy of bacterial species
CLO 2	Demonstrate awareness of the mechanism of genetic transfer and microbial regulation of gene expression
CLO 3	Analyse and critically evaluate the host-parasite relationships, the entry of pathogens into the host, host barriers, microbial toxins, plant microbe interactions and microbial pathogenesis.
CLO 4	Apply the knowledge of microbial structure and pathogenesis in the prevention of diseases and killing of microorganism using antimicrobial agents and its mode of action.

B. SYLLABUS

Module I
Introduction (bacteria, fungi, algae, protozoa and viruses), Contribution of Scientists, Koch's Postulates, methods in Microbiology -Principles of microbial nutrition, Culture media, Theory and practice of sterilization, pure culture techniques, Enrichment culture techniques and Microbial lab techniques.

Module II
Prokaryotic structure and function - Microbial nutrition and growth - Arithmatic and Geomatric Growth expression, mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, continuous culture, Diauxic growth, culture collection and maintenance of cultures.

Module III
Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual, ribosomal RNA sequencing, microbial regulation of gene expression (attenuation and negative regulation with e.g. *trp* and *lac* operon), transfer of genetic material: plasmids, transposons, transduction, transformation and conjugation .

Module IV
Host-parasite relationship -Normal micro flora of skin, oral cavity, gastrointestinal tract; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Plant -Microbe Interactions, Microbial pathogenesis -Disease reservoirs; Epidemiological terminologies; Infectious disease transmission

Module V
Chemotherapy/antibiotics -Antimicrobial agents, sulfa drugs, antibiotics -penicillin and cephalosporins, broad spectrum antibiotics, antibiotics from prokaryotes. antifungal antibiotics; mode of action, resistance to antibiotics

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Pelczar, M.J., Chan, E.C.S. & Kreig, N.R. (2001). Microbiology 6th Ed. Tata McGraw Hill.
- Prescott, L.M. (2014). Microbiology, 9th Ed. McGraw by Hill Higher Education.

References:

- Stanier, R.Y., Ingraham, J.L., Wheelis M.L. & Painter, P.R. (2005). General Microbiology, 5th Ed. McMillan,
- Atlas, R.M. (1997). Principles of Microbiology 2nd Ed. WMT Brown Publishers.
- VanDemark, P.J. & Batzing, B.L. Menlo Park (1987). The microbes: an introduction to their nature and importance, Benjamin/Cummings Publishing Co.
- Tortora, G. J., Funke, B. R. and Case, C.L. (1994).Microbiology 5th Ed. Benzamin Cummings Inc. California.

Course Name	Course Code	L:T:P	Credit	Semester
BIOINFORMATICS	MSB103	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological datasets at various database and will understand the data attributes with information stored in it.
CLO 2	Create new projects by applying various tools to correct the existing data interpretation issues by applying computational methods.
CLO 3	Apply these data sources and software for investigation of novel biological problems
CLO 4	Develop new protocols and methods for biological discoveries.

B. SYLLABUS

Module I: Basics of Bioinformatics
Introduction to Bioinformatics; Computers in Biology to understand Biological System; Basic commands of Windows, Unix and Linux operating systems; Concept of open resources in Bioinformatics.

Module II
Biological databases -
Database concepts; Introduction to Data types and source; Protein Sequence and Structural Databases; Nucleic acid databases; Genome databases; Specialized Databases; Protein databases- UniProt, Protein Data Bank. Clinically relevant drug-drug interactions databases; Information retrieval from Biological databases: Entrez system, TCGA data bases, Bioportal.

Module III
Sequence Analysis
Biological background for sequence analysis; Sequence alignment: Global, Local, Pairwise and Multiple sequence analysis; Algorithm for alignments; Database Searching; Tools for Sequence alignment.

Module IV
Introduction to Modeling and Visualization tools
Introduction to RASMOL, PyMoL SWISS-PDB Viewer.

Module V
Insilico Structure prediction of protein and docking
Protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification; Structure databases– PDB and MMDB, visualizing structural information, Docking of Molecules, structure prediction in proteins, prediction of buried residues in proteins, RNA secondary structure – minimum free-energy structures.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Sensen, C.W. (2002). Essentials of Genomics and Bioinformatics, John Wiley and Sons.
- Mount, D.W. (2004). Bioinformatics: Sequence and Genome Analysis. 2nd Ed., Cold Spring Harbor Laboratory Press.
- Baxevanis, A.D. and Ouellette, B.F.F (2009). Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley – Interscience

References:

- Gusfield, D. (1997). Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, Cambridge University Press
- Heijne, G. Von and Heijne, G. Von (1987). Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by Academic Press.
- Pevzner, P.A. (2000). Computational Molecular Biology: An Algorithmic Approach by MIT Press
- Doolittle, R.F., Abelson, J.N, & Simon, M.I. (1996). Computer Methods for Macromolecular Sequence Analysis, Academic press
- Waterman, M. (1995). Introduction to Computational Biology: Maps, Sequences and Genomes, 1st Ed, Chapman and Hall.

Course Name	Course Code	L:T:P	Credit	Semester
CELL AND MOLECULAR BIOLOGY	MSB104	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the organization of biomembranes, membrane trafficking, cell signalling molecules and explain signal transduction pathways.
CLO 2	Demonstrate awareness about different stages of cell division and cell cycle check points
CLO 3	Express knowledge of DNA replication, recombination, repair and mutations.
CLO 4	Apply the knowledge of gene expression in biotechnology.

B. SYLLABUS

Module I

Protein targeting - Chemical and physical properties of cell membranes and their major components, significance of these properties to membrane structure, integral and peripheral membrane proteins, biosynthesis of membrane and secreted proteins; targeting of proteins to membranes.

Module II

Membrane transport/Cell Cycle - Mechanisms for transport of small molecules across the membrane, including simple diffusion, facilitative diffusion, primary and secondary active transport, action of ionophores. Cell cycle and the events associated with each stage, control of the cell cycle and the proteins involved; know the role of the cyclins and cyclin-dependent kinases, cell cycle checkpoints, methods for synchronizing the cell cycle in cell populations.

Module III

Intracellular Signaling I - define growth, growth factor, growth factor receptor, mitogen, receptor, effector, second messenger, action of hormones and other biologically active agents that act via receptors in the nucleus and/or cytoplasm. Intracellular Signaling II - the intracellular signaling cascades triggered by hormone binding to these receptor, G proteins signalling, the action of Ca 2+ and diacylglycerol as second messengers.

Module IV: Replication

Replication of DNA, Role of DNA polymerases & proteins involved in DNA replication, Compare and contrast eukaryote and prokaryote DNA replication, telomeres, telomerase and altered telomerase function in aging and disease.

Recombination & Repair: Mutations and types of site mutations: substitution, transition, transversion, insertion, deletion, tautomer, frameshift and nonsense mutation. Repair mechanisms: dimer repair, excision repair, mismatch repair, trans-lesion repair, and recombinational repair.

Module V

Transcription - RNA transcription and the proteins required for each step, maturation of the RNA transcript derived from a eukaryotic gene, structure of prokaryote and eukaryote promoter and the function of promoter sequences, inhibitors of prokaryote and eukaryote transcription and their mechanisms of action. Concept of operon, inducer, operator and polycistronic transcript, expression of the lac operon and trp operon in *E. coli*, catabolite repression, leader peptide and attenuator site, enhancer and transcription factors, four common DNA-binding motifs found in transcription factors, mRNA stability and alternative splicing in gene expression

Translation-Genetic code and the concept of colinearity of the gene and protein, components required for translation, basic steps involved in initiation, elongation, and termination of protein translation, inhibitors of protein translation. Compare and contrast the spatial and temporal differences in prokaryotic and eukaryotic transcription and translation

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Albert, B. (2002). Molecular Biology of the Cell 4th Ed., Garland Science New York.
- Darnell, L. and Baltimore (2012). Molecular Biology, Mac Millan
- Watson et al., (2013). Molecular Biology of the gene, 7th Ed., Pearson.

References:

- Lewis, B. (2003). Genes VIII, Benjamin Cummings.
- Goodenough, U. W. (1984). Genetics 2nd Ed. Saunders (W.B.) Co Ltd.
- Swanson, C. P., Merz, T. & Young, W.J. (1981). Cytogenetics, Prentice Hall
- Berg, J. M., Tymoczco, J. L. & Stryer, L. (2002). Biochemistry, 3rd Ed. W.H. Freeman and Company, ,
- Brown, T.A. (1990). Genomes 2nd Ed. Oxford: Wiley-Liss,

Course Name	Course Code	L:T:P	Credit	Semester
Biochemistry And Metabolic Regulation-Lab	MSB121	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Biochemistry majors will be able to demonstrate an understanding of fundamental biochemical principles, such as the structure/function of biomolecules, metabolic pathways, and the regulation of chemical and molecular processes that occur in and between cells.
CLO 2	Biochemistry majors will gain proficiency in basic laboratory techniques in both chemistry and biology, and be able to create the scientific method to the processes of experimentation and hypothesis testing.
CLO 3	Students in the Biochemistry major will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums.
CLO 4	Develop your research skills in preparation for a career in the biosciences industry or academic research.

B. SYLLABUS

Module I: Proteins
Identification of protein by Biuret test, quantitation of protein by Bradford method, Separation of proteins by SDS-PAGE, Enzyme: Determination of serum alkaline phosphatase activity

Module II: Nucleic Acid
Biochemical estimation of DNA, RNA. Separation of DNAsamples on Agarose gel.
Carbohydrate: Color reactions of different type of carbohydrates, Biochemical estimation of blood sugar
Lipids: Blood Cholesterol estimation.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED MICROBIOLOGY -Lab	MSB122	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the structure of bacteria, the nutritional and physical requirements for bacterial growth and explain the dynamics of bacterial growth, evolution of bacteria and molecular taxonomy of bacterial species
CLO 2	Demonstrate awareness of the mechanism of genetic transfer and microbial regulation of gene expression
CLO 3	Analyse and critically evaluate the host-parasite relationships, the entry of pathogens into the host, host barriers, microbial toxins, plant microbe interactions and microbial pathogenesis.
CLO 4	Apply the knowledge of microbial structure and pathogenesis in the prevention of diseases and killing of microorganism using antimicrobial agents and its mode of action.

B. SYLLABUS

Module I

Preparation of culture media for cultivation of specific microorganism. Isolation of microbes from air, soil and water samples, their identification by staining techniques – simple staining, differential Gram staining, lacto phenol cotton blue staining for fungi

Module II

Biochemical test – Indole test, methyl red test, voges proskaeur test, citrate utilization, starch hydrolysis, protease, catalase test and oxidase test. Identification of microbes in water samples; standard plate count, presumptive and confirmed coli form test, BOD and COD

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
BIOINFORMATICS-Lab	MSB123	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological datasets at various database and will understand the data attributes with information stored in it.
CLO 2	Create new projects by applying various tools to correct the existing data interpretation issues by applying computational methods.
CLO 3	Apply these data sources and software for investigation of novel biological problems
CLO 4	Develop new protocols and methods for biological discoveries.

B. SYLLABUS

Module I
Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein

Module II
Local and Global Alignment- concepts Pair wise sequence alignment, multiple sequence alignment Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm

Module III
Motif and pattern searching, Structure prediction, Protein structure classification resources, Structure superposition tools, Energy minimization and simulated annealing

Module IV
Phylogenetic prediction and analysis

Module V
Docking small molecules/peptides in active site of protein. Use of automated docking procedures. Free energy calculation.

Module VI
Finding transcription regulatory signals

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
CELL AND MOLECULAR BIOLOGY-Lab	MSB124	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the organization of biomembranes, membrane trafficking, cell signalling molecules and explain signal transduction pathways.
CLO 2	Demonstrate awareness about different stages of cell division and cell cycle check points
CLO 3	Express knowledge of DNA replication, recombination, repair and mutations.
CLO 4	Apply the knowledge of gene expression in biotechnology.

B. SYLLABUS

1. Isolation of genomic DNA from prokaryotic and Eukaryotes
2. Isolation of plasmid.
3. Study of apoptosis by TUNEL method
4. Isolation of cell organelles by ultracentrifugation.
5. Study of in vitro transcription.
6. Study of DNA repair mechanism
7. Site-directed mutagenesis

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
INSTRUMENTATION IN BIOTECHNOLOGY	MSB130	30:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To demonstrate an understanding of the theory, proper operation, maintenance and applications of common analytical laboratory instruments, including equipment for centrifugation, electrophoresis, spectrophotometry, and chromatography.
CLO 2	To demonstrate qualitative and quantitative analytical skills with various instruments using common biotechnology laboratory protocols.
CLO 3	Students will develop critical thinking skills relevant to biotechnology by performing experiment and relevant data analysis, troubleshooting of experiments and equipment and become familiar with safe laboratory practices, able to identify unsafe conditions and taking corrective action, learning proper handling and disposal techniques for hazardous materials.
CLO 4	Students will begin to gain laboratory independence by cleaning and preparing items for the lab and preparing biological and/or chemical materials, as well as other items used in experiments.

B. SYLLABUS

Module I: Ultracentrifugation
Sedimentation equilibrium and sedimentation velocity methods, Analytical and Preparative centrifuges, application of density gradient and differential centrifugation.

Module II: Gel electrophoresis
Agarose and Polyacrylamide, Two-dimensional electrophoresis, Isoelectric focussing, Capillary electrophoresis, Pulse-field gel electrophoresis, Immunoelectrophoresis.

Module III
TLC gas chromatography, gel filtration, ion-exchange chromatography, affinity chromatography and HPLC, FPLC.

Module IV
UV and visible Spectroscopy, Spectrofluorimetry, Atomic absorption spectrophotometry, Mass Spectrometry, Infrared Spectroscopy, MALDITOF, Nuclear Magnetic Resonance and Electron Spin Resonance Spectroscopy, Magnetic Resonance Imaging. X -Ray diffraction.

Module V
Optical and Electron Microscopy, Transmission and Scanning Electron Microscopy, Tunneling Electron Microscopy, Polarization and Fluorescence microscopy.
Radio tracers, GM Counter, Proportional and Scintillation Counters, Autoradiography, Radio-immunoassay.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Wilson, K. & Walker, J. (2000). Practical Biochemistry, Principles & Techniques 5th Ed. Cambridge University Press.
- Friefelder, D. (1982). Physical Biochemistry: Applications to Biochemistry and Molecular Biology 2nd Ed. W. H. Freeman

References:

- Hoppert, M. (2005). Microscopic Techniques in Biotechnology, Wiley-Blackwell.
- Venn, R. F. (2002). Principles and Practice of Bioanalysis 1st Ed. Taylor and Francis, London.
- Van Impe, J.F.M., Vanrolleghem, P. A. & Iserentant, D. M. (1998). Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, Springer Science + Business media
- Glusker, J.P. & Trueblood, K.N. (1985).Crystal Structure Analysis: a primer by Oxford University Press.
- Rhodes, G. (1993).Crystallography Made Crystal Clear: A Guide for Users of Macromolecular Models, Academic Press Inc.
- Gunter, H. (1992).NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, Wiley India Pvt. Limited.
- Van Holde, K. E., Johnson, W. C. & Ho, P. S. (2006). Principles of Physical Biochemistry" by Prentice Hall

Course Name	Course Code	L:T:P	Credit	Semester
BIOSAFETY, BIOETHICS & IPR	MSB131	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the matter that the particular subject matter comes in the ambit of copyright/patent or not and we can get the right into this regard or not.
CLO 2	Create his mind that what is innovation and what are the inventive step and industrial use of subject matter that could be patentable.
CLO 3	Apply for patent/copyright before the appropriate authority
CLO 4	Develop your knowledge regarding infringement of your right. Students will come to know that what the act is amount to infringement and what are the remedies available against such infringement.

B. SYLLABUS

Module-1:
Intellectual Property: Patents, Trademarks, Copyright, Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of GMOs,IPs of relevance to Biotechnology and Case Studies; Agreements and Treaties, Indian Patent Act 1970 & recent amendments.
Module-2:
Patents and Concept of Prior Art: Types of patent applications, Ordinary, PCT, Conventional, Divisional and Patent of Addition; Specifications: Provisional and complete; Forms and fees, Invention in context of "prior art".
Module-3:
Patent Filing Procedures: National & PCT filing procedure; Time frame and cost; Status of the patent applications filed; Precautions while patenting–disclosure/non-disclosure; Patent licensing and agreement Patent infringement.
Module-4:
Biosafety: Introduction to Biological Safety Cabinets; Biosafety Levels of Specific Microorganisms; Biosafety guidelines:Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, applications in food and agriculture; Environmental release of GMOs; Risk Analysis, Risk management and communication; National Regulations and relevant International Agreements,Cartegana Protocol.
Module-5:
Bioethics: Ethical implications of biotechnological products and techniques, Social and ethical implications of biological weapons.
Evaluation:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Books Recommended:
Text books:
1. Deepa Goel &Shomini Parashar IPR, Biosafety and Bioethics, Pearson Education India, (2013)
2. Anupam Singh Intellectual Property Rights and Bio-Technology Biosafety and Bioethics, Narendra Publishing House, (2012)
Reference books:
1. BAREACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., (2007)
2. Kankanala C., Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd., (2007)

Course Name	Course Code	L:T:P	Credit	Semester
INDUSTRIAL SAFETY AND HAZARDS	MSB132	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate different types of hazards and prevention methods.
CLO 2	Create plant layout as per site selection based on safety measures and industrial hygiene.
CLO 3	Apply prevention methods to control occupational diseases.
CLO 4	Develop a framework for management according to philosophy and need for Industrial safety keeping in view of various applicable laws and suggest Government for implementation.

B. SYLLABUS

Module I: Hazards
Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II: Psychology and Hygiene
Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation. Industrial noise.

Module III: Occupational diseases and control
Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments. Safety in chemical operations and processes.

Module IV: Management
Safety organization – safety committee – safety education and training. Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety.

Module V: Laws
Factory Act. ESI Act, Environmental Act. Workment - comperation Act. Advantages of adopting safety laws.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Allocation. Van vostrand Reinhold Company, New York.
- Anonymous (1972). Guide for Safety in the Chemical Laboratory , 2nd Ed., Van Nostrand Reinhold Co., Litton Educational Publishing, Inc., New York
- Fawcett, H.H. & Wood, W.S. (1982). Safety and Accident Prevention in Chemical Operation, 2nd Ed. John Wiley and sons, New York.

References:

- Industrial Safety and Laws by Indian School of Labour Education, Madras.

Course Name	Course Code	L:T:P	Credit	Semester
Communication Skills -I	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel of formal communication.
CLO 4	Develop and empower self with the power of Words.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)
Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Self introduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioural Science I (Self Development and Interpersonal Skills)	**BSS111**	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop your understanding of who you are; what your core purpose is, what your values are and what limits your success
CLO 2	Manage your emotions and feelings more effectively to have the impact that you need
CLO 3	Develop the way that you regulate and control your emotions
CLO 4	Learn about your behavioral preferences to become more self-awareness
CLO 5	Develop and build your emotional intelligence.

B. SYLLABUS

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behavior
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

Course Name	Course Code	L:T:P	Credit	Semester
FRENCH – I	FLT 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN – I	FLG 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts

CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Course Contents:
Vocabulary:

- Personal information like age, name etc.
- Alphabets
- Greetings: Good morning, good afternoon, good evening,
- partinggood bye Etc.
- describing objects with articles in the classroom

Grammar:

- Personal Pronouns
- Use of verbs>**to be**< and >**to have**<in simple present tense
- Use of regular verbs liketo live, to go, to learn etc.
- Using definite and indefinite article in German in nominative case
- Interrogative pronouns> **who, what, where, where from, where to<**
- talk about gender, numbers and articles.
- Singular and plural
- Basic Phonetics: Consonants and Vowels

EXAMINATION SCHEME
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book:First 10 LessonsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977
References: Studio D A1 by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
Sprachtraining A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: Studio D: Glossar A1 - Deutsch – Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – I	FLS 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:
Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:
Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – I	FLC 111	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

COURSE CONTENT

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-I	**AND001**	0:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship

CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCE PLANT BIOTECHNOLOGY	**MSB201**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Aware of the in vitro plant propagation.
CLO 2	Able to identify and solve problems related to suspension culture and production of secondary metabolites.
CLO 3	Able to understand genetic engineering and its applications in various sectors.
CLO 4	N/A

B. SYLLABUS

Module I

Micropropagation: Concept of totipotency, Importance of micropropagation, Nutrient media, process, various methods of micropropagation, factors affecting micropropagation, acclimatization, somaclonal variation, applications, advantages and limitation of micropropagation.

Module II

Protoplast culture: Importance, isolation, purification and viability of protoplast, protoplast culture methods, various methods of fusion, isolation of desired fusion product, protoplast regeneration and factors affecting, fate of fusion, application of protoplast culture

Module III

Suspension culture: Concept, Significance and application of suspension culture, different methods of suspension culture, factors affecting culture, secondary metabolite production through in vitro culture methods, hairy root culture, advantages and limitation of suspension culture.

Module IV

Genetic engineering: Concept, Importance, gene, markers, vectors, recombinant DNA, indirect and direct gene transfer techniques, gene expression, *Agrobacterium* as a natural genetic engineer.

Module V

Application of transgenic plants and bioethics

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text

- Plant Tissue Culture: Theory and Practice by S.S. Bhojwani and M.K. Razdan, Elsevier New York, a revised Ed (1996).
- Introduction to plant tissue culture by M.K. Razdan, Science Publishers Inc., New Hampshire USA, 2nd Ed (2002).
- Plant Biotechnology by K.G. Ramawat, S. Chand Publication, New Delhi (2004).

Reference

- Plant Propagation by Tissue Culture by Annonymous: the background.volume 1. (Eds. George, Edwin F, Hall, M. A and De Klerk, Geert-Jan) Springer, 3rd Edition Dordrecht, London (2007).
- Acclimatization of tissue-cultured plants by B. N. Hazarika, Current Science, 85 (12): 1704-1712 (2003).
- Endosperm culture: a novel method for triploid plant production by T. D. Thomas and R. Chaturvedi, Plant Cell Tiss Organ Cult 93:1–14 (2008).
- Embryo Rescue In: Plant Development and Biotechnology by S. M. Reed Publisher: CRC Press LLC, pp 235-239 (2005).
- An epigenetic view of plant cells cultured *in vitro*: somaclonal variation and beyond by Ce´ lia Miguel and L. Marum Journal of Experimental Botany, 1-13 (2011).

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED ANIMAL BIOTECHNOLOGY	MSB202	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a practical approach of the basic concepts of cell culture and investigate the newer applications of cell culture
CLO 2	Develop the principles and applications of hybridoma technology, IVF-ET, animal cloning and vaccine development
CLO 3	Apply the concepts & techniques for the applications of transgenic animals with reference to animal models and discuss the public and ethical concerns over the use of animal biotechnology.
CLO 4	Develop the research skills in preparation for a career in the biosciences industry or academic research.

B. SYLLABUS

Module I
Culture media – Natural and defined media, Primary culture – Steps, Mechanical and enzymatic disaggregation, Cell lines – Maintenance of cell line, Tissue and organ culture, Cell growth kinetics; Cryopreservation, Contamination

Module II
Polyclonal and monoclonal antibodies, Advantages and disadvantages of monoclonal antibodies, Production strategy, Use of monoclonal antibodies, Therapeutic monoclonal antibodies.

Module III
Vaccines; Types of vaccines - First generation vaccine, Second generation vaccine, Recombinant subunit vaccine, Peptide vaccine, Nucleic acid vaccines.

Module IV
In vitro fertilization–steps, Embryo transfer –Steps, Advantages and disadvantages of IVF-ET; Gene transfer methods – Viral and non viral methods, Expression vector systems,

Module V
Biopharming - transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic proteins; Bioethical issues related to animal biotechnology

Examination Scheme

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text books:

1. Ramdass, P. (2014). Animal Biotechnology Recent concepts and developments. MJP publishers
2. Masters, J. R. (Ed.). (2000). Animal cell culture: a practical approach (pp. 3-10). New York: Oxford University Press.

Reference Books:

1. Freshney, R. I. (Ed.). (1986). Animal cell culture: a practical approach (Vol. 8). Oxford: IRL press.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED STRUCTURAL BIOLOGY	**MSB203**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand various aspects of protein structure and function including protein folding, degradation, molecular interactions and recognition.
CLO 2	Understand key experimental processes required to evaluate protein structure, function and knowledge of how to apply them to solve specific biochemical problems.
CLO 3	Understand and explain enzyme mechanisms in a structural context and to describe mechanisms of protein folding and concept of molten globule
CLO 4	Understand the evolution of protein structural motifs and domains and associate this with function

B. SYLLABUS

Module I: Introduction to structural biology and Fundamentals of protein structure
Structural biology Introduction and applications; Side chain structure and function in protein folding and functionality: Secondary structure of proteins-helices, sheets, loops and turns; Structural and functional proteins. Tertiary structure of proteins: alpha domain structures beta domain structures, alpha-beta domain structures, homo and hetero-dimers, trimers and tetramers; forces governing protein-protein interactions; open tertiary structure; Classification of proteins; Sequence and structural motifs in proteins,

Module II: Structural and Functional relationships of Proteins
Structure and function of an antibody; structure of hemoglobin, structure of muscle proteins; structure of viruses and viral proteins: structure and function of membrane proteins.

Module III: Determination of protein structures
Techniques used for three dimensional structure determinations of proteins: X-ray diffraction, NMR spectroscopy and electron microscopy.

Module IV: Protein solubility and stabilization
Salting in and salting out, Parameters affecting; enthalpic and entropic stabilization, mutations increasing stability, .helix capping; Native, partially denatured and denatured proteins; Protein denaturation, Physical and chemical denaturants; Refolding

Module V: DNA structure
Covalent structure of DNA, base pairing, hydrogen bonding, DNA melting and annealing, difference between AT and GC pairing, DNA models, The Watson Crick model; Crystal structure of B-DNA, major and minor groves, dyad symmetry, base pair stacking, propellor twist, A and Z- DNA, triple stranded DNA, telomeric sequences and structure, G-quartcts, palindromic and tandem sequences, Base pair flipping and DNA bulges, DNA methylation; Protein-DNA interactions; drug-DNA interactions; Databases of sequences and structure for protein and DNA, public domain softwares for visualizing and modeling biomolecules -Rasmol, Deepview, Whatif, RCSB.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Introduction to Protein Structure, C. Branden and J Tooze, Garland Publishing Company, New York. 2010.
- Textbook of Structural Biology, Anders Liljas, Lars Liljas and Poul, World Scientific Publishing Co Pte Ltd.

References:

- Protein Structure, M. Perutz, Oxford University Press.
- Structural Biology of Viruses, Wah Chiu, Roger M. Burnett and Robert Garce, Oxford University Press.
- Structure and Mechanism in Protein Science, Alan Fersht.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCE BIOSTATISTICS AND SCIENTIFIC WRITING	MSB204	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Research methodology and scientific writing in biotechnology, nanotechnology and environmental sciences.
CLO 2	Understanding the basics of research methodologies for carrying out research work
CLO 3	Understanding of the components of scientific writing of the research and review papers
CLO 4	Understanding of the relevant selection of the journals for communication of the manuscripts

B. SYLLABUS

UNIT-I

Research Formulation - Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem - Literature review - Primary and secondary sources - reviews, treatise, monographs-patents - web as a source - searching the web - Critical literature review - Identifying gap areas from literature review - Development of working hypothesis.

UNIT-II

Research design and methods - Research design - Basic Principles- Need of research design - Features of good design - Important concepts relating to research design - Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan - Exploration, Description, Diagnosis, Experimentation. Determining experimental and sample designs.

UNIT-III

Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection - Sampling Methods, Sampling Errors - Data Processing and Analysis strategies - Hypothesis-testing - Generalization and Interpretation.

UNIT-IV

Quantitative Methods: Data presentation, statistical analysis and interpretation of data, types of analysis, simple regression analysis, correlation, coefficient of determination, (r2), z-test, t-test, ANOVA, Chi.square test, multi-variate analysis of data, multiple regression. Computer Application : Role of computer in research, data organization, software selection and its applications, solving problems by using scientific software and tools, sample programmes for analysis of data.

UNIT-V

Reporting and scientific writing: Structure and components of scientific reports, types of report, research paper report, review paper report, technical reports and thesis. Thesis writing - different steps and software tools (LaTeX.) in the design and preparation of thesis, layout, structure (chapter plan) and language of typical reports, Illustrations and tables, bibliography, ,referencing and footnotes. Oral presentation - planning, software tools, creating and making effective presentation, use of visual aids, importance of effective communication. Selection of scientific journal based on indexing with Web of Science, Scopus etc., communication of manuscript with journals, revision in manuscripts.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- C. R. Kothari, Research Methodology: Methods & Techniques, Wishwa Publication
- . D K Bhattacharyya, Research Methodology, Excel Books
- Loraine Blaxter, Christina Hughes, Molcolm Tight, How to Research, Viva Books Pvt. Ltd.
- Research papers / web articles in the field of research methodology.

References:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee .Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S. Chand & Co.

Course Name	Course Code	L:T:P	Credit	Semester
MEDICAL BIOTECHNOLOGY	**MSB205**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop the theoretical and empirical concepts of disease diagnosis for a successful career in Biotechnology and allied industries.
CLO 2	Demonstrate the principles and applications of diseases therapy to solve the problems of society
CLO 3	Apply the concepts & techniques for the identification of diseases and associated risks and make progress efficiently towards solutions for real world problems
CLO 4	Develop the research skills in preparation for a career in the biosciences industry or academic research from Biotechnology and thereby produce recommendations for sustainable development

B. SYLLABUS

Module I

Diagnostic tools and Procedures: Antigens and antibodies-based assay, Nucleic Acid Based Assays, Culture based diagnostics approach, Radio-imaging techniques. Role of pharmacological testing in clinical management of disease.

Module II

Biochemical test: Different biochemical test using protein and enzyme markers and their interpretation. Kidney Function test, Liver function test, blood sugar test, hormone assay, Newborn Screening etc. Biochemical tests on different bacteria different biochemical compounds.

Module -III

Identification of disease agents, Mode of spread of infections- Skin, wound & burn, alimentary tract, blood infection, laboratory infection, nosocomial infections, infections in immune-compromised patients etc., Epidemiology-epidemics, pandemics and endemics disease. Control measure of microbial diseases-public health control methods. Hygiene regulations, population screening for disease.

Module IV

Clinically important taxonomic grouping of pathogens: Infection, diagnosis, treatment & Prevention- Coronaviruses, Influenza virus, Hepatitis viruses- A, B, C and E, Dengue, Japanese Encephalitis Virus and Chikungunya etc. Clinically important taxonomic grouping of bacteria- Staphylococci, Streptococci, Pneumococcus, Neisseria, Campylobacter, Mycobacteria, etc. Clinically important fungal infection- Aspergillosis, Mucormycosis (Black fungus) and Candidiosis etc.

Module V

Disease and therapy

Therapeutic intervention in blood disorder by stem therapy. Treatment products from recombinant and non-recombinant organisms, Interferons, Antisense therapy, Gene therapy, Stem Cell therapy and Immunotherapy; Modes of action of major groups of antimicrobial agents. Disease: Types, Causes, Symptoms, diagnosis and treatment of genetic Diseases, Diabetes, Cardiovascular disease and Cancer.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Marshall, W J, Clinical Chemistry, 3rd edition, Mosby, 1997.
- Harper's Biochemistry K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw Hill/ Appleton and Lange

***References*:**

- Sudbery, P. Human molecular genetics. Addison Wesley Longman (1998)
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Principles of Physical Biochemistry, K.E. Van Holde, W.C. Johnson, Prentice Hall
- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.
- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Biochemistry (Fifth Edition), Lubert Stryer
- Physical Biochemistry, David Freifeider
- Annual Review of Biochemistry (1995-2004)
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig., John Wiley and Sons Inc.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCE PLANT BIOTECHNOLOGY -Lab	**MSB221**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Able to do wet lab experiments related to in vitro cultures, micropropagation and seed viability.
CLO 2	Able to record observations and analyze results.
CLO 3	Able to write results.
CLO 4	N/A

B. SYLLABUS

Module I
Media preparation and sterilization.

Module II
Effect of cytokinins and auxins on explants.

Module III
Embryo rescue.

Module IV
Seed viability test and in vitro seed germination study

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED ANIMAL BIOTECHNOLOGY -Lab	**MSB222**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Able to do wet lab experiments related to in vitro cultures, micropropagation and seed viability.
CLO 2	Able to record observations and analyze results.
CLO 3	Able to write results.
CLO 4	N/A

B. SYLLABUS

1. To study the establishment of animal cell culture lab
2. Reagent preparation for cell culture
3. Culture and maintenance of cells
4. Passaging of cells
5. Cells quantitation
6. Cell viability assay
7. Apoptosis assay
8. Study of cytotoxicity under invitro model.
9. Cryopreservation of cells

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED STRUCTURAL BIOLOGY LAB	**MSB223**	0:0:2	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop practically skills to apply various methods used for crystallization of proteins.
CLO 2	Investigate key experimental processes required to evaluate protein solubility, precipitation and protein degradation
CLO 3	Demonstrate different software used for structure visualization of protein.
CLO 4	Understand and observe the interactions between the protein and its substrate of its inhibitor.

B. SYLLABUS

Buffers and reagents preparation for Protein fingerprinting

Protein fingerprinting

Effect of salt on the rate of protein precipitation

Effect of change in pH on protein solubility

Buffer and reagent preparation for protein crystallization

Protein crystallization using hanging drop vapor diffusion method

Protein structure analysis using pymol

Protein ligand interactions studies using pymol

Study of protein degradation

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Course Name	Course Code	L:T:P	Credit	Semester
ENVIRONMENTAL BIOTECHNOLOGY	MSB230	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge about environment issues due to municipal and hazardous industrial waste and discuss methods of waste treatment.
CLO 2	Gain a detailed understanding of different clean energy resources and biofuels for sustainable environment and use of microbes for application in bioremediation of environment
CLO 3	Discuss about cleaner agricultural practices and concept of biofertilizers and biopesticides
CLO 4	Explain about toxic effects of environmental pollutants and discuss about statutory requirements/legislations for good environment management and their compliance

B. SYLLABUS

Module I

Treatment of municipal wastes and industrial effluents (Physico-Chemical, biological analysis of waste water), Rr. Sec and test waste water treatment sludge treatment and disposal treatment of wastes from paper, textile, dairy, petrochemical and pharmaceutical industry .

Module II

Bioremediation and phytoremediation of toxic compounds like pesticides, hydrocarbons, polymers, surfactants, biotransformation and bioaccumulation

Module III

Renewable and non-renewable energy resources, clean fuel technology, biofuels.

Module IV

Biofertilizers and biopesticides – a cleaner agricultural practice, concept of N_2 - fixation, azolla, cyanobacteria, Rhizobium and VAM as biofertilizers.

Module V

Biomining – microbe assisted microbial leaching, bioaccumulation and bio sorption
Biosensors and biomarkers for ecotoxicity measurement, EIA and Environmental audit.
Principles in ecotoxicology; animal toxicity tests; statistical concepts of LD_{50}; dose-effect and dose response relationship; frequency response and cumulative response; Biological and chemical factors and influence toxicity; global dispersion of toxic substance; dispersion and circulating mechanisms of pollutants; Aquatic toxicity testes; statistical tests; response of planktons to toxicants; EC_{50};

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

***Text*:**

- Environmental Biotechnology – Concepts and Applications, Hans-Joachim Jordening and Jesef Winter
- Introduction to Environmental Biotechnology, Milton Wainwright

***References*:**

- Waste Water Engineering, Metcalf and Eddy. Publisher: Tata McGraw hill
- Agricultural Biotechnology, S.S. Purohit
- Environmental Microbiology: Methods and Protocols, Alicia L. Ragout De Spencer, Jonh F.T. Spencer Principles of Environmental Engineering, Gilbert Masters

Course Name	Course Code	L:T:P	Credit	Semester

ENTREPRENEURSHIP DEVELOPMENT IN BIOTECHNOLOGY	MSB231	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the principles and functions of management
CLO 2	Understand types of organizations, staff appraisal, training and development process
CLO 3	Understand the entrepreneurial process ,preparation of business plan
CLO 4	Understand the entrepreneurial motivation, traits and development

B. SYLLABUS

Module-I

BIO ENTERPREUNERSHIP: Introduction to bio-business, from the Indian context, SWOT analysis of bio-business. Entrepreneur, Creativity & Entrepreneurial personality and Entrepreneurship in Biotechnology, pillars of bio-entrepreneurship and major start-ups in Biotechnology, Concept and theories of Entrepreneurship, Entrepreneurial traits and motivation, Nature and importance of Entrepreneurs, Government schemes for commercialization of technology (eg. Biotech Consortium India Limited).

Module-II

PROJECT MANAGEMENT: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal.

Module-III

BIOTECH ENTERPRISES: Desirables in start-up, Setting up Small, Medium & Large scale industry, Quality control in Biotech industries, Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.

Module-IV

BUSINESS DEVELOPMENT IN BIOTECHNOLOGY: Factors affecting biotech business: (finance, infrastructure, equipment, manpower, resources, project location, end product, quality issues, etc) Basic principles and practices of management – Definition, concepts and application; Organization types, coordination, control and decision making in management

Module-V

ENTREPRENEURSHIP OPPORTUNITY IN INDUSTRIAL BIOTECHNOLOGY: Business opportunity, Essential requirement, marketing strategies, schemes, challenges and scope-with case study- Pollution monitoring and Bioremediation for Industrial pollutants, Pesticides, Herbicides etc. Integrated compost production- microbe enriched compost. Bio pesticide/insecticide production. Fermented products-probiotic and prebiotics. Stem cell production, stem cell bank, contract research. Production of monoclonal/polyclonal antibodies, Single cell protein and secondary metabolite production. Contact research in microbial genomics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggested Book:

1. Dynamics of Entrepreneurial Development and Management by Vasant Desai, Himalaya Publishing House, 2005.
2. Science Business: The Promise, the Reality, and the Future of Biotech by Gary P. Pisano Harvard Business School Press: 2006.
3. Innovation and entrepreneurship in biotechnology: Concepts, theories & cases by D. Hyne & John Kapeleris, 2006
4. Principles of Management P. C.Tripathi, P.N. Reddy Tata McGraw Hill Fifth Edition, 2012
5. Bio Entrepreneurship development-A resource book by BCIL, Govt of India 2018.

Course Name	Course Code	L:T:P	Credit	Semester
PHARMACEUTICAL TECHNOLOGY & BIOTECHNOLOGY	**MSB232**	3:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Pharmaceutical technology and biotechnology in the development and validation of different pharmaceutical dosage forms
CLO 2	Understanding of Pharmaceutical Dosage Forms & New Drug Delivery Systems
CLO 3	Understanding of Biotechnology based Pharmaceutical products.
CLO 4	Understanding of pharmaceutical industrial process.

B. SYLLABUS

Pharmaceutical Technology:

Module –I:
Introduction to Physical Pharmaceutics – Metrology, Calculations and Posology.
Pharmacopoeias & Formularies: IP,BP,USP
Packaging of Pharmaceuticals: Polymer Science and Applications, Formulations and Development, Packaging
Particulate Technology: Particle Size, Size reduction, Size Separation, Powder Flow and Compaction
Unit Operations: Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, Sterilization, and Drying

Module-II
Pharmaceutical Dosage Forms & New Drug Delivery Systems:
Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. Various route of drug administration.
Drug delivery systems: transdermal, parenteral, oral, mucosal, ocular, buccal, rectal and pulmonary delivery. Novel formulation approaches for better delivery of biotechnology derived drugs, such as reverse micelles, liposomes, microemulsions and microencapsulation.
Pharmaceutical Biotechnology:
Module III
Immunity & Immunological preparations.
Introduction about Immunity, Types of Immunity, Immunological preparations, Classification of Immunological preparations, Bacterial & Viral Vaccinces, Method of preparation using animals, Alternative method using eggs, Diagnostic preparations containing bacterial toxins, Preparation containing antibodies used to produce passive immunity.
Blood & blood Products:
Module-IV
Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, fibrin foam, plasma substitutes: ideal requirements, PVP, dextran.
Module-V
Pharmaceutical Biotechnology based drug Products:
Introduction, Method of Preparation and Use of :Activase, Humulin,Streptokinase Humatrope, Hepatitis B vaccine.
Introduction, Method of Preparation and Use of : Penicillins, streptomycins, tetracyclines, vitamin B12 & ethanol.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggested Books:

1. Pharmaceutical Biotechnology, by Daan J. A. Crommelin, Robert D. Sindelar. Informa Healthcare USA, Inc, 3rd edition.
2. Textbook of Pharmaceutical Biotechnology, By Chandrakant Kokate, Pramod H.J, SS Jalalpure , Publisher: Elsevier India Pvt Ltd.
3. Vyas SP, Dixit VK."Pharmaceutical Biotechnology", 1st edition ,2007, CBS Publishers & Distributors, New Delhi

Course Name	Course Code	L:T:P	Credit	Semester
COMMUNICATION SKILLS – II	BCS 211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Recognize the mannerisms and methodology of Interview.
CLO 4	N/A

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioural Science – II (Behavioral Communication and Relationship Management)	BSS211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate an understanding of interpersonal skills as part of effective communication processes.
CLO 2	Identify the effects of behaviour on interpersonal communication
CLO 3	Demonstrate a range of effective interpersonal communication skills
CLO 4	Use assertiveness and interpersonal skills in the workplace team
CLO 5	Utilise effective communication skills to build strong relationships
CLO 6	Develop, implement and promote effective communication techniques

B. SYLLABUS

Module I: Behavioral Communication
Scope of Behavioral Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioral Communication in relationship management
Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts
Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate
Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication
Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

Course Name	Course Code	L:T:P	Credit	Semester

FRENCH - II	FLT 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:

Unité 1 (Leçon 4) and Unité 2 Université et les grandes écoles : 18-39 Leçons 4, 5 & 6.

Contenu Lexical:

1. Les loisirs
2. Les saisons
3. Les nombres
4. Le logement et la ville
5. Les prépositions de lieu
6. Les verbes de direction
7. Les lieux de l'université
8. Les documents administratifs
9. Les expressions utiliseés en classe par le professeur
10. Quelquesraccourcis: diminutis et sigles

Contenu Grammatical:

1. Aimer, faire et savoir au present
2. La negation
3. Les adjectifs possessives au pluriel
4. Le partitifs
5. Aller au présent
6. <<il y a>>
7. L'usage des prepositions de lieu
8. Vouloir et pouvoir au présent
9. L'impératif
10. Le conditionnel de politesse

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN – II	FLG 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Content:

Vocabulary

- Verb was/were
- Types of Houses and Apartments,
- State and cities
- directions like north, south etc.,
- Neighboring countries of Germany and their respective languages.
- Description of house: Bedroom, bathroom, kitchen etc.

Grammar:

- Interrogatives – what, which, why, how, who, when
- Yes - no question
- Introduction of irregular verbs
- Article in accusative (definite and indefinite)
- Possessive article

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: Lesson 11 onwardsfromDeutschalsFremdsprache -1A, IBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013

Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007

SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013

http://www.duden.de/woerterbuch

Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – II	FLS 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:

Vocabulary: Passport Form, personal information, age, Interrogative pronouns, Alphabets, to be able to spell names, surnames, Good morning, good afternoon, Good bye Etc. different professions, countries, nationalities, languages.

Grammar:

Subject pronouns
Use of verbs SER/ESTAR/TENER in simple present tense
Use of regular AR /ER/IR ending verbs.
Llamarse y dedicarse
Simple Negativesenteses

ExaminationScheme:
Total: 100 marks

ContinuousEvaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**MidTerm Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Text &References:

Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Dictionaries for reference: Collins, www.wordreferences.com.

Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – II	FLC 211	2:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

1. Introduction to Chinese Language
2. Introduction to the Sound System , Initials and Finals
3. Table of sounds of Beijing Dialect
4. Tones
5. Writing System & Basic Strokes of Chinese Character
6. Rules of Stroke-Order of Chinese Character,
7. Expression of Greetings & Good wishes
8. Farewell
9. Asking & telling Personal Information : Name & Age
10. Personal Information : Residence
11. Personal Information : Family Members
12. Listening Skill & Practice
13. Conversation based on dialogues
14. China; an emerging world power (In English)

VOCABULARY CONTENT

Vocabulary will have approx 70 Characters including 50 characters of HSK-I level.

1. Vocab related to greetings & farewell; 你， 好，再见。。。

2。Vocab related to personal information; 名字，年纪， 家， 住，爸爸。。

GRAMMATICAL CONTENT

1. Introduction to the sound system, initials and finals, sound table & tones.
2. Basic strokes of Chinese Character & stroke- order.
3. Conjunction 和.
4. Word order in Chinese sentence.
5. Adjective Predicate sentence.
6. 是sentence type (1).
7. Interrogative sentence with 吗.
8. Attributive & structural particle 的.

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text Books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Elementary Chinese Reader Book-I (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-II	**AND002**	0:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

7. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
8. The group member shall write his/her name at the end of the blog.
9. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
10. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
11. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
12. For the topic chosen by the group, students are recommended to cover the following points:
    g) Current scenario (Regional, national and international level as applicable)
    h) Future predictions
    i) Duty of the government
    j) Government policies (related to the topic), if any
    k) Duty of public
    l) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

4. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
5. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
6. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
BIOPROCESS AND INDUSTRIAL BIOTECHNOLOGY	**MSB 301**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Aware of the bioenergetics and metabolic pathways
CLO 2	Able to identify and solve problems related to biochemical engineering
CLO 3	Able to understand cell engineering and its applications in various sectors.
CLO 4	N/A

B. SYLLABUS

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Media formulation sterilization, thermal death kinetics, batch and continuous sterilization system. Sterilization of Industrial Media, Air and Fermenter

Module II

Transport phenomena in bioprocess – Mass transfer, mass transfer co-efficient for gases and liquids. Rate of oxygen transfer. Determination of oxygen transfer coefficient. Rheological properties of medium. Biological heat transfer, Heat transfer coefficients.

Bioprocess control and monitoring variables such as temperature, agitation, pressure etc.

Module III

Kinetics of microbial growth, substrate utilization and product formation Batch, Fed-batch, types of reactors – CSTR, tower, airlift, bubble column, packed bed, immobilized cells, Control and monitoring, online and off-line control, Computers in bioprocess control systems.

Module IV

Downstream Processing

Aqueous - two-phase extraction; Adsorption-desorption processes; Membrane based separation: Dialysis, Electro dialysis, Micro filtration, Ultra filtration.

Chromatographic methods of separation based on size, charge, reverse phase, hydrophobic interactions, and biological affinity, HPLC, FPLC, MS-LC, Gas chromatography.

Electrophoresis, principle, types on the basis of support media, 1D, 2D gel electrophoresis, continuous and capillary electrophoresis.

Crystallization, Drying, Case studies.

Biomass: Bakers and distillers yeast production using various raw materials, "bio" factors for growth, Crabtree effect, harvesting, mushroom production from agro based raw materials and uses.

Module V

Industrial production of enzymes: cellulase, amylase, protease; organic acids: citric acid, acetic acid, lactic acid; ethanol, biomass, antibiotics: classification, penicillins, tetracyclins, chloramphenicol; vitamins: B_{12}, riboflavin, fermented dairy products.

Ethanol: Production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. po wer alcohol – definition, uses, merits and demerits of various technologies for its production.

Antibiotics: Various penicillin as precursor and 'R' – side chain, penicillianase, 6-APA, pencillin production, harvest and recovery, **Streptomycin:** Chemical structure, production, harvest and recovery, uses by-product of streptomycin fermentation.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text References:

***Text*:**

- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers

***References*:**

- Biochemical Engineering, Bailley and Ollis.
- Principples of Biochemical Engineerin, Humphrey.

Course Name	Course Code	L:T:P	Credit	Semester
Molecular Genetics and Developmental Biology	**MSB 302**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the principles of Genetics, genetic disorders and their diagnosis.
CLO 2	Acquaint with principles, technical requirements, scientific and commercial applications in Genetics in developmental biology
CLO 3	Support methodologies in genetics, as well as DNA handling with PCR- based detection and diagnostic tools.
CLO 4	N/A

B. SYLLABUS

Module I: Mendelian Genetics
Mendelian laws of inheritance, Monohybrid cross and the law of segregation, Dihybrid cross and law of independent assortment, Chromosome theory of inheritance, Multiple allele, lethal allele, Blood group, Rh factor

Module II: Fine Structure of Genes and Chromosomes
The concept of promoter, Coding sequence, Terminator, Induction of gene for expression. Structural organisation of chromatids, Centromeres, Telomeres, Chromatin, Nucleosome organisation; Euchromatin and heterochromatin; Special chromosomes (e.g., polytene and lampbrush chormosomes), Structural and numerical aberrations involving chromosomes; Hereditary defects - Kleinefelter, Turner, Cri-du-Chat and Down syndromes. Mutations - spontaneous and induced, Chemical and physical mutagens.

Module III: Extrachromosomal inheritance and Molecular Genetics
Coiling of shell in snails, Mitochondrial and chloroplast genetic systems, population genetics: Hardy-Weinberg equilibrium, Gene and genotypic frequencies.

Module IV
Introduction to the basic concepts of embryology and developmental biology. Gametogenesis: Spermatogenesis, its cellular and hormonal regulation. Oogenesis-Folliculogenesis and oocyte maturatiom. Fertilization-The cellular and molecular events-cell surface molecules in sperm-egg recognition in animals and union of gametes.

Module V
Cleavage patterns in animals. Early embryonic development and role of maternal contributions. Blastula formation and embryonic fields. Gastrulation and formation of germ layers. Morphogenesis, morphogenetic cells and molecules.

Examination Scheme

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text books:
1. Pierce, B. A. (2010). Genetics: A conceptual approach. Macmillan.
2. Berk, A., & Zipursky, S. L. (2000). Molecular cell biology (Vol. 4). New York: WH Freeman.

Reference Books:
1. Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., ... & Walter, P. (2013). Essential cell biology. Garland Science.
2. Brown, T. A. (1992). Genetics: a molecular approach (No. Ed. 2). Chapman & Hall.

Course Name	Course Code	L:T:P	Credit	Semester
ENZYME TECHNOLOGY AND IMMUNOTECHNOLOGY	MSB 303	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand different types of cells of the immune system, nature and structure of antibody and antigen
CLO 2	Understand the process of transplantation, and the immunological techniques
CLO 3	Aware of the bioenergetics and metabolic pathways
CLO 4	Able to identify and solve problems related to biochemical engineering
CLO 5	Able to understand cell engineering and its applications in various sectors.

B. SYLLABUS

Module I: Enzymology
Nomenclature of enzymes, Catalytic mechanisms, Regulation strategies, Inhibition of enzymes Single and multiple substrate systems, Allosteric enzymes, Enzyme kinetics.

Module II Enzyme technology and applications
Immobilization of enzymes, Process design and operation strategies for immobilized enzyme reactors of enzyme and Immobilization of multiple enzyme system, Abzymes, ADAPT and ADEPT, Application of enzyme - Industrial, Analytical and therapeutics, Textile processing

Module III:
Innate and acquired immunity, clonal nature of Immune Response.
Nature and Biology of antigens and super antigens Antibody structure and function; Types of immunity- innate, acquired, active and passive. Major Histocompatibilty Complex, BCR and TCR, Complement system

Module IV:
Cells of the immune system, Hematopoiesis and differentiation, lymphocyte trafficking, B-Lymphocytes, T - Lymphocytes, macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells. Regulation of immune response , Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance,

Module V: Cell mediated toxicity, Hypersensitivity**,** Autoimmunity, Tumor immunology, Transplantation Immunology, Synthetic vaccines, Immunological Techniques: Immuno diffusion, immuno-electrophoresis, ELISA, RIA, fluorescence activated cell sorter, Hybridoma technology and its applications

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzyme Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palmer.
- Steiner, K., & Schwab, H. (2012). Recent advances in rational approaches for enzyme engineering. Computational and Structural Biotechnology Journal, 2, e201209010. http://doi.org/10.5936/csbj.201209010
- Allan Svendsen Enzyme Functionality: Design: Engineering, and Screening 2003 CRC Press Ist edition.
- Turanli-Yildiz, B., Alkim, C., & Cakar, Z. P. (2012). *Protein Engineering Methods and Applications*. INTECH Open Access Publisher.
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.

References:

- Enzyme: A Practical Introduction to structure, Mechanism and data analysis, R.A. Copeland, John Wiley & Sons Inc.
- James C. Samuelson Enzyme Engineering: Methods and Protocols (Methods in Molecular Biology) 2013 Humana Press
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

Course Name	Course Code	L:T:P	Credit	Semester
RECOMBINANT DNA TECHNOLOGY	**MSB 304**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand various aspects of recombinant DNA Technology and its applications
CLO 2	Identify key experimental processes required for gene cloning, expression and purification of recombinant proteins.
CLO 3	Investigate and explain different vectors and enzymes required in genetic engineering.
CLO 4	Understand various sequencing methods available for gene sequencing.

B. SYLLABUS

Module I
Basic tools, specialized enzymes and specialized cloning vectors (e.g. Antarctic Phosphatase), Specialized cloning vectors (e.g. TOPO, TA, Gateway)

Module II: Gene isolation
Expression libraries and their screening, Techniques for analysis of genomic libraries (e.g. 3' RACE, 5' RACE, chromosome walking, chromosome jumping), T-DNA and transposon mediated gene traps

Module III: Heterologous gene expression (bacteria and yeast)
Advances in engineering of genes (codon optimization, translational enhancers, mRNA stabilizing factors), vectors (targeting signals, selection markers, purification and solubility tags) and hosts for overexpression and analysis

Module IV: Studying gene regulation and control
In-vitro transcription translation, run-on assays, protein-protein and protein-DNA interactions, promoter characterization, differential display. Manipulation of gene expression: Genome wide mutagenesis, gene silencing, RNAi, aptamers, constitutive and tissue specific promoters, expression enhancing elements, terminator technology

Module V:
Automation and robotic advances in RDT
DNA & protein isolation (alternatives to conventional methods) and sequencing (example from Human Genome Project and other sequencing projects), PCR machines, imaging and gel documentation
Laboratory, industrial and environmental applications of RDT
High throughput research, disease diagnosis and cure, forensics, DNA vaccines, drug discovery, maintaining genetic diversity, transgenic technology, marker-free GMOs

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:

- Recombinant DNA by J.D. Watson et al., W.H. Freeman and Company
- Recombinant DNA Technology by T. A. Brown
- Principles of Gene Manipulation: An Introduction to Genetic Engineering by R.W. Old and S. B Primrose, Blackwell Science Inc

References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA by B.R. Grick and J.J. Pasternak, ASM Press
- Molecular and Cellular Cells Methods in Biology and Medicine by P.B. Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- "Milestones in Biotechnology: Classic Papers on Genetic Engineering" by J.A. Bavies and W.S.
- Reznikoff, Butterworth Heinemann.
- "Gene Expression Technology" by D.V. Goeddel in Methods in Methods in Enzymology, Academic
- Press Inc.
- "DNA Cloning: A Practical Approach" by D.M. Glover and B.D. Hames, IRL Press.

Course Name	Course Code	L:T:P	Credit	Semester
GENOMICS AND PROTEOMICS	**MSB 305**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhance understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of proteins
CLO 4	N/A

B. SYLLABUS

GENOMICS

Module I: Introduction to Genomics
Contents of genomes, Molecular markers, Bioinformatics for the analysis of sequence data.

Module II: Transcriptomes
Genome expression; RNA Contents,

Module III
Strategies for large-scale sequencing projects. The structure, function and evolution of the human genome. The
human genome project. Human disease genes.

PROTEOMICS

Module IV: Introduction to proteomics
Protein structure**:** secondary structural elements, super-secondary structure, domains, mechanisms of protein folding, tertiary folds. Formation of oligomers. Protein solubility and interaction with solvents and solute. The activity of protein. Protein engineering principles.

Module V
Fundamental methods used in proteomics, Relationship between protein structure and function. Post
translational protein modification. Protein - protein interaction.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:
- Genomes II, T.A. Brown
- Recombinant DNA (Second edition) , James D. Watson and Mark Zoller.

References:
- A primer of genome Science, Greg Gibson and Spencer V. Muse.
- Gene cloning and DNA analysis – An introduction (fourth edition), T.A. Brown.

Course Name	Course Code	L:T:P	Credit	Semester
BIOPROCESS AND INDUSTRIAL BIOTECHNOLOGY LAB	**MSB 321**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Aware of the bioenergetics and metabolic pathways
CLO 2	Able to identify and solve problems related to biochemical engineering
CLO 3	Able to understand cell engineering and its applications in various sectors.
CLO 4	N/A

B. SYLLABUS

Module I

Isolation of industrially important micro organisms for microbial processes.
Determination of Thermal Death Point and Thermal death time of micro organisms for design of a sterilizer
Determination of growth curve of a supplied micro organism and also determine substrate degradation profile and to compute specific growth rate and growth yield from the data obtained.

Module II

Comparative studied of ethanol production using different substrates.
Microbial production of antibiotics (Penicillin)
Production and estimation of alkaline protease
Sauer Krant fermentation

Module III

Conventional filtration
Protein precipitation and recovery
Aqueous two-phase separation
Ion exchange chromatography
Gel filtration
Membrane based filtration i.e. Micro filtration and cross filtration in cross flow Modules.

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Course Name	Course Code	L:T:P	Credit	Semester
ENZYME TECHNOLOGY AND IMMUNOTECHNOLOGY LAB	**MSB 323**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand different types of cells of the immune system, nature and structure of antibody and antigen
CLO 2	Understand the process of transplantation, and the immunological techniques
CLO 3	Aware of the bioenergetics and metabolic pathways
CLO 4	Able to identify and solve problems related to biochemical engineering

B. SYLLABUS

1. Effect of pH and temperature on enzyme activity
2. Determination of Km and Vm from LB plot.
3. Solid/ liquid state fermentation
4. Immobilization of enzyme
5. Blood film preparation and identification of cells.
6. Identification of blood group.
7. Isolation of serum.
8. Radial Immuno Diffusion Test
9. Ouchterlony Double diffusion Test
10. DOT ELISA, SANDWICH ELISA
11. Purification of lgG through affinity chromatography

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
RECOMBINANT DNA TECHNOLOGY LAB	**MSB 324**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop practically skills to apply various methods used for DNA isolation.
CLO 2	Investigate key experimental processes required for gene cloning
CLO 3	Demonstrate different methods of bacterial transformation
CLO 4	Understand and observe the results of gene amplification and restriction digestion

B. SYLLABUS

1. Preparation and Transformation of competent cells by $CaCl_2$ method.
2. Restriction digestion
3. Ligation
4. Southern hybridization
5. Western blotting
6. RFLP
7. PCR

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
GENOMICS AND PROTEOMICS LAB	**MSB 325**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhance understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of proteins.
CLO 4	N/A

B. SYLLABUS

1. Gene finding tools and Genome annotation
2. Comparison of two given genomes
3. Micro array and Micro array data analysis
4. Inference of protein function from structure
5. Two-hybrid methods

Examination Scheme:

IA				EE		
Practical (Mid Term)	**Viva**	**Regular Performance**	**Attendance**	**Practical (End Term)**	**Practical Record**	**Viva**
20	15	10	05	25	10	15

Note: Minor variation could be there depending on the examiner.

Course Name	Course Code	L:T:P	Credit	Semester
ADVANCED FOOD TECHNOLOGY	**MSB 330**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the role and scope of food technology in biotechnology
CLO 2	To understand the knowledge and skills in food chemistry, food microbiology
CLO 3	To understand the safety, quantitative skills in food technology
CLO 4	To understand the engineering and processing, marketing and consumer research in food technology

B. SYLLABUS

Module I
Processing and preservation technologies used in food industry: heating, drying, and baking, irradiation (infrared, microwave and radio frequency), concentration, freezing, chemical preservation, chilling, fermentation, a combination of those technologies.

Module II
Pre and post-harvest technologies for extension of storage life and better handling and transportation of fresh fruits and vegetables, to sustain freshness and reduce
spoilage.

Module III
Development of environment - friendly packaging materials based on product characteristic and performance
properties packaging materials, and finished package forms, process schedules for thermal processing of foods in cans, glass, tin-free steel and aluminum containers, and retortable pouches based on heat penetration studies and sterilization value.

Module IV
Starter culture, prebiotics, probiotics - their use as flavor enhancer and diseases/ infection combats, application
in production of cheese, butter, ice-cream, yoghurt, application in biomedical research, e.g. recombinant LABs as vaccine; modified milk proteins.

Module V
Production of SCP (Single cell protein), baker's yeast, brewing industry, application of transgenic plants in food production, transgenic fish, transgenic poultry.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

Text:
- Food technology by Fraziar.
- Food Microbiology, 2nd edition by Adams and Moss.

References:
- Introduction to food Biotechnology. Green, Perry Johnson 2002. CRC Press, Boca Raton Florida.
- Food Biotechnology- Techniques and application. Gauri S. Mittal 1992. Technomic Publishing Co., Inc., Lancaster.

Course Name	Course Code	L:T:P	Credit	Semester
TISSUE ENGINEERING	**MSB 331**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the design and functional assessment of bioengineered tissue substitutes
CLO 2	To understand the Strategies for engineering tissues with a load-bearing function will be of particular focus
CLO 3	To understand the Strategies to study cell-surface and cell-cell interactions to physical stimuli
CLO 4	To understand the bioreactors, biological scaffolds and 3D cell-tissue constructs will be explored through recent papers

B. SYLLABUS

Module I: Fundamentals of tissue engineering
Basic definition, History, Concepts and overview, Principles and components, current scope of development; use in therapeutics and in vitro testing

Module II: Engineering materials
Scaffolds: Functions, Types (ECM-like Scaffolds, Tissue-Derived Scaffolds, Fibrin Gel, Natural Sponge; Injectable Scaffolds, Elastic Scaffolds, Inorganic Scaffolds Composite Scaffolds). Biomaterials: properties, cellular adhesion, surface modifications. Polymers (Natural such as Protein and Polysaccharides; Synthetic such as Poly(α-hydroxyacids, Hydrogels and Polyurethanes), Composite.

Module III: Cell Sources:
Fundamental properties of cells, autologous, allogeneic, syngeneic, and xenogeneic cells, and genetically engineered cells, Stem and progenitor cells. Cell Extraction, Biomolecules /synthetic ECM: Growth Factors (Representative Growth factors), Delivery of Growth factors

Module IV: Tissue Culture & Engineering Design Aspects
Biomechanics aspects of tissue engineering: application of physical forces, Principles of Scaffold Design – Material considerations, 2 D cell expansion, 3D Tissue Architecture and Function Transport considerations, Bioreactors, Cell seeding and metabolism considerations, Design of Polymeric Scaffolds,
Interface Biology – Biocompatibility/Immunogenicity.

Module V: Case Studies
Musculoskeletal Tissue Engineering, Cardiovascular Tissue Engineering, Neural Tissue Engineering, Visceral Tissue Engineering. Other Key Issues and Emerging Areas of Interest: Nanobiotechnology, Ethical Issues, FDA and Regulatory Issues, Tissue Engineering Market

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

***Text*:**
- Frontiers in Tissue Engineering (ISBN 0080426891), Patrick, Mikos, McIntire, Pergamon
- Principles of Tissue Engineering (ISBN 0124366309), Lanza, Langer, Vacanti, Academic Press

***References*:**
- Tissue Engineering: Engineering Principles for the Design of Replacement Organs and Tissues By W. Mark Saltzman; Published Oxford University Press US, 2004, pp 523
- Tissue engineering Fundamentals and Applications By Yoshito Ikada, Published Elsevier, 2006, pp 469
- Tissue Engineering Methods & Protocols (ISBN 0896035166, Morgan and Yarmush, Humana Press.

Course Name	Course Code	L:T:P	Credit	Semester
DRUG DISCOVERY & DEVELOPMENT	**MSB 332**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand of Drug discovery & development general process
CLO 2	Understand of Drug development considerations
CLO 3	Understand of Drug Receptor theories in relation to drug development
CLO 4	Understanding of Rational Drug Design in Drug discovery and development process

B. SYLLABUS

Module: I

Drug discovery & development:

General Introduction of drug design and development, Strategies for Target Identification and validation, Lead Identification and Optimization, Pre-Clinical Research and Clinical Research & Pharmacovigilance.

Module: II

Drug development considerations:

Introduction to Pharmacology, Sources of drugs, Dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and dependence, Pharmacogenetics.

Module: III

Pharmacokinetics:

Pharmacokinetic, Pharmacodynamic and Toxicological considerations in drug development, Physiochemical properties of drugs in relations to their biological activity, Rout of drugs administrations, Various types of dosage formulations, Stability of drugs.

Module: IV

Drug Receptor Theories:

Principles of drug action, Mechanisms of drug action, Drug-receptor interactions, Types of drug targets, G-Protein coupled receptor, Ion Channels, Ligand Gated Ion Channels, Enzymatic drug receptor and Transducer mechanisms, Dose response relationship, Factors modifying drug action.

Module: V

Rational Drug Design:

Introduction, Types of drugs design: Legand based, Structure based, Rational drug discovery, Computer Aided drug design, De novo drug design methodologies.

Structure activity relationships in drug design, Statistical techniques behind QSAR, Molecular descriptors 3D QSAR and COMFA, Molecular modeling, Molecular docking and dynamics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggested Books:

- New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.
- Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
- Biopharmaceutics & Pharmacokinetics by DM Brahmankar & SB Jaiswal, Published by Vallabh Prakashan; 3rd Edition 2012.
- Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd

Course Name	Course Code	L:T:P	Credit	Semester
COMMUNICATION SKILLS - III	**BCS311**	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	Learn about the importance of interviews, etiquette.
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume
Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

Course Name	Course Code	L:T:P	Credit	Semester
Behavioral Science III (Leading Through Teams)	**BSS311**	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe team design features and the difference between team and group, and components of the concept.
CLO 2	Identify the patterns of interaction in a team, method of studying attractions and repulsions in groups sociometry and construction of socio-gram for studying interpersonal relations in a Team.
CLO 3	Analyze various stages of team growth, team performance curve profiling a team: Role of leadership in managing team.
CLO 4	Differentiate between management values, pragmatic spirituality in life and organization building global teams through universal human values.
CLO 5	Demonstrate the leaning of teams, leadership and values, pragmatic spirituality in life and organization building global teams.

B. SYLLABUS

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles
Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team
Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication
Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams
Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

Organizational Behaviour, Davis, K.

- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Course Name	Course Code	L:T:P	Credit	Semester
FRENCH – III	**FLT311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Unité 3 La science au quotidien Page : 40-61 Leçons 7, 8 & 9

Contenu Lexical:

1. L'heure
2. Les jours de la semaine
3. Les mois de l'année
4. Les matières et types de cours
5. Les spécialitésscientifiques.
6. L'annéeuniversitaire
7. Les nationalités
8. Les noms de pays
9. Les métiers scientifiques
10. Les chiffres de 69 à l'infini
11. Quelquesunités de mesure
12. Quelquestermesscientifques
13. Les termes de l'exposition
14. Les expression familières pour accepter une invitation.

Contenu Grammatical:

1. Finir, commencer au présent
2. Les prepositions de temps
3. Féminins et masculine des noms de métiers scientifiques
4. Les adjectifs de nationalité.
5. Le future proche
6. Les adjectifs demonstratives
7. Le but: pour + infinitive
8. Le register familier

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text & References:

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	L:T:P	Credit	Semester
GERMAN - III	**FLG311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents

Vocabulary:

- Furniture
- Days and months name
- Time vocabulary like 15 min, quarter, minute, seconds.
- Adjectives use to describe furniture.

Grammar:

- Past participle of verb had
- Usage of negation like **not = nicht; kein= not a single.**
- Preposition of time.
- Use of adjective in sentences.
- Introduction and use of separable verbs

EXAMINATION SCHEME

Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

PrescribedText-Book: First 10 LessonsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977

References: **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
Tangram A1by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
SprachtrainingA1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013
http://www.duden.de/woerterbuch
Materials are given in form of photocopies if felt to be necessary

Course Name	Course Code	L:T:P	Credit	Semester
SPANISH – III	**FLS311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Content:
Vocabulary:

Home, Classroom, Neighborhood, hotel, Restaurant, Market, Days name, Months name, Colors names etc. Interrogatives.
Grammar:

Use of SER/ESTAR/TENER/ HAY
Difference between Estar and Hay
Demonstrative pronouns
Interrogatives – what, which, why, how, who, when
Introduction of irregular verbs
Possessive pronouns

ExaminationScheme:
Total: 100 marks

Continuous Evaluation (Total 50 Marks)					EndSemEvaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-TermExam**
10	**15**	**10**	**10**	**5**	**50**

Skills Evaluated: Writing, Comprehension, grammar, and Vocabulary
Text &References:
Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005
Dictionaries for reference: Collins, www.wordreferences.com.
Essential materials are given in the form of photocopies.

Course Name	Course Code	L:T:P	Credit	Semester
CHINESE – III	**FLC311**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

1. Personal information : hobbies & habits
2. Personal information : abilities
3. Expression of gratitude
4. Expression of apology
5. Numbers & currencies
6. Expression of time
7. Description of weather
8. Description of direction,
9. Listening of dialogues
10. Conversation based on dialogues
11. Chinese CBT package /video clipping
12. Sino-Indian relations (in English)

VOCABULARY CONTENT

Vocabulary will include approx 110 Characters including 50 Characters of HSK-I level.

1. Vocab related to hobbies, abilities, gratitude, apology numbers, time, weather, direction, etc will be covered.

GRAMMAR CONTENT

1. Question of type (2) & (3)
2. 有sentence
3. Auxiliary verbs:要,会,能, 可以
3. The sentence with a verb as its predicate.
4. 们: a plural suffix
5. Numeration
6. Interrogative pronoun 多少
7. Counting Money
8. A numeral-measure word as the attributive
9. Time words: Time, month, day & date
10. The demonstrative pronoun as the attributive
11. The adverbial adjunct:
12. Words of location

EXAMINATION SCHEME:Total: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

Text books & References

1. Learn Chinese with me book-I (Major Text book), People's Education Press
2. Elementary Chinese Reader Book-I (suggested reading)
2. Chinese Reader (HSK Based) book-I (suggested reading)
3. Practical Chinese Grammar for foreigners (suggested reading)

Course Name	Course Code	L:T:P	Credit	Semester
Anandam-III	**AND003**	0:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society

CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

13. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
14. The group member shall write his/her name at the end of the blog.
15. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
16. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
17. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
18. For the topic chosen by the group, students are recommended to cover the following points:
    m) Current scenario (Regional, national and international level as applicable)
    n) Future predictions
    o) Duty of the government
    p) Government policies (related to the topic), if any
    q) Duty of public
    r) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

7. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
8. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
9. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	L:T:P	Credit	Semester
PROJECT	**MSB 460**	0:0:0	24	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To carry out the real time research project
CLO 2	To understand the research methodology to carry out the research project
CLO 3	To understand the research paper publications of research work
CLO 4	To understand the project work report writing

B. SYLLABUS

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to

section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References/ Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality
Draw Conclusions

Examination Scheme: Evaluation will be done by external examiner

Project Report	50
Viva Voce	50
Total	**100**

AANANDAM
(RUSA – Govt. of Rajasthan)

Course Code: AND001/002/003 **Credit:2 /sem**

Ref: 27.11, Academic Council of AUR

INTRODUCTION

Aanandam is a credited subject that aims to instill **the joy of giving** and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact on society
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence and Efficiency

AANANDAM: COMMUNITY SERVICE

- Community service programs are very effective for students' **personal** and **social**, ethical, and **academic** development. These effects depend on the characteristics of the programs chosen
- Involvement of students in community work has an impact on development of student **skills**, **creativity, critical thinking,** and **innovative powers. Passion and Positivity** are basic requirements for Community service
- They would **examine social challenges** /problems, **assess the needs** of the community, **evaluate** previous implemented projects, and **think of further solutions**
- They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities.

BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- obtain employment
- be useful to society as it will protect them against stress, frustration, and depression

ABOUT AANANDAM COURSE

Students are expected to engage in:

- An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)
- **Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.**
- **It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules**.
- Two credits for a project in each semester
- 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

- Do at least one individual act of goodness each day and Record this act in a dedicated diary/register
- Share this dedicated diary/register in a 30-minute**Anandamperiod** with the mentor and share your experience with the class
- Students in **Semester scheme** must take up one Group Community Service Project per semester

- Students in **Annual scheme** must take up two Group Community Service Projects per year
- Take one Group Community Service Project from **August to November**
- Take one Group Community Service Project from **January to April**
- The students must take photographs to document their work
- The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
- The students may submit newspaper cuttings
- The students must participate in the **Aanandam Day** by displaying charts of their Group Community Service Project
- They can make power point presentations of their project which will help them get better grades

ROLE OF FACULTY MENTOR

- The mentor will **maintain a register** wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
- Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The **act will not be evaluated** - just if it was recorded or not.(**Be suggestive not judgmental)**
- In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
- The mentor will divide the class for the Group Community Service Project and record it in a register.**8-12 students can form a group** for project work.
- The students will opt the project of their choice.
- The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
- The mentor will guide the students to write the Group Community Service Project Report.
- Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spread sheet

ROLE OF DIRECTOR/HOIS

- Allot one period of half an hour for Aanandam course
- Assign all faculty members as mentors for this period of half an hour for students
- Each faculty will have one class to mentor
- Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.
- To coordinate the **Aanandam Day** activities
- To organize **Aanandam Day** in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefitof students (to motivate and inspire them for community service)
- Photographs of the **Aanandam Day** should be displayed in department and these should be uploaded in the gallery of University web page on HTE portal
- A **Project Assessment Committee** (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

- **Director/HoIs**
- **One person from community**
- **Departmental Aanandam Coordinator**
- **Project Mentors (1 to 7 or more members)**

The number of mentors can vary depending on the number of projects and students in each department.

- University level PAC to be formed for university colleges and departments
- State level PAC to be formed at Commissionerate level for Universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

- literacy programs, in today's digital age many organizations/individuals might also need help with email and websites

- livelihood projects,
- time giving activities to adopted communities(awareness regarding Govt. programmes)sports like yoga, meditation, drills, and physical exercises in adopted areas
- activities on arts and culture such as restoration of traditional art and culture and monuments.
- understand their responsibility in taking care of environment and appreciating cultural diversity
- While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers
- A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.
- Another group may be formed for attending to old people(who have money but need assistance for market and groceries) [Time Bank]
- Another group may be formed for civic activities, awareness programmes.
- Local social problems to be taken up and solutions devised
- Innovations and Startups to be encouraged
- help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society(the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- Students should also submit their certificates from the government bodies and or non government bodies they collaborate with, if any
- Photographs of **Display charts** or **ppt/video** prepared while presentation on the group community service in the **Aanandam Day** must be submitted along with the report
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

- **Project Assessment Committee** will assess the Group Community Service Project Report
- submitted by the students, in the duly filled given format, based on:
- Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with the community
- presentation of the project report
- impact on society and the course outcome results

Format for evaluation by Project Assessment Committee (Total max marks 50)

- Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
- Report contains presentation /video **(max.10 marks)**
- Photographs of Students' participation and involvement of community **(max.10 marks)**
- Problem solving and challenging issues addressed/innovation **(max. 30 marks)**

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects
For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs

Grading Marks
C grade =32 hrs
B grade>32hrs to <=44hrs
A grade >44hrs to<=54hrs
O grade >54hrs to<=64hrs

AWARD AND RECOGNITIONDEPARTMENT, UNIVERSITY AND STATE LEVEL

- Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.

- The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education for contesting the state level award
- State Level Project Assessment Committee will evaluate projects received from all the universities (one each).
- A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

AMITY UNIVERSITY RAJASTHAN JAIPUR

Bachelor of Technology (Bioinformatics)
ProgramCode:BTF
Duration–4Years FullTime

ProgramStructure
And
Curriculum&Schemeof Examination
With
ChoiceBasedCredit System (CBCS)
2021Batch

AMITYINSTITUTEOFBIOTECHNOLOGY
AMITYUNIVERSITYRAJASTHANJAIPUR

CreditSummaryTable

B. TechProgramBioinformatics					
Semester	**CC**	**DE**	**VA**	**OE**	**Total**
1	**16**	**3**	**6**	**-**	**25**
2	**16**	**3**	**6**	**3**	**28**
3	**18**	**3**	**6**	**3**	**30**
4	**18**	**3**	**6**	**3**	**30**
5	**17**	**3**	**6**	**3**	**29**
6	**18**	**3**	**6**	**3**	**30**
7	**20**	**3**	**6**	**-**	**29**
8	**20**	**-**	**-**	**-**	**20**
Total	**143**	**21**	**42**	**15**	**221**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective,FW-FieldWork

MinorTrack:IntroductoryBioinformatics							
Sem	**Course Code**	**Course**	**Category**	**L**	**T**	**P/F W**	**Credit s**
2	BTF231	BiologicalInformationandDatabases	DE	3	-	-	3
3	BTF332	BasicsofPERLprogrammingI	DE	3	-	-	3
4	BTF432	BasicsofPERLprogrammingII&Python	DE	3	-	-	3
5	BTF504	MolecularModeling&DrugDesigning	CC	3	-	-	3
6	BTF603	AdvancedComputational Biology-II	CC	3	-	-	3
Total							**15**

B.Tech.Bioinformatics

SemesterI

Code	Course	Category	L	T	P/FW	Credit
BTF101	Applied Mathematics-I	CC	3	1	-	4
BTF102	AppliedPhysics-I	CC	2	-	-	2
BTF103	Applied Chemistry-I	CC	2	-	-	2
BTF104	IntroductiontoComputers	CC	2	-	-	2
BTF105	LifeSciences	CC	2	-	-	2
BTF122	Applied Physics-ILab	CC	-	-	2	1
BTF123	Applied Chemistry– ILab	CC	-	-	2	1
BTF124	IntroductiontoComputers Lab	CC	-	-	2	1
BTF125	EngineeringGraphicsLab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF130	TermPaper	DE	3			3
BTF131	ChemicalBiology	DE	3			
BTF132	BasicsinBiotechnology	DE	3			
BTF133	IntroductiontoBioinformatics	DE	3			
AND001	AANANDAM-I	VA	-	-	-	2
BCS 101	English	VA	1	-	-	1
BSS104	UnderstandingSelfforEffectiveness –I	VA	1	-	-	1
FLT101 FLG101 FLS101 FLC101	ForeignLanguage-I FrenchG ermanS panish Chinese	VA	2	-	-	2
TOTAL						**29**

SemesterII						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF201	Applied Mathematics-II	CC	3	1	-	4
BTF202	Applied Physics-II	CC	2	-	-	2
BTF203	Applied Chemistry-II	CC	2	-	-	2
BTF204	ObjectOrientedProgramminginC++	CC	2	-	-	2
BTF205	InternetTechnologies	CC	2	-	-	2
BTF222	AppliedPhysics-IILab	CC	-	-	2	1
BTF223	AppliedChemistry–IILab	CC	-	-	2	1
BTF 224	ObjectOrientedProgramminginC++Lab	CC	-	-	2	1
BTF225	InternetTechnologiesLab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF230	TermPaper	DE	3			3
BTF231	BiologicalInformationandDatabases	DE	3			
BTF232	ComputationalBiology	DE	3			
BTF233	Databasemanagement System	DE	3			
OE	OpenElective-I	OE				3
AND002	AANANDAM-II	VA	-	-	-	2
BCS 201	English	VA	1	-	-	1
BSS204	Behavioural Science–II(Problem SolvingandCreativeThinking	VA	1			1
FLT201 FLG201 FLS201 FLC201	ForeignLanguage -II French German Spanish Chinese	VA	2	-	-	2
Total						**30**

SemesterIII						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 301	Cell Biology	CC	3	-	-	3
BTF 302	Biochemistry - I	CC	2			2
BTF303	Microbiology	CC	3	-	-	3
BTF304	Computer-I	CC	2	-	-	2
BTF321	CellBiology-Lab	CC	-	-	2	1
BTF322	Biochemistry-I-Lab	CC	-	-	2	1
BTF323	Microbiology-Lab	CC	-	-	2	1
BTF324	Computer-I-Lab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF330	TermPaper	DE				3
BTF331	Metabolomics	DE				
BTF332	BasicsofPERLprogrammingI	DE				
BTF333	Chemiinformatics	DE				
OE	OpenElective-II	OE				3
EVS001	EnvironmentalSciences	CC	4	-	-	4
AND003	AANANDAM-II	VA	-	-	-	2
BCS 301	CommunicationSkills–I	VA	1	-	-	1
BSS304	UnderstandingSelfforEffectiveness–III	VA	1	-	-	1
FLT301 FLG301 FLS301 FLC301	Foreign Language -III FrenchG ermanS panish Chinese	VA	2	-	-	2
Total						30

SemesterIV						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF401	Biochemistry-II	CC	3	-	-	3
BTF402	MolecularBiology	CC	3	-	-	3
BTF403	Computers-II	CC	2	-	-	2
BTF404	Genetics	CC	3	-	-	3
BTF405	**StatisticsforBiology**	**CC**	**3**	**-**	**-**	**3**
BTF421	Biochemistry–II-Lab	CC	-	-	2	1
BTF422	MolecularBiology-Lab	CC	-	-	2	1
BTF423	Computers-II-Lab	CC	-	-	2	1
BTF424	Genetics-Lab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF430	Termpaper	DE	3			3
BTF431	Proteomics	DE	3			
BTF432	BasicsofPERLprogrammingII& Python	DE	3			
BTF433	MolecularStructureVisualization	DE	3			
OE	OpenElective-III	OE				3
AND004	AANANDAM-II	VA	-	-	-	2
BCS 401	CommunicationSkills–II	VA	1	-	-	1
BSS404	BehavioralScience-IV (RelationshipManagement)	VA	1	-	-	1
FLT401 FLG401 FLS401 FLC401	ForeignLanguage-IV FrenchG e rmanSp anishCh inese	VA	2	-	-	2

SemesterV						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF501	StructuralBiology	CC	3	-	-	3
BTF502	AdvancedComputationalBiology–I	CC	3	-	-	3
BTF503	Immunology	CC	2	-	-	2
BTF504	MolecularModeling&Drug Designing	CC	2	-	-	2
BTF505	Computers-III	CC	2	-	-	2
BTF521	StructuralBiology-Lab	CC	-	-	2	1
BTF522	AdvancedComputationalBiology–I-Lab	CC	-	-	2	1
BTF523	Immunology-Lab	CC	-	-	2	1
BTF524	MolecularModeling&Drug Designing-Lab	CC	-	-	2	1
BTF525	Computers-III-Lab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF530	TermPaper	DE	3			3
BTF531	FunctionalandComparative Genomics	DE	3			
BTF532	TranscriptomicsandData Analysis	DE	3			
BTF533	Immunoinformaticsand BiochemicalTechniques	DE	3			
BTF-534	ScientificWriting	DE	3			
OE	OpenElective-IV	OE				3
AND005	AANANDAM-II	VA	-	-	-	2
BCS501	CommunicationSkills–III	VA	1	-	-	1
BSS504	UnderstandingSelffor Effectiveness–V	VA	1	-	-	1
FLT501 FLG501 FLS501 FLC501	ForeignLanguage-V FrenchG ermanS panish Chinese	VA	2	-	-	2
	Total					**29**

SemesterVI						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF601	Genomics	CC	3	-	-	3
BTF602	ComputationalProteomics	CC	3	-	-	3
BTF603	AdvancedComputationalBiology-II	CC	3	-	-	3
BTF606	Clinical Research& Pharmacovigilance	CC	3	-	-	3
BTF605	Computers-IV	CC	2	-	-	2
BTF621	Genomics-Lab	CC	-	-	2	1
BTF622	ComputationalProteomics-Lab	CC	-	-	2	1
BTF623	AdvancedComputationalBiology-II -Lab	CC	-	-	2	1
BTF625	Computers-IV-Lab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF630	TermPaper&Industry Visit	DE	3			3
BTF631	SystemBiology	DE	3			
BTF632	Biocomputing MethodsofBioinformatics	DE	3			
BTF633	IPRandDrugRegulatoryAffairs	DE	3			
OE	OpenElective-V	OE	-	-	-	3
AND006	AANANDAM-II	VA				2
BCS 601	CommunicationSkills–IV	VA	1	-	-	1
BSS604	UnderstandingSelffor Effectiveness–VI	VA	1	-		1
FLT601 FLG601 FLS601 FLC601	ForeignLanguage-VI French German Spanish Chinese	VA	2	-	-	2

Note:AftercompletionoftheEndTermExaminationthestudentsmustcompulsorilyundergoIndustrialTrainingof6weeks.Theevaluationofthistrainingwouldbecarriedoutin VIIsem.

For domain elective: BTF630- Term Paper & Industry Visit: In addition to term paper Students mustcompulsorily undergo Industrial Visit (Cluster of 5-6 Industries) for One week and they will be graded ontheirlearningoutcomeofthevisitforonethirdcomponentofthisTermPaper&IndustryVisit.

Evaluation will be

asfollows;TermPaper:2Credit(7

0Marks)

IndustryVisit:1Credit(30Marks)

SemesterVII						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 701	Bioinformatis Algorithms ,Python and Matlab	CC	4	-	-	4
BTF 702	Data Mining	CC	3	1	-	4
BTF 703	Entrepreneurship Development	CC	3			3
BTF 704	R Programming	CC	3	1	-	4
BTF750	Industrial Training (Evaluation)	CC	-	-	-	3
BTF 722	Data Mining-Lab	CC	-	-	2	1
BTF 723	Bioinformatics Algorithm, Python & Matlab-Lab	CC	-	-	2	1
BTF 724	R Programming Lab	CC	-	-	2	1
DEElectives: Studenthastoselect1coursefromthelistoffollowingDEelectives						
BTF730	TermPaper	DE	3			3
BTF731	BioJava	DE	3			
BTF732	OptimizationAlgorithm	DE	3			
BTF733	BioPerl	DE	3			
AND007	AANANDAM-II	VA				2
BCS 701	CommunicationSkills–V	VA				1
BSS704	UnderstandingSelfforEffectiveness–VII	VA				1
FLT 701FLG 701FLS 701 FLC701	ForeignLanguage-VII French German Spanish Chinese	VA				2

SemesterVIII						
Code	**Course**	**Category**	L	T	**P/FW**	**Credit**
BTF860	Project / Dissertation	CC	-	-	-	20
Total						

SemesterI

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Course Name	Course Code	LTP	Credit	Semester
Applied Mathematics	BTF 101	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Apply Leibnitz's theorem, Taylor's theorem and mean value theorems.
CLO 2	Find Asymptotes & curvature, tangents & normals, maxima & minima and approximate calculation of a function.
CLO 3	Differentiate the implicit function, partial derivatives of multi-variable functions and differentiation under integration sign.

B. SYLLABUS:

ModuleI:DifferentialCalculus
Derivative of a function, Derivatives at a point, Fundamental rules for differentiation: Product Rule, Quotient RuleandChainRule,

ModuleII: IntegralCalculus
DifferentiationofImplicitFunctions,ParametricformsandLogarithmicDifferentiation,Successivedifferentiation,Leibnitz'st heorem (without proof), Meanvaluetheorem, Taylor'sandMaclaurin'sTheorem, Asymptote &Curvature,Partial Differentiation,Euler'sTheorem,MaximaandMinima

ModuleIII:
FundamentalIntegralFormulae,MethodsofIntegration:IntegrationbySubstitution,ByParts,PartialFractions,

ModuleIV:OrdinaryDifferentialEquations
DefiniteIntegralanditsProperties,ReductionFormulae,Applicationtolength,AreaandVolume.

ModuleV:OrdinaryDifferentialEquations
Definition of Order and Degree of differential equation, Formation of ODEs, Solution of Differential Equation of1stOrderand1stDegree:VariableSeparation

ModuleVI:
Homogeneous Differential Equations, Linear Differential Equations, Exact Differential Equations, General LinearODEofSecondOrder,SolutionofHomogeneousEquation,SolutionofSimpleSimultaneousODE

ExaminationScheme:

Text&References:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- Narayan,S.(2005).DifferentialCalculus.S.Chand,30thRevisededition.
- Narayan,S.(2005).IntegralCalculus,S.Chand,NewDelhi.

References:

- Forsyth,A.R.(2013).ATreatiseonDifferentialEquations,BoD–BooksonDemand.
- Dass,H.K.(2008).AdvancedEngineeringMathematics,S.Chand,NewDelhi.

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Course Name	Course Code	LTP	Credit	Semester
Applied Physics-I	BTF 102	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an understanding of the various concepts of vector analysis and of electrostatics.
CLO 2	define and understand the various terms and principles involved in SHM
CLO 3	solve simple problems on the applications of wave nature of light.

B. SYLLABUS:

ModuleI:Electrostatics
Brief introduction of Vectors, gradient of a scalar field, divergence and curlof vector field, Electric flux, Gauss'slaw,StatementsofGaussdivergenceandStokestheorem

ModuleII:Relativity
Michelson-Morleyexperiment,Inertial&non-inertialframes,Specialtheory ofRelativity,Relativisticspace-time transformation,Transformationofvelocity,Variation ofmasswithvelocity,Mass-energyequivalence

ModuleIII:Oscillations&Waves
Simple harmonic motion – equation and energy conservation, superposition of two SHMs, Lissajous figures,dampedand forced oscillations – equations, amplitude andfrequency response, LCR Circuit, resonance, sharpnessofresonance,equationofmotionforplaneprogressivewaves,superpositionofwaves

ModuleIV:WaveNatureofLight
Interference: Conditionsof interference, division of wavefront, Fresnel'sbiprism, division of amplitude,interferenceduetothinfilms,Newton'srings

ModuleV: WaveNatureof Light
Diffraction: FresnelandFraunhoferdiffraction, Fraunhoferdiffractionat asingleslit, Transmissiongratinganditsresolvingpower.
Polarization:
Birefringence,Nicolprism,Productionandanalysisofplane,circularlyandellipticallypolarizedlight,Halfandquarter waveplates,Opticalrotation

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- French,A.P.(1971).VibrationsandWaves,CRCpress.

- William,C.,William,C.,Elmore.,&Mark,A.(1969).PhysicsofWaves.CourierCorporationElmore,Heald.
- Griffiths,D.J.,Jackson,J.D.,&Jackson, J.D. (1962). Introduction to Electrodynamics, Vol. 3, New Yorketc,Wiley.
- Ghatak,A.K.,&ThyagarajanK.(1989).Optical Electronics,CambridgeUniversityPress..

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Course Name	Course Code	LTP	Credit	Semester
Applied Chemistry-I	BTF 103	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Investigate**: the types of bonds present between molecules, their interaction with each other, their solubility, polarity and structure and orientation in space,
CLO 2	**Understand**: the working of engines, its efficiency and basic concepts of thermodynamic processes,
CLO 3	**Create**: the structure of the organic compounds by predicting their UV-, IR- & NMR Spectra

B. SYLLABUS:

ModuleI:ChemicalBonding
Typesof bond: Ionic, Covalent and Co-ordinate bond; Fajan'srule; Hybridisation; H- bonding ; Valence bond andMolecularorbitaltheoryfordiatomicmolecule.

ModuleII:OrganicMechanism
Electronegativityanddipolemoment;ElectronDisplacementEffects:InductiveEffect;MesomericEffect;ElectromericEffects;Fissionofcovalentbonds;IntermediatesofOrganicreactions;Carbonium, Carbanion,FreeRadicalandCarbene;Typesoforganicreactions;Substitution,Elimination,Addition.

ModuleIII: InstrumentalmethodforAnalysis
Introduction; Principles of spectroscopy; Law's of Absorbance; IR: Principle Instrumentation; Application; UV:Principle,InstrumentationandApplication;NMRPrincipleandInstrumentation;Application;Chromatography;GC:Principle,InstrumentationandApplication;HPLC:Principle,InstrumentationandApplication.

ModuleIV:Thermodynamics
Introduction; Terminology; First Law; Heat Capacity; Calculation of thermodynamic quantities; Adiabatic andIsothermal Process; Reversible and Irreversible Process; Second law of Thermodynamics; Standard State; Gilbb'sHelmholtz equation; VantHoff Isotherm and Isochore; Maxwell Relation; Third law of Thermodynamics; ChemicalPotential;ActivityandActivityCoefficient;Coupled Reactions.

ModuleV:ChemicalEquilibrium
Introduction;LeChatelier'sPrinciple;Equilibrium constantfrom ThermodynamicConstants;Acid -BaseConcept;Weak acidandWeak baseandtheirsalts;SolubilityProduct;pHandpOH,BufferSolution,BufferAction.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- Jain,P.C.,&JainM.(1998).EngineeringChemistry.
- ChawlaS.(2002).ATextbookofEngineeringChemistry,DhanpatRaiandCo.(Pvt.)Ltd.,EducationalandTechnic

alPublishers,Delhi.

References:

- Morrison,R.T.,&Boyd,R.N.(1992).OrganicChemistry,6th.
- Puri, B. R., Sharma, L. R., & Pathania S. M. (1993). Principles of Physical Chemistry, Shoban Lal NaginChand&Co.,NewDelhi.
- Finar,I.L.(1973).OrganicChemistry, Vol.1.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Introduction to Computers	BTF 104	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate working of various components and applications of computer.
CLO 2	Apply the principles of procedure-oriented programming for various fields.
CLO 3	Create computer programs for various applications using C language.

B. SYLLABUS:

ModuleI: Introduction

Introduction to computer, history, von-Neumann architecture, memory system(hierarchy, characteristics and types),H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation:Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binaryarithmetic,floatingpointarithmetic,signedandunsignednumbers,Memorystorageunit.

ModuleII:ProgramminginC

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C,Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrementoperator, Conditional, bitwise operators, Expressions, Precedence of Arithmetic operators, Operator precedence ofArithmetic Operators, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.CStatements,conditionalexecutingusingif,else,nestingofif,switchandbreakConceptsofloops,exampleofloops in C using for, while and do-while, continue and break. Storage types(automatic, register etc.), predefinedprocessor,CommandLine Argument.

ModuleIII:FundamentalFeaturesinC

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values andtheir types, calling function, function argument, function with variable number of argument, recursion.Pointers,relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays asarguments.StringsandCstringlibrary.StructuresandUnions.DefiningCstructures,givingvaluestomembers,Arrayo fstructure,Nestedstructure,passingstrings asarguments.FileHandling.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

Text:

- Kanetkar,Y.(2001).LetusC,BPBPublications,2nd Edition.
- Balagurusamy,E.(2004).ProgramminginANSIC,TataMcGraw-HillEducation.
- Herbert,S.(2002).TheCompleteReference,OsbourneMcgrawHill,4thEdition.
- RajaRamanV.(1995).ComputerProgramminginC,PrenticeHallofIndia.

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Course Name	Course Code	LTP	Credit	Semester
LIFE SCIENCES	BTF 105	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop foundational knowledge of life sciences.
CLO 2	Critically evaluate the current scientific findings and correlate it to the theoretical knowledge base.
CLO 3	Identify scientific problems and formulate solutions by taking into account relevant facts.

B. SYLLABUS:

ModuleI:CellBiology
Organization of cell (Inorganic-Water and Ions; Organic-Proteins, Lipids and Carbohydrates constituents), Physicalstructure of the cell-Brief introduction to the Cell Membrane, Cytoplasmand its Organelles (Nucleus,Mitochondria,Golgi,EndoplasmicReticulum,Lysosomes,Peroxisomes,Ribosomes,Chloroplasts)
Cell cycle.

ModuleII:Introductionto CellPhysiology
Transport ofsubstances through the cellmembrane- Osmosis, Diffusion andits types, Active transport(Sodium-potassiumpump)andPassive transport,Membranepotential,MeasuringMembranePotential,ActionPotential

Electrocardiogram
(ECG)Electromyography
(EMG)Electroencephalograph
y(EEG)

ModuleIII:EnvironmentalBiotechnology
Biosensors, Biochipsand Biofilms, GMO's and Biofertilizers, Biofuels, Gene Therapy, Stem cell andNanobiomolecules,BioInformatics-IntroductionandApplications

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

- Sodhi,G.S.(2005).FundamentalConceptsofEnvironmentalChemistry,AlphaScienceInt'lLtd.
- Sharma,B.K.,&Kaur,H.(2001).AnIntroductiontoEnvironmentalPollution,Krishnaprakashanmedia(p)Ltd.
- Berg,J.M.,Tymoczko,J.L.,&StryerL.(2011).Biochemistry,WHFreemanandCo.,NewYork.
- Lodish,H.(2008).MolecularCellBiologyby.Macmillan,(2008).

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Course Name	Course Code	LTP	Credit	Semester
Applied Physics-I LAB	BTF 122	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about experiments of determing wavelength, disperse power, specific rotation
CLO 2	Determining speed, width of narrow slit, temperature coefficient
CLO 3	Determining resistance, value of acceleration, moment of inertia and density.

Unit:01
ListofExperiments

1. Todeterminethewavelengthofsodiumlightby Newtons'sringsmethod.
2. Todeterminethedispersivepowerofthematerialofprismwiththehelpofaspectrometer.
3. Todeterminethespecificrotationofsugarby Bi-quartzor Laurenthalfshadepolarimeter.
4. Todeterminethespeedofultrasonicwavesinliquidbydiffractionmethod.
5. Todeterminethewidthofanarrowslitusingdiffractionphenomena.
6. Todeterminethetemperaturecoefficientofplatinumwire,usingaplatinumresistancethermometerandaCallender&Grif/fth'sbridge.
7. To determinethevalueofspecificcharge(ratioofe/m)ofan electronbyThomsonmethod.
8. Todeterminetheinternalresistanceof Leclanchecellwiththehelpof Potentiometer.
9. Todeterminetheresistanceperunitlengthofa CareyFoster'sbridgewireandalsotofindoutthespecificresistanceofagivenwire.
10. Toplotgraphshowingthevariationofmagneticfieldwithdistancealongtheaxisofacircularcoilcarryingcurrent,andhenceestimatetheradiusofthecoil.
11. To determinethevalueofaccelerationdueto gravity("g")in thelaboratoryusingbarpendulum.
12. Todeterminethemomentofinertiaofaflywheelaboutitsownaxisofrotation.
13. Todeterminethedensityofmaterialofthegivenwirewiththehelpofsonometer

Examination Scheme:

IA			EE			
ClassTest(Practical Based)	**Mid TermViva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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Course Name	Course Code	LTP	Credit	Semester
Applied Chemistry-I LAB	BTF 123	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstration of tritration process.
CLO 2	Learning about Beer's Law
CLO 3	Spectroscopic analysis

Unit:01

ListofExperiments

1. Titrationofphosphoricacidandsodiumhydroxidesolutionusing pHmeter.
2. VerificationandapplicationofBeer'sLaw.
3. Spectroscopicanalysisofironinwatersample.
4. Conductometrictitration.
5. Determinationofwater modulesofcrystallizationinMohr'ssalt.
6. (A) DeterminationofsurfaceTension ofliquid.
   (B) Applicationofsurfacetensionmethodinmixtureanalysis.
7. Applicationofdistributionlawinthedeterminationofequilibriumconstant.
8. Analysisofironore.
9. Plantpigmentsseparationbypaperchromatography.

ExaminationScheme:

IA			EE			
ClassTest(Practical Based)	**Mid TermViva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Introduction to Computers- LAB	BTF 124	4:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about C programming
CLO 2	Fundamentals of C programs, syntax, operators, looping etc
CLO 3	File handling

SoftwareRequired: TurboC

CourseContents:

ModuleI
DOScommands

ModuleII
Creation ofbatchfiles

ModuleIII
Cprograminvolvingproblemslikefindingthenthvalueofcosineseries,Fibonacciseriesetc.

ModuleIV
C programsincludinguserdefinedfunctioncalls

ModuleV
C programsinvolvingpointers,andsolvingvariousproblemswiththehelpofthose.

ModuleVI
Filehandling

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**Mid TermViva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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Course Name	Course Code	LTP	Credit	Semester
Engineering Graphics-Lab	BTF 125	4:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills about projections of point and lines
CLO 2	Plane figures and solid projections
CLO 3	Learning about surface development

B. SYLLABUS:

ModuleI: General
Importance,Significanceandscopeofengineeringdrawing,Lettering,Dimensioning,Scales,Senseofproportioning, Differenttypesofprojections,OrthographicProjection,B.I.S.Specifications.

ModuleII:Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in differentquadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance,intersectingandnon-intersectinglines.

ModuleIII:Planes other than the Reference Planes
Introductionof
otherplanes(perpendicularandoblique),theirtraces,inclinationsetc.,Projectionsofpointsandlineslyingintheplanes,conversionofobliqueplaneintoauxiliaryPlaneandsolutionofrelatedproblems.

ModuleIV:Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes andlines lying in the plane figures making different given angles (with one of both reference planes). Obtaining trueshapeoftheplane figurebyprojection.

ModuleV:Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid makinggivenangles.

ModuleVI:Development of Surface
DevelopmentofsimpleobjectswithandwithoutsectioningIsometricProjection

Examination Scheme:

IA			EE			
ClassTest (PracticalBased)	MidTerm Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
30	15	05	20	10	10	10

Text&References:

- Engineering drawing by Shah, Mahendrakumar Budhichand, and Bachubhai Chhibubhai RanaPearsonEducationIndia,(2009).
- GeometricDimensioning&TolerancingbyGill,PritamSingh..Seagull BooksPvtLtd,(2009).
- EngineeringDrawingbyBhatt,N.D.Engineer4(1980).

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Course Name	Course Code	LTP	Credit	Semester
AANANDAM-I	AND 001	4:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodnessand charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringforsomeone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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Course Name	Course Code	LTP	Credit	Semester
Term Paper	BTF 130	4:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

A term (or research) paper is primarily a record of intelligent reading in several sources on a particularsubject.
Thestudentswillchoosethetopicatthebeginningofthesessioninconsultationwiththefaculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semesterthe detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done byBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
1. Choosingasubject
2. Findingsourcesofmaterials
3. Collectingthenotes
4. Outliningthepaper
5. Writingthefirstdraft
6. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
a) The material sources should be not more than 10 years old unlessthe nature of the paper is such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
b) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
c) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
a) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
b) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
c) Checkcrossreferences.

4. Outliningthepaper
a) Reviewnotestofindmainsub-divisionsofthesubject.
b) Sort the collected material again under each main division to find sub-sections for outline so that

itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose
b) mainbodyofthepaper
c) statementofsummaryandconclusion

Avoidshort,bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

a) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses ofrelevance to the question at hand. Sometimes, therelevance of a particular section may be clear to you but not to your readers. To avoid this,ensureyoubrieflyexplaintherelevanceofeverysection.

b) Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.
c) Checkfor properspelling,phrasingandsentenceconstruction.
d) Checkforproperformonfootnotes, quotes, andpunctuation.
e) Checktoseethatquotationsserveoneofthefollowingpurposes:
f) Showevidenceofwhatanauthorhassaid.
g) Avoidmisrepresentationthroughrestatement.
h) Saveunnecessarywritingwhenideashavebeenwellexpressedbytheoriginalauthor.
i) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
1) Title page
2) Tableofcontents
3) Introduction
4) Review
5) Discussion&Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of thepaperandthereviewpartshouldbetwothirdsofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintherese archpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:
a) summaryofquestionposed
b) summaryoffindings
c) summaryofmainlimitationsofthestudyathand
d) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs
Crystal,D. (2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challengesto communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument]. Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,Universityof Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,UniversityCollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowof theidea/ideas,relevanceofmaterialused/presented,outcomesvs .objectives,presentation/vivaetc.)

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chemical Biology	BTF 131	4:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various biological processes involve in synthesis of molecules like DNA, RNA, protein, fats and vitamins.
CLO 2	Create projects for development of reaction schema for synthetic and semisynthetic approach.
CLO 3	Apply these reaction methods and processes for generation of new testing protocols and novel molecule synthesis.

B. SYLLABUS:

ModuleI:Principlesofchemicalbiology
Classification & chemistry of carbohydrates, proteins and nucleic acids. Chemical method tosynthesisepeptides,polynucleotides,.CellularReceptorsfordrugaction,strategiesforidentifyingthe cellulartargetofphysiologicallyactivenaturalproducts(paclitaxel,vancomycin).

ModuleII:Chemical reactionsinlivingsystems
ClassificationofEnzymes, Introductiontoenzymechemistry: Redoxreactions(1), Grouptransferreactions,Isomerases,Carboxylationanddecarboxylation,

ModuleIII:Chemicalreactions
Typesofchemicalreactionsimportantinorganicsynthesise:Eliminations,additions,condensation(Ald olcondensation)andSubstitutions,andRearrangements(ClaisenReactions).

ModuleIV:Structuralchemicalbiology
Purinebiosynthesis,thiaminebiosynthesis,vitaminEbiosynthesis,Steroids(Cholesterol),porphyrinbi osynthesise.

ModuleV:Chemicaltoolsinenzymology
Specificity in DNA polymerase and the role of induced fit, Group I ribozyme: kinetics andmechanisms,RNAmodificationsandapplicationstocatalysis,Unnaturalaminoacids

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

- Waldmann,Herbert,andPetraJanning(2004),Chemicalbiology:apracticalcourse. Wiley-VCH.

- Tanner, Julian A., and Ka To Shum, (2010), "Chemical Biology." Kirk-Othmer Encyclopedia ofChemicalTechnology.
- Sener,Bilge.(2009),Innovationsinchemicalbiology.Springer.
- Schreiber,StuartL.(2000),"Target-orientedanddiversity-orientedorganicsynthesisindrugdiscovery."Science287.5460,1964-1969.
- Chan, Leo L., et al. (2008), A General Method for Discovering Inhibitors of Protein−DNAInteractionsUsingPhotonicCrystalBiosensorsChem.Biol.3(7).
- Vineyard, Diana, et al (2007). Optimization of non-natural nucleotides for selective incorporationoppositedamagedDNAOrg.Biomol.Chem.,5,3623–3630.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Basics in Biotechnology	BTF 132	4:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the role of different branches of Biotechnology.
CLO 2	Acquire summarize and inferring the field of their interest among the different papers of Biotechnology.
CLO 3	Demons execute the concepts in the field of agriculture, veterinary sciences, pharmaceutical industry and food industry etc.

B. SYLLABUS:

ModuleI
Historyofbiotechnology,scopeofbiotechnology,introductionofgeneticengineering,plantandanimaltissueculture.

ModuleII
Fermentation technology, immobilized enzymes, vaccines, antibodies and hybridoma technology,diagnostics,embryotransfertechnology,sexingofembryo,transgenics.

ModuleIII
Genome, genomemapping,physicalmaps,geneticmaps

ModuleIV
DifferenttypesofDNAmarkersandtheirapplications.

ModuleV
Application of biotechnology in agriculture, veterinary sciences, pharmaceutical industry, food industry,chemicalindustryandenvironment.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

TextandReference Books:

- Course Becker, J.M. , Cold Well, G. A. & Zachgo, E. A. (2007). Biotechnologya Laboratory,AcademicPress.
- Brown,C.M.,Campbell,I.,&Priest,F.G.(2005).IntroductiontoBiotechnology,Panima.
- Singh, B.D.(2006).BiotechnologyEyxpandingHoriozon,Kalyani.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Introduction to Bioinformatics	BTF 133	4:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify structure-function relationships, information theory, gene expression, and database queries
CLO 2	Analyse and critically evaluate the results form biological databases and ability to design, perform and record experiments independently.
CLO 3	Select and implement a problem with the scientific reasoning and data analysis.

B. SYLLABUS:

ModuleI:

Introduction to Bioinformatics: What is Bioinformatics, its goals and scopes, Application ofBioinformatics, Human Genome Project, Role of Computers and Biology in Bioinformatics.IntroductiontoBiologicalDatabases

ModuleII:
Characteristics and Classification of Databases- Primary, Secondary, Composite and SpecializedDatabases.ENTREZ,EBI,NCBI,ExPasy,

ModuleIII:
FileFormats: FASTA,ASN.1,GenBank,EMBL,ClustalW,PHYLIP.

ModuleIV
Sequence Analysis: Pairwise alignment: Global alignment and Needleman Wunsch Algorithm,LocalalignmentandGappenaltyanditsStatistical significanceScoringMatrices:PAM,BLOSUM.

ModuleV:
Molecularinteractions of Protein-Protein: Protein DNA, Protein carbohydrates, protein ligand,Protein-proteinInteractiondatabases:BIND,DIP,GRID,STRING,KEGG,MetaCyc,EcoCyc.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage(%)	15	5	10	10	10	50

Text&References:

- Setubal Joao and Meidanis Joao, (1997), Introduction to computational molecular Biology, PWSPublishing Company(An International Thomsaon Publishing Company), Indianlowpricededition.
- David Mount, (2004), Bioinformatics: sequence and Genome Analysis, by, second Edition. ColdSpringharbourlaboratorypress.
- A. Malcolm Campbell and Laurie J.Heyer, (2007), Discovering Genomics, Proteomics andbioinformatics,Publisher:BenjaminCummings.
- Aluru,Srinivas,(2005),Handbookofcomputationalmolecularbiology.CRCPress,.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
English	BCS 101	4:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding essential vocabulary and grammar
CLO 2	Learning about communication
CLO 3	Speaking and writing in English.

B. SYLLABUS:

ModuleI:Vocabulary
UseofDictionary,UseofWords:Diminutives,Homonyms&Homophones

ModuleII:EssentialsofGrammar-I
Articles,PartsofSpeech,Tenses

ModuleIII:EssentialsofGrammar-II
SentenceStructuremSubject-Verbagreement,Punctuation

ModuleIV:Communication
Theprocessandimportance,Principles&benefitsofEffectiveCommunication

ModuleV:SpokenEnglishCommunication
SpeechDrills,Pronunciationandaccent,StressandIntonation

ModuleVI:CommunicationSkills-I
Developinglisteningskills,Developingspeakingskills

ModuleVII:CommunicationSkills-II
DevelopingReadingSkills,DevelopingwritingSkills

ModuleVIII:WrittenEnglishcommunication
ProgressionofThought/ideas,Structure ofParagraph.StructureofEssays

ModuleIX:ShortStories
OfStudies, byFrancisBacon
Dream Children, by Charles
LambThe Necklace, by Guy de
MaupassantAShadow,byR.K.Narayan
GloryatTwilight,BhabaniBhattacharya

ModuleX:Poems

AlltheWorldsaStage	Shakespeare
ToAutumn	Keats
O!Captain,MyCaptain.	Walt
WhitmanWheretheMindisWithoutFear	RabindranathTagore
PsalmofLife	H.W.Longfellow

ExaminationScheme:

Components	A	CT	HA	EE
Weightage(%)	05	15	10	70

Text&References:

- MadhulikaJha, Echoes, OrientLongMan
- Ramon&Prakash,BusinessCommunication,Oxford.
- SydneyGreenbaumOxfordEnglishGrammar,Oxford.
- SuccessfulCommunications,MalraTreece(AllynandBacon)
- EffectiveTechnicalCommunication,M.AshrafRizvi.

***30hrs ProgrammetobecontinuedforFullyear**

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Course Name	Course Code	LTP	Credit	Semester
Understanding Self for Effectiveness-I (Understanding Self for Effectiveness)	BSS 104	4:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning strategies for development of a healthy self esteem
CLO 2	Importance of attitudes and its effective on personality
CLO 3	Building Emotional Competence

B. SYLLABUS:

ModuleI:Self:CoreCompetency
Understanding ofSelf,ComponentsofSelf–Self-identity,Self-concept,Self-confidence,Self-image

ModuleII:TechniquesofSelfAwareness
ExplorationthroughJohari Window,Mapping the key characteristics ofself-Framing a charter forselfStages–self-awareness,self-acceptanceandself-realization

ModuleIII:SelfEsteem&Effectiveness
MeaningandImportance,Componentsofself-esteem,Highandlowself-esteem,Measuringyourselfesteem

ModuleIV:BuildingPositiveAttitude
Meaningandnatureofattitude,ComponentsandTypesofattitude,Importanceandrelevanceofattitude

ModuleV:BuildingEmotionalCompetence
EmotionalIntelligence–
Meaning,components,ImportanceandRelevance,PositiveandNegativeemotionsHealthyandUnhealthyexpression ofemotions

ModuleVI:End-of-SemesterAppraisal
Viva based on personal journal, Assessment of Behavioralchange asa result of training, Exit Level Rating by SelfandObserver

ExaminationScheme:

Components	SAP	A	MidTerm Test(CT)	VIVA	Journalfor Success(JOS)
Weightage(%)	20	05	20	30	25

Text&References:

- Davis,K.OrganizationalBehaviour,
- Hoover,JudhithD.(2002).EffectiveSmallGroup andTeamCommunication,HarcourtCollegePublishers.
- Charles:TeamManagement, Dick,McCann&Margerison,Edition,vivabooks(1992)
- Bates,A.P.,&Julian,J.Sociology-UnderstandingSocialBehaviour
- Dressler,DavidandCans,Donald:TheStudyofHumanInteraction

- Lapiere,Richard.T–Social Change
- Lindzey, G.andBorgatta, E: Sociometric Measurementin the Handbookof Social Psychology,Addison–Welsley,US.
- Rose,G.(1985).OxfordTextbookofPublicHealth,Vol.4.
- LaFasto&Larson.(2001).WhenTeamsWorkBest,ResponseBooks(Sage),NewDelhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, GroupPfeiffer&Company.
- SmitherR.D.(1994).ThePsychologyofWorkandHumanPerformance,HarperCollinsCollegePublishers.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
French-I	FLT 101	4:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

ModuleA:pp.01to37:Unités1,2,Unité3Objectif1,2
OnlygrammarofUnité3:objectif3,4and5

Contenulexical:Unité1:Découvrirlalanguefrançaise:(oraletécrit)

1. seprésenter,présenterquelqu'un,fairelaconnaissancedesautres,formulesdepolitesse,rencontres
2. dire/interrogersioncomprend
3. Nommerleschoses

Unité2:Faireconnaissance

1. donner/demanderdesinformationssurunepersonne,premiers contacts,exprimer sesgoûtsetsespréférences
2. Parlerdesoi:parlerdutravail,deses activités,desonpays,desaville.

Unité3:Organisersontemps

1. direladateetl'heure

Contenugrammatical:

1. organisationgénéraledelagrammaire
2. articleindéfini,défini,contracté
3. nom,adjectif,masculin,féminin,singulieretpluriel
4. négationavec«de»,"moiaussi", "moinonplus"
5. interrogation:Inversion,est-ceque,qui,que,quoi,qu'est-ceque,où,quand,comment,quel(s),quelle(s)
   Interro-négatif:réponses:oui,si,non
6. pronomtonique/disjoint-pourinsisteraprèsunepréposition
7. futurproche

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/Conversation Practice

Text&References:

- lelivreàsuivre:Campus:Tome1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German-I	FLG 101	4:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in German vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in German

B. SYLLABUS:

ModuleI: Introduction
Self-introduction:heissen,kommen,wohnwn,lernen,arbeiten,trinken,etc.Allpersonal pronounsinrelationtotheverbstaughtsofar.
Greetings:GutenMorgen!,GutenTag!,GutenAbend!, GuteNacht!,Dankesehr!,Danke!,VielenDank!,(estutmirLeid!),
Hallo,wiegeht's?:Dankegut!,sehrgut!,prima!,ausgezeichnet!,
Esgeht!,nichtso gut!,so lala!,miserabel!

ModuleII:Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – gameforself-introduction.

ModuleIII:Phonetics
SoundsystemofthelanguagewithspecialstressonDipthongs

ModuleIV:Countries,nationalitiesandtheirlanguages
To make the students acquainted with the most widely used country names, their nationalitie and the languagespokeninthatcountry.

ModuleV:Articles
Thedefiniteandindefinitearticlesinmasculine,feminineandneutergender.AllVegetables,Fruits,Animals,Furniture,Ea tables,modesofTransport

ModuleVI:Professions
Toacquaintthestudentswithprofessionsinboththegenderswiththehelpoftheverb"sein".

ModuleVII:Pronouns
Simplepossessivepronouns,theuseofmy,your,etc.
Thefamilymembers,familyTreewiththehelpoftheverb"tohave"

ModuleVIII:Colours
Allthecolorandcolorrelatedvocabulary–colored,colorful,colorless,pale,light,dark,etc.

ModuleIX:Numbersandcalculations–verb"kosten"
Thecounting,pluralstructuresandsimplecalculationlikeaddition,subtraction,multiplicationanddivisiontotesttheknowledge ofnumbers.
"Wieviel kostet das?"

ModuleX:RevisionlistofQuestionpronouns
W–Questionslikewho,what,where,when,which,how,howmany,howmuch,etc.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation

I–Interaction/Conversation Practice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,SprachkursDeutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant-1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish-I	FLS 101	4:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in Spanish vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in Spanish

B. SYLLABUS:

ModuleI
A brief historyof Spain, Latin America, the language, the culture…and the relevance of Spanish language in today'sglobalcontext.
Introductiontoalphabets

ModuleII
Introduction to'*Saludos*' (Howtogreeteach other. Howto present /introduce each other).Goodbyes(despedidas)
Theverb*llamarse*andpracticeofit.

ModuleIII
ConceptofGenderandNumber
Monthsofthe years,days of the week,seasons. Introduction to numbers1-100, Colors,
Revisionofnumbersandintroductiontoordinalnumbers.

ModuleIV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Someadjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agreewithgenderandnumberoftheirnouns.Exerciseshighlightingusageof*Ser*and*Estar*.

ModuleV
Time,demonstrativepronoun(Este/esta,Aquel/aquellaetc)

ModuleVI
IntroductiontosomekeyAR/ER/IRendingregularverbs.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/Conversation Practice

Text&References:

- Español, EnDirectoIA
- EspañolSinFronteras

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chinese-I	FLC 101	4:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

B. SYLLABUS:

ModuleI
Showpictures,dialogueandretell.G
ettingtoknoweachother.
PracticingchartwithInitialsandFinals.(CHART–
TheChinesePhoneticAlphabetCalled“HanyuPinyin”inMandarinChinese.)
PracticingofTonesasitisatonal
language.Changesin3rdtoneandNeutralTone.

ModuleII
Greetings
LetmeIntroduce
Themodalparticle“ne”.
UseofPlease‘qing”– sit,havetea..... etc.
Abriefself introduction–
Nihaoma?Zaijian!Useof“bu”negative.

ModuleIII
Attributives showing
possessionHow is your Health?
ThankyouWhereareyoufrom?
A few Professions like –Engineer, Businessman, Doctor, Teacher, Worker.Areyoubusywithyourwork?
May Iknowyourname?

ModuleIV
Use of “How many” – People inyour
family?Useof“zhe” and“na”.
Useofinterrogativeparticle“shenme”,“shui”,“ma”and“nar”.Howto
makeinterrogativesentencesendingwith“ma”.
Structuralparticle“de”.
Useof“Nin”whenandwheretouseandwithwhom. Useofguixing.
Useofverb“zuo”andhowtomakesentenceswithit.

ModuleV
FamilystructureandRelations.U
seof“you”–“meiyou”.

Measure
wordsDaysandWeek
days.Numbers.
Maps,differentlanguagesand Countries.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- "ElementaryChineseReaderPartI"Lesson1-10

SemesterII

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Applied Mathematics-II	BTF 201	4:0:0	4	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Solve system of linear equations; be familiar with the definition and properties of matrix; find the eigenvalues and eigenvectors of a square matrix.
CLO 2	Investigate the properties of vectors and study their differentiation and integration properties.
CLO 3	Calculate the measure of central tendency and doing curve fitting.

B. SYLLABUS:

ModuleI:LinearAlgebra
Definition of a Matrix, Operations on Matrices Determinants, Elementary Operations, Reduction of a Matrix toRow Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination andGauss Jordan – Method, Eigen values and Eigen Vectors of Matrix, Caley-Hamilton theorem, Diagonalization of amatrix.

ModuleII:ComplexNumber
Definitionof ComplexNumber, Equality, Conjugateand Modulusof a ComplexNumber, Polar fo rmof a ComplexNumber,De-Moivre'sTheorem,

ModuleIII:
Roots of a Complex Number, Exponential and Circular function of a Complex Number, Hyperbolic Functions andtheirinverses.

ModuleIV: VectorCalculus
Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral,Green's theorem in plain (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (withoutproof)

ModuleV:Statistics
Frequency Distribution, Arithmetic Mean, Median, Partition Values, Mode, Variance and Standard Deviation,CurveFitting,Principleofleastsquares,Linearregression.

ModuleVI:Probability
Introduction to Probability, Additionand Multiplication theoremof Probability, Randomvariablesand ProbabilityDistribution,Expectedvalues,Binomialdistribution,PoissondistributionandNormal. DistributionandtheirApplications.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage (%)	15	5	10	10	10	50

Text&References:

- Dass,H.K.(2011).HigherEngineeringMathematics,S.Chand,Delhi.
- Mishra,S.(2013).FundamentalsofMathematicsFuncationsa:FunctionsandGraphs.PearsonEducation,Firsted.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Applied Physics-II	BTF 202	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	demonstrate basic knowledge of Quantum theory and apply it to other phenomenon as observed in sub-atomic Physics
CLO 2	solve simple problems in Quantum Theory.
CLO 3	identify and analyse the various spectra as observed during electronic transitions

B. SYLLABUS:

ModuleI:WaveMechanics
de-Broglie matter waves, wavenature of particles, phase and group velocity, Heisenberg uncertaintyprinciple, wavefunction and its physics interpretation, Operators, expectation values. Time dependent & time independentSchrÖdingerwaveequationforfree&boundstates,squarewellpotential(rigidwall),Conceptofsteppotential.

ModuleII:AtomicPhysics
Vector atom model, LS and j-j coupling, Zeeman effect & Paschen-Back effect, Bragg's law, X-ray spectra andenergy leveldiagram, Laser – Einstein coefficient, population inversion, condition of light amplification, He-Ne andRubylaser

ModuleIII:SolidStatePhysics
Sommerfield's free electron theory of metals, Fermi energy, Energy bands in solids, physics of semi-conductors,doping, intrinsic and extrinsic semiconductors, Depletion layer, characteristics of PN junction, Forward and reversebaising,Breakdownvoltage,Superconductivity,Meissnereffect,IntroductiontoNanomaterials

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

- Beiser,A.(2002).ConceptofModernPhysics,McGraw-HillHigherEducation;6th edition.
- Agarawal&Goel.(2011).AppliedPhysicsII,PragatiPrakashan.
- Pallai,S.O.(2009).SolidStatePhysics,NewAcademicScienceLtd;6edition.
- Wehr&Richards.(1984).PhysicsofAtom,Addison-Wesley,4edition.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Applied Chemistry-II	BTF 203	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand water hardness hazards and removal it through water softening techniques.
CLO 2	Improve the CFV and octane number of fuel.
CLO 3	Develop the biodegradable polymer.

B. SYLLABUS:

ModuleI:Water&Lubricants

HardnessofWater;BoilerFeedWater;ScaleandSludge;SofteningofWater;ExternalandInternalTreatmentofBoiler Water; Domestic Water Treatment; Domestic Water Treatment; Desalination of Brackish Water; ChemicalAnalysisofWater;DissolvedO_2(BOD,COD);EstimationofFreeChlorine;TDS.

Introduction;MechanismofLubrication;TypesofLubricants;ChemicalstructurerelatedtoLubrication;Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point;DropPoint; CloudPoint;PourPoint.SelectionofLubricants.

ModuleII:Fuel&Polymers

Introduction; Characteristics of good Fuel ; Calorific value; Bomb Calorimeter; Proximate and Ultimate analysis ofcoal; Carbonization of coal; Gasification and Liquification of coal: Fischer Tropsch and Bergius Process; WaterGasandProducerGas

Introduction; Polymerization: Addition and Condensation Polymerization; Thermosetting and ThermoplasticPolymers;MolecularWeightofPolymer;Rubber,PlasticandFiber;Preparation,PropertiesandusesofP MMA,Polyester,EpoxyResinsand Bakelite,SiliconePolymers.

ModuleIII:Corrosion

Introduction, Mechanism of Dry and Wet Corrosion, Types of Corrosion, Galvanic Corrosion, Concentration CellCorrosion, Passivity, Underground Soil Corrosion, Pitting Corrosion, Intergranular Corrosion, Waterline InfluencingCorrosion,CorrosionControl.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- Jain&Jain.(2008).EngineeringChemistry,DhanpatRoy&Sonseds.
- Chawla,S.(2009).EngineeringChemistry,DhanpatRoy&Sonseds.

References:

- Dara,S.S.(2004). EngineeringChemistry,SChand,NewDelhi.
- Ratan,S.(2013).EngineeringChemistry,S.K.Kataria&Sons.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Object Oriented Programming in C++	BTF 204	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Apply the principles of object-oriented programming for various fields.
CLO 2	Create computer programs for various applications using C++ language.
CLO 3	

B. SYLLABUS:

ModuleI:IntroductionClassesandObjects

Review of C, Difference between C and C++, Procedure Oriented and Object -Oriented Approach. Basic Concepts:Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding,Message Passing. Characteristics of Object-Oriented Languages. Introduction toObject-Oriented Modelingtechniques(Object,FunctionalandDynamicModeling).

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class,State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, FriendFunctions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, StaticClassData,ArrayofObjects,ConstantmemberfunctionsandObjects,MemorymanagementOperators.

ModuleII:Inheritance&Polymorphism

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguityresolution using scope resolution operator and Virtual base class, Aggregation, composition vs classificationhiérarchies,Overridinginheritancemethods,Constructorsinderivedclasses,NestingofClasses.
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading(Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtualfunctions.

ModuleIII:Strings,FilesandExceptionHandling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling,Generic Programming – function template, class Template Standard Template Library: Standard Template Library,Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes,GeneralTheoryofOperation,Vectors.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- Venugopal,A.R.,&Ravishanker,T.(1997).MasteringC++,TMHPublications.
- LaforeR.(2004).ObjectOrientedProgrammingusingC++,BPBPublications.
- BalagurusamyE.(2013).ObjectOrientedProgrammingwithC++,TMH;Sixthedition.

References:

- Parasons.(1999).ObjectOrientedProgrammingwithC++,BPBPublication.
- Lawlor, S.C.(2002).TheArtofProgrammingComputerSciencewithC++,VikasPublication.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Internet Technologies	BTF 205	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate basic principles of internet technology.
CLO 2	Apply the knowledge of internet for efficiently searching data for building datasets in different application.
CLO 3	Create, design and maintain websites or own computer networks for any specific field.

B. SYLLABUS:

ModuleI
Introduction to Internet, its history, the working of Internet, components of Internet, Web sites and WebPages,MajorprotocolsthatmakeuptheWeb,theURLandtheDomainNameSystem, Webbrowsers,plug-ins,ActiveX,multimedia,AbriefaboutWebprogramminglanguagesandfunctions,Real-Time communication, Blogs and RSS, Brows e using different browsers, Search Engines and searching the web,different searchingstrategies.

ModuleII
Awareness about cyber-crime, safety, privacy, and exchanging information over electronic media etc., Strategies forevaluatingresourcesfoundontheInternet.

ModuleIII
Computer network, Typesof computer networks, Network Topology, Different types of networktopology with theiradvantagesanddisadvantages.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- Bioinformatics:Databases andSystems,StanleyLetovsky
- NetworkingforDummiesbyLowe,Doug.

References:

- IntroductiontoBioinformaticsbyTeresaAttwood,DavidParry-Smith,
- Bioinformatics: Sequence, Structure and Databanks:APracticalApproach(The PracticalApproach Series,236),DesHiggins(Editor),WillieTaylor
- Bioinformatics:ABiologist'sGuidetoBiocomputingandtheInternet,StuartM.Brown
- Allaboutcomputersfordummies byGookinDass

- Bioinformatics:SequenceandGenomeAnalysis,DavidW.Mount.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Applied Physics-II-LAB	BTF 222	4:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Determining wavelength of prominent lines of mercury spectrum
CLO 2	Learning about how to determine wavelength of the He-Ne laser light, frequency of electricity.
CLO 3	Energy band-gap of germanium crystal etc.

Practicals

ListofExperiments

1. To determinethewavelengthofprominentlinesofmercuryspectrumusingplanetransmissiongrating.
2. Todeterminethethicknessofagivenwirebywedgemethod.
3. TodeterminethewavelengthofHe-Nelaserlightusingsingleslit.
4. Todeterminethefrequencyofanelectricallymaintainedtunningforkbymelde'smethod.
5. Tostudythevariationofmagneticfieldalongtheaxisofhelmholtzcoilandtofindoutreductionfactor.
6. TodrawtheV–Icharacteristicsofaforwardandreversebiaspnjunctiondiode.
7. Todeterminethefrequencyofacmainsusingsonometer.
8. Todeterminetheenergyband-gapofgermaniumcrystalusingfourprobesmethod.
9. TodrawV–Icharacteristicsofaphotocellandtoverifytheinversesquarelawofradiation.
10. Todeterminetheaccelerationduetogravity("g")usingKeter'sreversiblependulum.
11. Tostudythecharacteristicsofphotovoltaiccell(Solarcell).

Examination Scheme:

IA			EE			
ClassTest (Practical Based)	**Mid TermViva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Applied Chemistry-II-LAB	BTF 223	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about how to determine viscosity index, flash point and fire point of lubricating oil
CLO 2	Chemical Analysis of Water
CLO 3	Urea Formaldehyde resin synthesis etc.

Unit:01

Practicals

CourseContents:

1. Determiningtheviscosityindexoflubricatingoilbyusing Redwoodviscometer.
2. Determiningtheflashpointandfirepointof lubricatingoil.
3. DeterminationofHardnessofWater.
4. ChemicalAnalysisofWaterlikeAlkalinity,residualChlorine.
5. SynthesisofUreaFormaldehyderesin.
6. DeterminationofMolecularweightofPolymer.
7. DeterminationofIonexchangecapacityofaregion.
8. Determination of dissolvedOxygeninWater.
9. Determination of Iodinevalueinwater.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Object Oriented Programming in C++ LAB	BTF 224	4:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate how to create objects
CLO 2	Use of constructors and destructors.
CLO 3	File handling

Practicals

SoftwareRequired: TurboC++

- Creationofobjectsinprogramsandsolvingproblemsthroughthem.
- Differentuseofprivate,publicmembervariablesandfunctionsandfriendfunctions.
- Useofconstructorsand destructors.
- Operatoroverloading
- Useofinheritanceinandaccessingobjectsofdifferentderivedclasses.
- Polymorphismandvirtualfunctions(usingpointers).
- Filehandling.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**Mid TermViva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Internet Technologies LAB	BTF 225	4:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on Microorganisms and their use in different industries
CLO 2	Acquire industrial skills of microbial culture, growth, and practices
CLO 3	Demonstrate the advanced application of Microbes in emerging industrial sectors

CourseContents:

- Differenttypesofsearchengines,searchingtheweb,variousstrategiesforefficientsearching.
- Usingweb-basedtools,workingwithBiologicalsequences:
  a) Conversionsofsequencefromoneformtoanother(e.g.,nucleicacidsequencetoaminoacidsequenceetc.)
  b) Findingoutdifferentparameters of a given sequence (e.g., composition, molecular weight, complement, reversecomplementetc.).
- ReferencinginScientificliteratureandtheirpracticalusage.
- FormatconversionofBiologicalsequences.
- Pubmedandrelevantliteraturedatabases:Featuresandusage.

Examination Scheme:

IA			EE			
ClassTest(Practical Based)	**MidTermViva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-II	AND 002	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringfor someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Term Paper	BTF 230	4:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

A term (or research) paper is primarily a record of intelligent reading in several sources on a particularsubject.
Thestudentswillchoosethetopicatthebeginningofthesessioninconsultationwiththefaculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semesterthe detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done byBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
7. Choosingasubject
8. Findingsourcesofmaterials
9. Collectingthenotes
10. Outliningthepaper
11. Writingthefirstdraft
12. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
d) The material sources should be not more than 10 years old unlessthe nature of the paper is such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
e) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
f) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
d) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
e) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
f) Checkcrossreferences.

4. Outliningthepaper
c) Reviewnotestofindmainsub-divisionsofthesubject.
d) Sort the collected material again under each main division to find sub-sections for outline so that

itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose
b) mainbodyofthepaper
c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

j) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses ofrelevance to the question at hand. Sometimes, therelevance of a particular section may be clear to you but not to your readers. To avoid this,ensureyoubrieflyexplaintherelevanceofeverysection.

k) Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.
l) Checkfor properspelling,phrasingandsentenceconstruction.
m) Checkforproperformonfootnotes, quotes, andpunctuation.
n) Checktoseethatquotationsserveoneofthefollowingpurposes:
o) Showevidenceofwhatanauthorhassaid.
p) Avoidmisrepresentationthroughrestatement.
q) Saveunnecessarywritingwhenideashavebeenwellexpressedbytheoriginalauthor.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
8) Title page
9) Tableofcontents
10) Introduction
11) Review
12) Discussion&Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of thepaperandthereviewpartshouldbetwothirdsofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintherese archpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:
e) summaryofquestionposed
f) summaryoffindings
g) summaryofmainlimitationsofthestudyathand
h) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs
Crystal,D.(2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challengesto communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,
S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument].Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,Universityof Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongst adult learners of German as a foreign language. Unpublished PhD dissertation, UniversityCollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowof theidea/ideas,relevanceofmaterialused/presented,outcomesvs.objectives,presentation/vivaetc.)

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Biological Information and Databases	BTF 231	4:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate, Biological information database, structure and pathway databases. Sequence databases to both nucleic acid and protein sequences.
CLO 2	Create biological information database, structure and pathway databases. Sequence databases to both nucleic acid and protein sequences.
CLO 3	Apply and analyse biological data using a variety of Bioinformatics tools and can compare various methods applied to solve biological questions.

B. SYLLABUS:

Module I: Introduction to biological databases, Primary and Secondary databases. Nucleotidedatabases: GenBank, EMBL, DDBJ, Nucleotiide sequence flatfiles. Protein sequence databases:NBRF-PIR,SwissProt,UniportKnowledgebase,UniportKnowledgebaseflatfile.PopularSequenceformats

ModuleII: Structure databases: Introduction to Structures, Structure database like PDB andMMDB,Structurefileformats,Structureviewers,Structuresimilaritysearching.

ModuleIII: Information retrieval from Biological databases: Integrated Information retrieval:TheEntrezsystem,SRS

Module IV: Genomic Mapping: Introduction, Relationship between mapping and sequencing,Genomicmapping elements, Types of maps, Comparitive Maps, Uses of Mapping resources.Genomicdatabases:Introduction,Genomeprojects,Genomebrowsers,UCSC,NCBI,Ensembl.

ModuleV: Protein-ProteinInteractionNetworks, databasesandsoftware: DIP(DatabaseofInteracting Proteins), PPI Server, BIND - Biomolecular Interaction Network Database, PIM –Hybrigenics, PathCalling Yeast Interaction Database, MINT - a Molecular Interactions Database,GRID-TheGeneral RepositoryforInteractionDatasets, InterPreTS-proteininteractionpredictionthroughtertiarystructure.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- Mount, D. W., &Mount, D. W. (2001). Bioinformatics: sequence andgenome analysis(Vol. 2). NewYork::Coldspringharborlaboratorypress.
- Sensen,C.W.(Ed.).(2008).Essentialsof genomicsandbioinformatics.JohnWiley&Sons.
- Higgs,P.G.,&Attwood,T.K.(2013).Bioinformaticsandmolecularevolution.JohnWiley&Sons.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Computational Biology	BTF 232	4:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological data at various database and will understand the data attributes with information stored in it.
CLO 2	Create new projects by applying various tools to investigate existing data interpretation methods and can address issues by applying computational methods.
CLO 3	Apply these data sources and computational methods for investigation of novel biological problems.

B. SYLLABUS:

ModuleI
SequenceAnalysis: Multiplesequenceanalysis,ApplicationofMSA,scoringMSA,MethodsofMSA.

ModuleII:
ProfileandBLOCKanalysis,PositionSpecificScoringMatrices,MSAanalysissoftwareandtools.

ModuleIII:
ProteinStructureClassification:Primary,Secondaryandtertiary,proteinstructuredatabasesandVisualizationtools.ProteinStructureclassificationanddatabases.Proteinstructureevaluation.

ModuleIV: GenomeAnalysis:Prokaryoticandeukaryoticgenome,sequenceassemblyandgeneidentification,comparativegenomics-Synteny,Horizontalgenetransfer.FunctionalGenomics.

ModuleV: PrincipleofXrayCrystallography,NMR,MethodsofsingleXraydiffractionofmacromolecule-Molecular replacement Method and multiple isomorphous replacement method and directmethod,fibreDiffraction

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- Setubal Joao and Meidanis Joao, (1997), Introduction to computational molecular Biology, PWSPublishing Company(An International Thomsaon Publishing Company), Indianlowpricededition.

- David Mount, (2004), Bioinformatics: sequence and Genome Analysis, by, second Edition. ColdSpringharbourlaboratorypress.
- A. Malcolm Campbell and Laurie J.Heyer, (2007), Discovering Genomics, Proteomics andbioinformatics,Publisher:BenjaminCummings.

Aluru,Srinivas,(2005),Handbookofcomputationalmolecularbiology.CRCPress,.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Database Management Systems	BTF 233	4:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available databases and will able to design the data attributes for storing information.
CLO 2	Create new projects by applying various database concept to investigate existing data design and can address issues by applying novel methods
CLO 3	Apply these data sources and compile to design novel biological data resources.

B. SYLLABUS:

ModuleI:Overviewandhistoricalperspective
Filesystemsvs.DBMS,advantagesofDBMS;

ModuleII:DescribingandstoringdatainDBMS
Levels of abstraction and data independence; Data models and their comparison;Entityrelationshipmodel - concepts, design, keys and features; Relational model -introduction, structure of the relationaldatabases, integrity constraints, Relational algebra and calculus -selection and projection, set operations,renaming,Joins,Divisionetc.

ModuleIII:SQLand

PerlModuleIV:Databasedesi

gn
Functionaldependencies,Normalforms;Concurrencycontrolanddatabasediscovery-conceptoftransaction:atomicity,consistency,isolationanddurability,transactionsandschedules,concurrentexecutionoftransactions, Lockbasedconcurrencycontrol,Databaserecovery

ModuleV:Currenttrends
DistributeddatabasesandmultimediadatabasesDatawarehousingandDataMining

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- Han, J., Kamber, M., & Pei, J. (2011). Datamining: concepts andtechniques: concepts andtechniques.Elsevier.
- Pujari,A.K.(2001).Dataminingtechniques.Universitiespress.
- Elmasri, R. (2008).Fundamentalsofdatabasesystems.PearsonEducationIndia.
- Connolly, T. M., & Begg, C. E. (2005). Databasesystems: apracticalapproachto design, implementation,andmanagement.PearsonEducation.
- Jeffrey,D.U.(1989).Principlesofdatabaseandknowledge-basesystems.
- Kimball, R., & Ross,M. (2011). Thedatawarehousetoolkit: thecompleteguide todimensionalmodeling.JohnWiley&Sons.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
English	BCS 201	4:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about communication skills
CLO 2	Speaking and writing in English
CLO 3	Learning about short stories and poems.

B. SYLLABUS:

ModuleI:Vocabulary
UseofDictionary,UseofWords:Diminutives,Homonyms&Homophones

ModuleII:EssentialsofGrammar-I
Articles,PartsofSpeech,Tenses

ModuleIII:EssentialsofGrammar-II
SentenceStructure,Subject-Verbagreement,Punctuation

ModuleIV:Communication
Theprocessandimportance,Principles&benefitsofEffectiveCommunication

ModuleV:SpokenEnglishCommunication
SpeechDrills,Pronunciationandaccent,StressandIntonation

ModuleVI:CommunicationSkills-I
Developinglisteningskills,Developingspeakingskills

ModuleVII:CommunicationSkills-II
DevelopingReadingSkills,DevelopingwritingSkills

ModuleVIII:WrittenEnglishcommunication
ProgressionofThought/ideas,Structure ofParagraph,Structure ofEssays

ModuleIX:ShortStories
Of Studies, by FrancisBacon, Dream Children, by CharlesLambThe Necklace, by Guy de MaupassantAShadow,byR.K.NarayanGloryatTwilight,BhabaniBhattacharya

ModuleX:Poems

AlltheWorldsaStage	Shakespeare
ToAutumn	Keats
O!Captain,MyCaptain.	Walt
WhitmanWheretheMindisWithoutFear	RabindranathTagore
PsalmofLife	H.W.Longfellow

ExaminationScheme:

Components	A	CT	HA	EE
Weightage(%)	05	15	10	70

Text&References:

- MadhulikaJha, Echoes, OrientLongMan
- Ramon&Prakash,BusinessCommunication,Oxford.
- SydneyGreenbaumOxfordEnglishGrammar,Oxford.
- SuccessfulCommunications,MalraTreece(AllynandBacon)
- EffectiveTechnicalCommunication,M.AshrafRizvi.

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Course Name	Course Code	LTP	Credit	Semester
Understanding Self for Effectiveness-II (Problem Solving and Creative Thinking)	BSS 204	4:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the process of problem solving and creative thinking.
CLO 2	Facilitation and enhancement of skills required for decision-making
CLO 3	

B. SYLLABUS:

ModuleI:ThinkingasatoolforProblemSolving
Whatisthinking:TheMind/Brain/Behavior
,CriticalThinkingandLearning:,MakingPredictionsandReasoning,MemoryandCriticalThinking,Emotions andCriticalThinking,Thinkingskills

ModuleII:HindrancestoProblemSolvingProcess
Perception,Expression,Emotion,Intellect,Workenvironment

ModuleIII:ProblemSolving
Recognizing and Defininga problem, Analyzingthe problem (potential causes)Developingpossiblealternatives,EvaluatingSolutions
Resolutionof problem,
ImplementationBarrierstoproblemsolvin
g:

- Perception
- Expression
- Emotion
- Intellect
- Workenvironment

ModuleIV:PlanofAction
Construction of POA,
MonitoringReviewingandanalyzingth
eoutcome

ModuleV:CreativeThinking
Definitionandmeaningofcreativity,Thenatureofcreativethinking

- ConvergentandDivergentthinking
- Ideagenerationandevaluation(BrainStorming)
- Imagegeneration andevaluation
- Debating

Thesix-phasemodelofCreativeThinking:ICEDIPmodel

ModuleVI:End-of-SemesterAppraisal
VivabasedonpersonaljournalAssessmentofBehaviouralchangeasaresultoftraining
ExitLevelRatingbySelfandObserver

ExaminationScheme:

Components	SAP	A	MidTermTest(CT)	VIVA	JournalforSuccess(JOS)
Weightage(%)	20	05	20	30	25

Text&References:

- MichaelS.(1999).HowtobeaBetterProblemSolver,KoganPage,NewDelhi.
- GeoffP.(1999).HowtobeaBetteratcreativity;by:KoganPage,NewDelhi,(1999)
- RichardY.C.,&KeithP.,(1998).WheelerPublishing,NewDelhi.
- PhilLoweKoge(1996).Page: CreativityandProblemSolving,NewDelhi,
- Pfeiffer, J. W., (1996). Theories and Models in Applied Understanding Self for Effectiveness, ManagementPfeiffer&Company.
- Bensley, A.D. (1998). Crit ical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole PublishingCompany.

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Course Name	Course Code	LTP	Credit	Semester
French-II	FLT 201	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

ModuleA:pp.38– 47:Unité3:Objectif3,4,5.6

ModuleB:pp.47to75Unité4,5

Contenulexical:

Unité3:Organisersontemps

1. donner/demanderdesinformationssurunemploidutemps,unhoraireSNCF– Imaginerundialogue
2. rédigerunmessage/unelettre pour…
   i) prendreunrendez-vous/accepteretconfirmer/annuler
   ii) inviter/accepter/refuser
3. Faireunprogrammed'activités
   imaginer une conversationtéléphonique/un dialoguePropositions-interroger,répondre

Unité4:Découvrirsonenvironnement

1. situerunlieu
2. s'orienter,s'informersurunitinéraire.
3. Chercher,décrireunlogement
4. connaîtrelesrythmesdelavie

Unité5:s'informer

1. demander/donnerdesinformationssurunemploidutempspassé.
2. donneruneexplication,exprimerledouteoulacertitude.
3. découvrirlesrelationsentrelesmots
4. savoirs'informer

Contenugrammatical:

1. Adjectifsdémonstratifs
2. Adjectifspossessifs/exprimerlapossessionàl'aidede:
   i. «de»ii.A+nom/pronomdisjoint
3. Conjugaison pronominale –négative, interrogative-constructionàl'infinitif
4. Impératif/exprimerl'obligation/l'interdictionàl'aidede«il faut….»/«ilnefautpas…»
5. passécomposé
6. Questionsdirectes/indirectes

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/Conversation Practice

Text&References:

- lelivreàsuivre:Campus:Tome1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German-II	FLG 201	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in German vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes
CLO 3	**Demonstrate** comprehension of nuance between script and sound in German.

B. SYLLABUS:

ModuleI:EverythingaboutTimeandTimeperiods
Time and times of the
day.Weekdays,months,seasons.
Adverbsoftimeandtimerelated prepositions

ModuleII:Irregularverbs
Introduction toirregularverbslike to be,and others,tolearn the conjugations of thesame, (fahren, essen, lessen,schlafen,sprechenundähnliche).

ModuleIII:Separableverbs
TocomprehendthechangeinmeaningthattheverbsundergowhenusedassuchTreatment ofsuchverbswithseparableprefixes

ModuleIV:Readingandcomprehension
Readingand deciphering railway schedules/school time tableUsageofseparableverbsintheabovecontext

ModuleV:Accusativecase
Accusativecasewith therelevantarticles
Introductionto2differentkindsofsentences–NominativeandAccusative

ModuleVI:Accusativepersonalpronouns
Nominativeand accusativeincomparison
Emphasizingontheuniversalapplicabilityofthepronounstobothpersonsandobjects

Module VII: Accusative prepositions Accusative propositions with their useBoththeoreticalandfigurativeuse

ModuleVIII: Dialogues
Dialoguereading:'Inthemarketplace'
'Atthe Hotel'

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/Conversation Practice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,SprachkursDeutsch
- Schulz Griesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant-1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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Course Name	Course Code	LTP	Credit	Semester
Spanish-II	FLS 201	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in Spanish vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in Spanish

B. SYLLABUS:

ModuleI
Revisionofearliermodules.

ModuleII
SomemoreAR/ER/IRverbs.IntroductiontorootchangingandirregularAR/ER/IRendingverbs

ModuleIII
Moreverbalphrases(eg,DiosMio,Quelastimaetc),adverbs*(bueno/malo,muy,mucho,bastante,poco).*
Simpletextsbasedongrammarandvocabularydoneinearliermodules.

ModuleIV
Posessivepronouns

ModuleV
Writing/speaking essayslike my friend, my house, my school/institution, myself….descriptionsof people, objectsetc,computer/internetrelatedvocabulary

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/Conversation Practice

Text&References:

- Español, EnDirectoIA
- EspañolSinFronteras

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Course Name	Course Code	LTP	Credit	Semester
Chinese-II	FLC 201	4:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

B. SYLLABUS:

ModuleI

Drills, Practice reading aloud, Observe Picture and answer the question. Tone practice. Practiceusing the languagebothbyspeakingandbytaking notes.Introductionofbasicsentencepatterns.Measurewords.Gladtomeetyou.

ModuleII

Wheredoyoulive?Learnin
g different
colors.Tonesof“bu”
Buyingthingsandhowmuchitcosts?Dialo
gueonchangeofMoney.
MoresentencepatternsonDaysandWeekdays.
How to tell time. Saying the units of time in Chinese. Learning tosayusefulphraseslike– 8:00, 11:25, 10:30
P.M.everyday,afternoon,evening,night,morning3:58,onehour,tobegin,toend…..etc.
Morning,Afternoon,Evening,Night.

ModuleIII

Use of words of location like-li, wais hang,
xiaFurniture–table,chair,bed,bookshelf,..etc.
Descriptionofroom,houseorhostelroom..egwhatisplacedwhereandhowmanythingsarethereinit?
ReviewLessons–
PreviewLessons.Expression‘yao”,“xiang”and“
yaoshi”(if).Daysofweek,monthsinayearetc.
IamlearningChinese.IsChinesedifficult?

ModuleIV

Countingfrom 1-
1000Useof‘chang-
chang”.
Making an Inquiry – What time is it now? Where is the Post
Office?Daysoftheweek.Monthsinayear.
UseofPreposition–“zai”,“gen”.
Use of interrogative pronoun– “duoshao” and
“ji”.“Whose”???Sweateretcisit?
DifferentGamesandgoingoutforexerciseinthemorning.

ModuleV

Theverb“qu”

- Goingtothelibraryissuingabookfromthelibrary
- Goingtothecinemahall,buyingtickets
- Goingtothepostoffice,buying stamps
- Goingtothemarkettobuythings..etc
- Goingtothebuyclothes….Etc.

Hobby.Ialsolikeswimming.Comprehensionandanswerquestionsbasedonit.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation

I–Interaction/Conversation Practice

Text&References:

- "ElementaryChineseReaderPartI"Lesson11-20

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Cell Biology	BTF 301	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction, history, types and cell cycle
CLO 2	Learning about cell structures, signaling and other mechanism.
CLO 3	Knowledge regarding cancer biology

B. SYLLABUS:

Module I : Introduction to Cell Biology, Cell biology historical perspectives, the cell theory, pre cellularevolution, different classes of cell, prokaryotic and eukaryotic cells.The Cell- Division Cycle,Overviewofthecellcycle,cellcyclecontrolsystemwithphases, mitosisandmeiosis.

ModuleII: Membrane Structure and TransportacrossCell Membrane,Membranestructure-LipidBilayer, Fluidity of Membrane, Membrane Proteins. Principles of Transmembrane transport, Types ofMembraneTransport, TransportProteins, MembranechannelsinTransportprocess
CellOrganellesandCellLocomotion

Module III: Cellular organelles: structure and function of- cell wall, Mitochondria, Chloroplast, Nucleus,Endoplasmicreticulum,Lysosomes, peroxisomes andGolgibodies.

ModuleVI: Cell locomotion- Cytoskeleton, structure and function ofciliaandflagella.CellularSignaling, General Principles of Cellular Signaling, Molecular tools involved in cell Signaling, Types ofCellSignaling,SignalingPathway–cAMPPathway, NotchPathway.

ModuleV: CancerBiology
Cancer-Evolution of Cancer,Hallmarks of Cancer,Causes, Organ specific Cancer,Genesrelated toCancer, Metastasis and Angiogenesis,Apoptosis, Prevention of Cancer,Diagnosisand Treatment ofCancer.StemCellsProperties ofStemcell,TypesofStemCell.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:
Text:

1. Essential Cell Biology , B. Alberts, D. Bray,A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K.Roberts,4th Edition,GarlandPublishingCompany,pp:864.
2. CellBiology,T.Devasena,1stEdition,OxfordPublishingHouse,pp:659.Refe
rences:

1. CellandMolecularBiology,GeraldKarp,JohnWileyandSonsInc.
2. CellandMolecularBiology,DeRobertis,B.I.PublicationPvt.Ltd.
3. CellinDevelopmentandInheritance,E.B.Wilson,Macmilian
4. DevelopmentalBiology,S.F.Gilbert,SinauerAssociatesInc.
5. MolecularCellBiology,H.Lodish,A.Berk,S.L.Zipursky,P.Matsudaura, D.BaltimoreandJ.Danell, W.H.PreemanandCompany.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOCHEMISTRY-I	BTF 302	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Chemical properties , bonding and interacrtion of molecules.
CLO 2	Introduction to biomolecules
CLO 3	Metabolism

B. SYLLABUS:

ModuleI:Introduction,aimsandscope:
ChemicalfoundationsofBiology-Propertiesofwater,acids,basesandbuffers,covalentbonds,Non-covalentinteractionsinbiologicalsystems.

Introductiontobiomolecules:-Carbohydrates:
Structure of monosaccharides, sterioisomerism and optical isomerism of sugars, reactionsofaldehydesandketonegroups,ring structureand anomericforms,mutarotation.Chemical reactionsofsugars,importantderivativesofmonosaccharides,di-andtri-saccarides.

ModuleII:Lipids:
Definitionandclassification.Fattyacids:introduction,classification,nomenclature,structureandproperties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols: nomenclature,physical properties, chemical properties and characterization of fats -hydrolysis,saponificationvalue,acid value, rancidity of fats, Reichert-Meissel number and reaction of glycerol. Biological significance offats.Lipidsandbiologicalmembranes,Lipidlinkedproteinsandlipoproteins.

ModuleIII:Carbohydratemetabolism:
glycolysis pathway and reactions, Citric acid cycle - Overview, Metabolic sources ofAcetylCo-A,enzymesand regulation, The amphibolic nature of the Citric acid cycle,Electron transport chain andoxidative photophosphorylation. Glycogen breakdown and synthesis, glycogen storage and its diseases,Gluconeogenesis, The glyoxylate pathway, Pentose phosphate pathway, Lipid digestion, absorption
andtransport,fattyacidoxidation,ketonebodies,fattyacidbiosynthesis,regulationoffattyacidmetabolism.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

Text:

- LehningerPrinciplesofBiochemistrybyM.M.CoxandD.L.Nelson,5th edition,2008,W.H.Freema

nandcompany,NewYork.
- Biochemistry by J.M. Berg, J.L. Tymoczko and L. Stryer, 5th edition, 2002, W.H. Freeman andCompany,NewYork.
- BiochemistrybyU.Satyanarayana,3rdedition,2006,NewCentralBookAgency(p)Lt.

References:

- ToolsofBiochemistry,T.G.Cooper,JohnWileyandSonsInc.
- Harper'sBiochemistry,K.Robert,M.D.Murray,D.K.Granner,P.A.MayesandV.I.Rodwell,McGraw-Hill/AppletonandLange.
- Biochemistry,C.K. Mathews,K.E.VanHoldeandK.G. Ahern, Benjamin/Cummings.
- TextbookofBiochemistry,E.S.West,W.R.Todd,H.S.Mason,andJ.T.VanBruggenOxford&IBHPublisher,ForthEdition.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MICROBIOLOGY	BTF 303	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to microbiology
CLO 2	To understand Structure, function and classification of microbes
CLO 3	To understand pathogenicity

B. SYLLABUS:

ModuleI:Historicalperspective
Introduction and historical perspective - Discovery of the microbial world, controversy over spontaneousgeneration

ModuleII:Control of microorganisms and microbes
Theoryandpracticeof sterilization;controlofmicroorganismsbyphysicalandchemicalagents;antibiotics.

ModuleIII:MethodsinMicrobiology,
Pureculturetechniques;Media;Principlesofmicrobialnutrition;Isolationofmicroorganisms,identification and characterization,Growth - The definition ofgrowth, mathematicalexpressionofgrowth,growthcurve,measurementofgrowth,synchronousgrowth,continuouscultu re,culturecollectionandmaintenanceofcultures.

Module IV:Microbes:Structure,FunctionandClassification
Prokaryotic Cells: cell walls, cell membranes, Flagella and Pili, Capsules, ribosomes, Cell inclusions,endosporesandgenophore;Structureandclassificationoffungi,protozoa,viruses,algae;Archaea

ModuleV
Classification of Bacteria; Bergeys Manual: briefintroduction;Ribotyping, ARDRA,RAPDNormalMicrobiota;Mechanismofmicrobialpathogenicity,MicrobialDiseases:Typho id,Cholera,Tuberculosis,Tetanus,HIV

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:
TextBooks:
1. Prescott,Herley,Klein(2002).Microbiology,5thedn.C.B.S.Publishers.

2. PelczarM.J.,ChanE.C.S.andKreig,N.R.Microbiology VIEdition,TataMcGrawHill.
3. JayaramPanikerC.K.(2009)AnanthnarayanandPaniker'sTextbookofMicrobiology,8thedn.OrientBlackSwan.

Reference:

1. Stanier,R.(2009).GeneralMicrobiology,5thEdn,Macmillian.
2. Salisbury,WhitakerandHall,PrinciplesofFermentationTechnology,AdityaBooksPvt.Ltd.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTER-I	BTF 304	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to OOP concept.
CLO 2	Develop sense of writing general programs using different operators , looping concept , array, trees etc
CLO 3	Exception handling

B. SYLLABUS:

ModuleI
C++programminglanguage–
Classesandobjects,ConstructorsandDestructors,Inheritance,Pointers,VirtualFunctions,Polymorphism.

ModuleII
ConsoleIOoperations,DataFiles,Exceptionhandling

ModuleIII
Data Structures: - Linked list, doubly linked list, circular link list; stack implementation using array and linked list;Queueimplementationusingarray&linkedlist;priorityQueue

ModuleIV
Traversal:-Preorder,Postorder,inorder;Tree:Binarytree,m-waytree,AVLtree,

ModuleV
Sorting-Bubblesort,Insertionsort,QuickSort,Selectionsort,Mergesort;Searching:Linearsearch,Binarysearch

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:
- LetUsC++byKanetKar,BPB
- AlgorithmandDataStructure,RSSalaria

References:
- Acomprehensiveguideto c++byAklecha,BPB
- IntroductiontoobjectorientedProgrammingandC++byKanetKar,:BPB

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CELL BIOLOGY LAB	BTF 321	4:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Microscopes and it's types
CLO 2	Experimentations about plant, animal, onion cells
CLO 3	Study about mechenisms like mitosis, meiosis , osmosis

ModuleI
StudyofMicroscopy
Partsand typesofMicroscope

ModuleII
StudyofPlantCellandAnimalCell
StudyofOnionCells,Studyofcheckcells,StudyofRBC.

ModuleIII
StudyofPlastids
StudyofchromoplastsusingTomato,StudyofchloroplastusingChili,StudyofLeucoplastsusingPotato.

ModuleIV:
CellDivision
MitosisandMeiosis.StudyofpermanentslidesofMitosisandMeiosis.

ModuleV
Studyofosmosis.

ModuleVI
StudyofapoptosisusingRBC

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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Course Name	Course Code	LTP	Credit	Semester
BIOCHEMISTRY-I LAB	BTF 322	4:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Colorimetric analysis
CLO 2	Quantitative estimations
CLO 3	Estimation of sugars, cholesterol, fatty acids

B. SYLLABUS:

ModuleI
ColorimetricdeterminationofpK.
Colourreactionsofsugars.(Molischstest,iodinetest,Saliwanofftest,Fehlingstest,Benedictstest,Bialstest).
QuantitativeestimationofSugars

ModuleIII
Cholestrol
estimationEstimation of free
fatty
acidsEstimationofiodinenum
ber.

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MICROBIOLOGY LAB	BTF 323	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Media preparation
CLO 2	Isolation of microbes and staining concept
CLO 3	Microscopic examination

B. SYLLABUS:

Units:01

CourseContents:

1. Preparationofsolidandliquidmedia.
2. Isolationofmicroorganismsbyplating,streakingandserialdilution.
3. Preparationofslantandstabculturesforbacteriaandfungi
4. Enumerationofmicrobialpopulation.
5. Microscopicexaminationofbacteria bygramstaining.
6. Endosporestaining.
7. Capsulestaining.
8. Negativestaining
9. Observethemicrobesinlivingconditionbyhangingdropmethod.
10. Fungalslidepreparationandstudyofcharacteristicsoffungi.

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTER LAB-I	BTF 324	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Implementation of classes , constructors and destructors
CLO 2	Concept of inheritance
CLO 3	Sorting and searching

B. SYLLABUS:

ModuleI
OOPS: Implementation of classesusing array and pointers; Implementation of constructor, destructor, Inheritance,polymorphism,Files

ModuleII
Arrayandlinkedlist implementationofstack,queue

ModuleIII
Implementationofdifferentsortingandsearchingmethods

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-III	AND 003	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

B. SYLLABUS:

(RUSA–Govt.ofRajasthan)

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodnessand charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringfor someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page

- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTF 330	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

B. SYLLABUS:

A term (or research) paper is primarily a record of intelligent reading in several sources on a subject. Thestudents will choose the topic at the beginning of the session in consultationwiththe facultyassigned.The progress of the paper will be monitored regularly by the faculty. At the end ofthe semesterthedetailed paper on the topic will be submitted to the faculty assigned. TheevaluationwillbedonebyBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:

1. Choosingasubject
2. Findingsourcesofmaterials
3. Collectingthenotes
4. Outliningthepaper
5. Writingthefirstdraft
6. Editing&preparingthefinalpaper

1. ChoosingaSubject

Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials

a) The material sources should be not more than 10 years old unlessthe nature of the paperis suchthatitinvolvesexaminingolderwritingsfromahistorical pointofview.
b) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
c) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes

Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.

a) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
b) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
c) Checkcrossreferences.

4. Outliningthepaper

a) Reviewnotestofindmainsub-divisionsofthesubject.
b) Sort the collected material again under each main division to find sub-sections for outline so that

itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose
b) mainbodyofthepaper
c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

a) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonlyinformation/details/analysesofrelevancetothequestionathand.Sometimes,the

relevanceofaparticularsectionmaybecleartoyoubutnottoyourreaders.Toavoidthis,ensureyoubriefl yexplaintherelevanceofeverysection.

b) Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.
c) Checkfor properspelling,phrasingandsentenceconstruction.
d) Checkforproperformonfootnotes, quotes, andpunctuation.
e) Checktoseethatquotationsserveoneofthefollowingpurposes:
f) Showevidenceofwhatanauthorhassaid.
g) Avoidmisrepresentationthroughrestatement.
h) Saveunnecessarywritingwhenideashavebeenwellexpressedbytheoriginalauthor.
i) Checkforproperformontablesandgraphs.Becertainthatanytableorgraphisself-explanatory.

Termpapersshouldbecomposedofthefollowingsections:

1) Title page
2) Tableofcontents
3) Introduction
4) Review
5) Discussion&Conclusion
6) References
7) Appendix

Generally,theintroduction,discussion,conclusionandbibliographypartshouldaccountforathirdofthepaperandt hereviewpartshouldbetwothirdsofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintherese archpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:

a) summaryofquestionposed
b) summaryoffindings
c) summaryofmainlimitations ofthestudyathand
d) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.

ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.

Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs

Crystal,D.(2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures.Challengestocommunicationinasecondlanguage. Berlin/NY:MoutondeGruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt,R./Shimura,A./Wang,Z./Jeong,H.(1996),Suggestionstobuy:Televisioncommercialsfrom

theU.S.,Japan,China,andKorea.In:Gass, S./Neu, J. (eds.)(1996),
Speechactsacrosscultures.Challengestocommunicationinasecondlanguage.Berlin/NY:Moutonde
Gruyter:285-316.

JournalArticles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising
rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook

Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideW
eb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as
aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-
journal.com/.

OtherWebsites

Verterhus,
S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument].Retrieved[1
3.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers

Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of
Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a
SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund
AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,UniversityofHamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical
accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,University
CollegeDublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables
andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation

40%

(Basedonabstractwriting,interimdraft,
generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation

60%

(Based on the organization ofthe paper,objectives/problem
profile/ issue outlining, comprehensivenessof
theresearch,flowof
theidea/ideas,relevanceofmaterialused/presented,outcomesvs
.objectives,presentation/vivaetc.)

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
METABOLOMICS	BTF 331	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to metabolomics
CLO 2	Online databases and pipelines using for metabolomics
CLO 3	Insilico methods to interpret metabolomic data.

B. SYLLABUS:

ModuleI
IntroductiontoMetabolomics,metabolome,metabolites,metabonomics.AnalyticalmethodsforMetabolomics. SeparationmethodsandDetectionMethods.

ModuleII
Online Metabolomics Databases and Pipelines: ChemSpider, Human Metabolome Database (HMDB),ChemicalEntitiesofBiologicalInterest(ChEBI),PubChem.Metabolicpathwaydatabases:KyotoEnc yclopedia of Genes and Genomes (KEGG), BioCycand the "Cyc" family of metabolicpathwaydatabases,HumanMetabolomeDatabase(HMDB)Pathways,KNApSAcK.

ModuleIII
Online analytical reference spectra for Metabolomics: Nuclear Magnetic Resonance (NMR) data, Gas - Chromatography/Mass-Spectrometry(GC/MS)data,

ModuleIV
MadisonMetabolomicsConsortiumDatabase(MMCD),METLIN,MassBank,ReSpectforPhytochemicals,M S-MSFragmentViewer1.0,MetabolomeExpress.

ModuleV
Computational Methods to Interpret and Integrate MetabolomicData: Mass spectrometry (MS) - basedMetabolomics,Single-cellMetabolomics,Biomarkerdiscovery,Dataclusteringandvisualization,Classificationandprediction, Fluxbalanceanalysis.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

TextBook&References:

1. Metabolomics.EditedbyUteRoessner.Publisher-JanezaTrdine9,51000Rijeka,Croatia,Copyright ©2012InTech,FirstpublishedFebruary,2012.

2. The Handbook ofMetabolomics, 2012. Teresa Whei-Mei Fan • Andrew N.Lane • Richard M. Higashi.ISBN:978-1-61779-617-3(Print)978-1-61779-618-0(Online).PublisherHumanaPress,Copyright HolderSpringerScience+BusinessMediaNewYork

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BASICS OF PERL PROGRAMMING-I	BTF 332	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand basics of PERL.
CLO 2	A To practice general Example of Perl Coding
CLO 3	

B. SYLLABUS:

ModuleI
Introduction, First Steps In Perl, Working with Simple Values, PERL programming: An Introduction, Perl features,Operators,Statements, Loops, Arrays, Arrays slices,Hashes, List Processing, File Handles, Pattern Matching. HowtorunPERLprogramsinLinux/Windowsenvironment,ErrorMessage,Debugging,Perlinterpreters,Perlscripts.

ModuleII
Scalar valuesandscalar variables, Strings and numbers,Assignment statements, Blocks, Arrays, Hashes, Operators,Bindingoperators,Loops,

ModuleIII
IO,Inputfromfile,InputfromSDIN,Inputfromfilenamedincommandline.

ModuleIV
Regularexpression,Patternmatching,Metasymbols,Patternmodifiers,Built-infunctions.

ModuleV
Filesand Data, References, Subroutines,Application of Perl in Bioinformatics: Representing strings and sequenceddatainPerl,ProgramtostoreaDNAsequence,ConcatenatingDNAfragments,DNAtoRNAtranscription

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- BeginningPerlforBioinformatics,BookbyJamesTisdallShroffPublishers&Distributors,01-Jan-2001
- Mastering Perlfor Bioinformatics, James Tisdall, O'Reilly& Associates, Inc. Sebastopol,CA,USA©2003

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHEMI-INFORMATICS	BTF 333	4:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction, history, evolution and prospects
CLO 2	Representation and manipulations of 2D and 3D structures
CLO 3	Concept of ADMET

B. SYLLABUS:

ModuleI
CheminformaticsIntroduction:
Introduction to cheminformatics, History and Evolution of cheminformatics, Use of cheminformatics,Prospects ofchemiinformatics.

ModuleII
Representation and Manipulation of 2d Molecular Structure. Introduction: Computer Representations ofChemical Structures, Graph Theoretic, Representations of Chemical Structures, Connection Tables andLinear Notations, Canonical Representations of Molecular Structures, Nomenclature; Different types ofNotations; SMILES Coding; Matrix Representations; Structure of Molfiles and Sdfiles; Libraries andtoolkits;Differentelectroniceffects;Reactionclassification.

ModuleIII
Structure Searching, Substructure Searching, Screening Methods, Algorithms for Subgraph Isomorphism,Practical Aspects of Structure Searching,Reaction Databases. Representation and Manipulation of 3DMolecular Structures, Introduction, Experimental 3D Databases, 3D Pharmacophores , Implementation of3DDatabaseSearching,

ModuleIV
Theoretical3DDatabases,Structure-GenerationPrograms,ConformationalSearchandAnalysis,SystematicConformationalSearch,RandomConformationalSearch,OtherApproachestoConformational Search, Comparison and Evaluation of Conformational Search Methods , The GenerationofDistanceKeysforFlexibleMolecules,Pharmacophoreanditsmappingtechniques.

ModuleV
ADMET Properties,Quantitative Structure-PropertyRelations; DescriptorAnalysis; Model Building;ModelingToxicity;TargetIdentificationandValidation;LeadFindingandOptimization;VirtualScreening;DesignofCombinatorialLibraries;Ligand-BasedandStructureBasedDrugdesign;ApplicationofCheminformaticsinDrugDesign.Combinatoriallibrarygenerationformolecules.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Leach,Andrew R., and Valerie J. Gillet. An introductionto chemoinformatics. Springer Science & Business Media,2007.

Cramer,Christopher J.Essentialsof computationalchemistry:theoriesandmodels.JohnWiley&Sons,2013.

Kuntz,IrwinD."Structure-basedstrategiesfordrugdesignanddiscovery."Science257.5073(1992):1078-1082.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
ENVIRONMENTAL SCIENCES	EVS 001	4:0:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to environmental science
CLO 2	Knowledge about Natural resources
CLO 3	Concepts of ecosystem, biodiversity and conservation

B. SYLLABUS:

ModuleI:The multidisciplinary nature of environmental studies
Definition,scopeandimportanceN
eedforpublicawareness

ModuleII:NaturalResources
Renewableandnon-renewableresources:
Naturalresourcesandassociatedproblems
Forestresources:Useandover-
exploitation,deforestation,casestudies.Timberextraction,mining,damsandtheireffects
onforestsandtribalpeople.
Waterresources:Useandover-utilizationofsurfaceandgroundwater, floods,drought, conflictsoverwater,
dams-benefitsandproblems.
Mineralresources:Use
andexploitation,environmentaleffectsofextractingandusingmineralresources,casestudies.
Foodresources:Worldfoodproblems,changescausedbyagricultureandovergrazing,effectsofmodernagriculture,f
ertilizer-pesticideproblems,waterlogging,salinity,casestudies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of
alternateenergysources,casestudies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion
anddesertification.

- Roleof anindividualinconservationofnaturalresources.
- Equitableuseofresourcesforsustainablelifestyles.

ModuleIII:Ecosystems
Conceptofanecosystem
Structure and function of an ecosystem
Producers,consumersanddecomposersE
nergyflowintheecosystemEcologicalsuc
cession
Foodchains,foodwebsandecologicalpyramids
Introduction,types,characteristicfeatures,structureandfunctionofthefollowingecosystem:

a. Forestecosystem
b. Grasslandecosystem
c. Desertecosystem

d. Aquaticecosystems(ponds,streams,lakes,rivers,oceanestuaries)

ModuleIV:Biodiversityanditsconservation

Introduction – Definition: genetic, species and ecosystem diversityBiogeographicalclassificationofIndia

Valueofbiodiversity:consumptive use,productiveuse,social,ethicalaesthetic andoptionvalues

Biodiversityat global,nationalandlocallevels

Indiaasamega-
diversitynationHot-
spotsofbiodiversity
Threats to biodiversity: habitat loss,poaching of wildlife, man wildlife
conflictsEndangeredandendemicspeciesofIndia
Conservationofbiodiversity:In-situandEx-situconservationofbiodiversity

ModuleV:EnvironmentalPollution
Definition
Causes,effectsandcontrolmeasuresof:
a. Air pollution
b. Waterpollution
c. Soilpollution
d. Marinepollution
e. Noisepollution
f. Thermalpollution
g. Nuclearpollution

Solidwastemanagement:Causes,effectsandcontrolmeasuresofurbanand
industrialwastes.
Roleofanindividualinpreventionofpollution.
Pollutioncasestudies.
Disastermanagement:floods,earthquake,cycloneandlandslides.

Module VI: Social Issues and the
EnvironmentFrom unsustainable to sustainable
developmentUrbanproblems andrelatedtoenergy
Water conservation,rainwaterharvesting,watershedmanagement
Resettlementandrehabilitationofpeople;itsproblemsandconcerns.
Casestudies.Environmentalethics:Issuesandpossiblesolutions
Climatechange,globalwarming,acidrain,ozonelayerdepletion,nuclearaccidentsandholocaust.Casestudies.
WastelandreclamationConsumeri
sm and waste
productsEnvironmentalProtection
Act
Air(PreventionandControlofPollution)ActWater
(Prevention and control of Pollution)
ActWildlifeProtectionAct
ForestConservationAct
Issuesinvolvedinenforcement
ofenvironmentallegislationPublicawareness

Module VII:HumanPopulationandtheEnvironment
Populationgrowth,variationamongnationsPopulation
explosion – Family Welfare
ProgrammesEnvironmentandhumanhealth
HumanRightsVa
lueEducationHI
V/AIDS
WomenandChildWelfare
Role of Information Technology in Environment and Human
HealthCaseStudies

ModuleVIII:FieldWork
Visittoalocalareatodocumentenvironmentalassets-
river/forest/grassland/hill/mountain.Visittoalocalpollutedsite–
Urban/Rural/Industrial/Agricultural
Studyofcommonplants,insects,birds
Studyofsimpleecosystems-pond,river,hillslopes,etc(Fieldworkequalto5lecturehours)

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

- Agarwal,K.C.2001EnvironmentalBiology,NidiPubl.Ltd.Bikaner.
- Bharucha Erach, The Biodiversity of India,Mapin Publishing Pvt. Ltd.,Ahmedabad380 013, India,Email:mapin@icenet.net(R)
- Brunner R.C., 1989,HazardousWasteIncineration,McGrawHillInc.480p
- ClarkR.S.,MarinePollution,ClandersonPressOxford(TB)
- Cunningham,W.P.Cooper,T.H.Gorhani,E&Hepworth,M.T.2001,EnvironmentalEncyclopedia,JaicoPubl.House, Mumabai,1196p
- DeA.K.,EnvironmentalChemistry,WileyEasternLtd.
- DowntoEarth,CentreforScienceandEnvironment(R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. StockholmEnv.InstituteOxfordUniv.Press.473p
- HawkinsR.E.,EncyclopediaofIndianNaturalHistory,BombayNaturalHistorySociety,Bombay(R)
- Heywood,V.H&Waston,R.T.1995.GlobalBiodiversity Assessment.CambridgeUniv.Press1140p.
- Jadhav,H&Bhosale,V.M.1995.EnvironmentalProtectionandLaws.HimalayaPub.House,Delhi284p.
- Mckinney,M.L. & School, R.M. 1996.Environmental Science Systems& Solutions,Web enhanced edition.639p.
- MhaskarA.K.,MatterHazardous,Techno-SciencePublication(TB)
- Miller T.G.Jr.EnvironmentalScience,WadsworthPublishingCo.(TB)
- Odum,E.P.1971.FundamentalsofEcology.W.B.SaundersCo.USA,574p
- RaoMN.&Datta,A.K.1987.WasteWatertreatment.Oxford&IBHPubl.Co.Pvt.Ltd.345p.
- SharmaB.K.,2001.EnvironmentalChemistry.GeolPubl.House,Meerut
- SurveyoftheEnvironment,TheHindu(M)
- TownsendC.,HarperJ,andMichaelBegon,EssentialsofEcology,BlackwellScience
- Trivedi R.K., Handbookof Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II,EnviroMedia(R)
- TrivediR.K.andP.K.Goel,Introductiontoairpollution,Techno-SciencePublication(TB)
- Wanger K.D.,1998Environnemental Management.W.B.SaundersCo.Philadelphia,USA499p

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS-I	BCS 301	4:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop general writing skills.
CLO 2	Develop letter writing skills.
CLO 3	Learning about how to write reports.

B. SYLLABUS:

ModuleI:IntroductiontoWritingSkills
Effective Writing
SkillsAvoiding Common
ErrorsParagraphWriting
NoteTaking
WritingAssignments

ModuleII:LetterWriting
TypesF
ormats

ModuleIII
Memo
AgendaandMinutes
NoticeandCirculars

ModuleIV:ReportWriting
Purpose and Scope of a
ReportFundamentalPrinciplesofReportWr
itingProjectReportWriting
SummerInternshipReports

ExaminationScheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage(%)	20	20	25	10	10	10	5

CAF–
CommunicationAssessmentFileGD–
GroupDiscussion
GP–GroupPresentation

Text&References:

- BusinessCommunication,Raman–Prakash,Oxford
- Creative EnglishforCommunication,KrishnaswamyN,Macmillan
- TextbookofBusinessCommunication,RamaswamiS,Macmillan
- WorkinginEnglish,Jones,Cambridge
- AWriter'sWorkbookFourthedition,Smoke,Cambridge
- EffectiveWriting,Withrow,Cambridge
- WritingSkills,Coe/Rycroft/Ernest,Cambridge
- Welcome!,Jones,Cambridge

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding Self for Effectiveness-III (Interpersonal Communication)	BSS 304	4:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhancing personal effectiveness and performance through effective interpersonal communication
CLO 2	Enhancing their conflict management and negotiation skills
CLO 3	

B. SYLLABUS:

ModuleI:InterpersonalCommunication:AnIntroduction
ImportanceofInterpersonalCommunicationTypes–SelfandOtherOriented
Rapport Building – NLP, Communication
ModeStepstoimproveInterpersonalCommunication

ModuleII:BehaviouralCommunication Meaning and Nature of behavioiural communicationPersuasion,Influence,ListeningandQuestioning
GuidelinesfordevelopingHuman Communicationskills
RelevanceofBehaviouralCommunicationforpersonalandprofessionaldevelopment

ModuleIII:InterpersonalStyles
TransactionalAnalysis
LifePosition/ScriptAnalysis
GamesAnalysis
InteractionalandTransactionalStyles

ModuleIV:ConflictManagement
Meaningandnatureofconflicts
Stylesandtechniquesofconflictmanagement
Conflictmanagementandinterpersonalcommunication

Module V:NegotiationSkills
Meaning and Negotiation approaches (Traditional and Contemporary)Process andstrategiesofnegotiations
Negotiationandinterpersonalcommunication

Module VI:End-of-SemesterAppraisal
Vivabasedonpersonaljournal
AssessmentofBehaviouralchangeasaresultoftrainingExitLe

velRatingbySelfandObserver

Text&References:

- VangelistL.Anita,MarkN.Knapp,InterPersonalCommunicationandHumanRelationships:ThirdEdition ,AllynandBacon
- JuliaT.Wood.InterpersonalCommunicationeverydayencounter
- Simons,Christine,Naylor,Belinda:EffectiveCommunicationforManagers,19971st EditionCassel
- Goddard,Ken:InformativeWriting,19951st Edition,Cassell
- HarvardBusinessSchool,EffectiveCommunication:UnitedStatesofAmerica
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations(IPR)
- Beebe,BeebeandRedmond;InterpersonalCommunication,1996;AllynandBaconPublishers.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FRENCH-III	FLT 301	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

ModuleB: pp. 76 – 88 Unité

6ModuleC:pp.89to103Unité7

Contenulexical: **Unité6:sefaireplaisir**

1. acheter :exprimerseschoix,décrireunobjet(forme,dimension,poidsetmatières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité,commanderunrepasaurestaurant
3. parler desdifférentesoccasionsdefairelafête

Unité7:Cultiversesrelations

1. maîtriserlesactesdelacommunicationsocialecourante(Salutations,présentations,invitations,remerciements)
2. annoncer un événement, exprimer un souhait, remercier,s'excuserpar écrit.
3. caractériserunepersonne(aspectphysiqueetcaractère)

Contenugrammatical:

1. accorddesadjectifsqualificatifs
2. articlespartitifs
3. Négationsavecde,ne…rien/personne/plus
4. Questionsaveccombien,quel…
5. expressionsdela quantité
6. ne…plus/toujours-encore
7. pronomscomplémentsdirectsetindirects
8. accord du participe passé (auxiliaire « avoir ») avecl'objetdirect
9. Impératifavecunpronomcomplémentdirectouindirect
10. constructionavec«que»-Jecrois que/Jepenseque/Jesaisque

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- lelivreàsuivre:Campus:Tome1

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GERMAN-III	FLG 301	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to ask and tell time
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes, daily routine using Separable verbs.
CLO 3	**Demonstrate**Student will be able to write and speak sentences using modal verbs.

B. SYLLABUS:

ModuleI:Modalverbs
Modal verbs with conjugationsand
usageImpartingthefinernuances
ofthelanguage

ModuleII:InformationaboutGermany(ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals,important cities and towns and characteristic features of the same, and also a few other topics related toGermany.

ModuleIII:Dativecase
Dative case, comparison with accusative
caseDativecasewiththerelevantarticles
Introductionto3differentkindsofsentences–nominative,accusativeanddative

Module IV:Dative personalpronouns
Nominative,accusativeanddativepronounsincomparison

ModuleV:Dativeprepositions
Dativeprepositionwiththeirusageboththeoreticalandfigurativeuse

ModuleVI:Dialogues
IntheRestaurant,
At the Tourist Information
Office,Atlelphoneconversation

ModuleVII:Directions
Names ofthedirections
Askingandtellingthedirectionswiththehelpofaroadmap

ModuleVIII:Conjunctions
Toassimilatetheknowledgeoftheconjunctionslearntindirectlysofar

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,Sprachkurs Deutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant- 1,2&3
- Rosa-MariaDallapiazzaetal, TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
SPANISH-III	FLS 301	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction of stem changing irregular verbs
CLO 2	Introduction of prepositions (Cerca de/ lejos de/ encima de etc.)
CLO 3	Present continuous tense **(Estar+ gerundio)**

B. SYLLABUS:

ModuleI
Revisionofearliersemestermodules
Setexpressions(idiomaticexpressions)withtheverb*Tener*,*Poner*,*Ir*….
Weather

ModuleII
Introductionto*Gustar*…andallitsforms.Revisionof*Gustar* andusageofit

ModuleIII
TranslationofSpanish-English;English-Spanish.Practicesentences.Howtoaskfordirections (usingestar)
IntroductiontoIR+A+INFINITIVEFORMOFAVERB

ModuleIV
Simple conversation with help of texts and vocabularyEnelrestaurante
En el institutoEnelaeropuerto

ModuleV
Reflexives

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- Español,EnDirectoIA

- EspañolSinFronteras-NivelElemental

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE-III	FLC 301	4:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

B. SYLLABUS:

ModuleI
Drills
Dialoguepractice
Observe picture and answer the
question.Introductionofwrittencharacters.
Practicereadingaloud
Practiceusingthelanguagebothbyspeakingandbytakingnotes.Charac
terwritingandstrokeorder

ModuleII
Measurewords
Positionwordse.g.inside,outside,middle,infront,behind,top,bottom,side,left,right,straight.Directionalwords
–beibian,xibian,nanbian,dongbian,zhongjian.
Our school and its different building
locations.Whatgamedoyoulike?
Differencebetween“hii”and“neng”,“keyi”.

ModuleIII
Changing affirmative sentences to negative ones and vice
versaHumanbodyparts.
Notfeelingwellwordse.g.;fever,cold,stomachache,headache.Useoft
hemodalparticle“le”
Makingatelephone call
Useof“jiu”and“cal”(Grammarportion)Automo
bilese.g.Bus,train,boat,car,bikeetc.
Traveling,bytrain,byairplane,bybus,onthebike,byboat..etc.

ModuleIV
Theordinalnumber“di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian
etc.useoftoentertoexit
Structural particle “de” (Compliment of

degree).GoingtothePark.
Description about class schedule during a week in school.Grammaruseof“li”and“cong”.
Comprehensionreadingfollowedbyquestions.

ModuleV
Persuasion-
Pleasedon’tsmoke.Pleasespeaks lowly
Praise–Thispictorialisverybeautiful

Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White,Big-Small,Slow-Fast…etc.
TalkingaboutstudiesandclassmatesUs
eof"itdoesn'tmatter"
Enquiring about a student, description about study
method.Grammar:NegationofasentencewithaverbalpredicatE.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- "ElementaryChineseReaderPart I,Part-2"Lesson21-30

SemesterIV

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOCHEMISTRY-II	BTF 401	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Proteins and nucleotides
CLO 2	Enzyme kinetics
CLO 3	Amino acid and nucleotide metabolism

B. SYLLABUS:

ModuleI :Proteinsand aminoacids:
Aminoacids and peptides- classification, chemical reactions and physical properties., Introduction toprotein structure and function. Glycoproteins -structure and function, Vitamins and Coenzymes: structureandfunctionofwatersolublevitamins.

ModuleII: Enzymes:
Introduction to kinetic and catalytic mechanisms of enzymes; Regulation of enzyme activity; Effects ofphysicalparameters onenzymeactivity,enzymeinhibitors–types ofinhibition.

ModuleIII:NucleicacidsandNucleotides:
Classification of Nitrogenous bases, Types and properties of nucleotides, Structure and propertiesofvariousnucleicacids(DNA&RNA)

ModuleIV:Aminoacidmetabolism:
Amino acid deamination, urea cycle, biosynthesis and breakdown ofnutritionallynon-essentialaminoacids (asparagines, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, Tyrosine.)SpecializedProducts ofAminoAcids,Nitrogenfixation

Module V:NucleotideMetabolism:
Metabolism of purines and pyrimidines, clinical significance of nucleotide metabolism, biosynthesis ofnucleotide coenzymes(NAD, NADP, FAD, FMN), Catabolism of heam and clinical s ignificance ofbilirubin.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

* Lehninger PrinciplesofBiochemistrybyM.M.CoxandD.L.Nelson, 5thedition,2008, W.H.Freemanandcompany,NewYork.
* Biochemistry by J.M. Berg, J.L. Tymoczko and L. Stryer, 5th edition, 2002, W.H. Freeman andCompany,NewYork.
* Biochemistry by U.Satyanarayana, 3rd edition, 2006, New Central Book Agency (p)
Lt.ReferenceBooks:
* ToolsofBiochemistry,T.G.Cooper,JohnWileyandSonsInc.
* Harper'sBiochemistry,K.Robert,M.D.Murray,D.K.Granner,P.A.MayesandV.I.Rodwell,McGraw-Hill/AppletonandLange.
* Biochemistry,C.K. Mathews,K.E. VanHoldeandK.G.Ahern, Benjamin/Cummings.
* Text book of Biochemistry, E.S. West, W.R. Todd, H.S. Mason, and J.T. Van Bruggen Oxford & IBHPublisher,ForthEdition.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MOLECULAR BIOLOGY- I	BTF 402	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Structure of DNA and RNA
CLO 2	Replication , transcription and translation
CLO 3	Splicing

B. SYLLABUS:

Module I: Structure of DNA and RNA, DNA Structure, Polynucleotide Chains, HydrogenBonding,Double Helix, Minor and Major Grooves, Circular DNA, Topoisomerases, Supercoiling in DNA, RNAstructure,ComplextertiaryRNAstructures.

Module II: DNA replication and Repair, Chemistry of DNA synthesis, Mechanism of DNA polymerase,Replication fork, Specialization of DNA polymerases, DNA synthesis at the replication fork, Initiation ofDNA replication,Binding and unwinding: origin selection andactivationbytheinitiatorprotein,Finishing replication. Replication errors and their repair, DNA damage, Repair and tolerance of DNAdamage.

Module III: Transcription, Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, Generalandspecifictranscriptionfactors,Regulatoryelementsandmechanism oftranscriptionregulation

Module IV: Modifications in RNA, 5'-cap formation, transcription termination, 3 '-end processing andpolyadenylation,Splicing,Editing,GeneticCodeandcodonusage;

Module V: Translation, Prokaryotic and Eukaryotic translation, Mechanisms of initiation, elongation andtermination,regulationoftranslation.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

• PrinciplesofBiochemistry,A.L.Lehninger,D.L.Nelson,M.M.Cox,WorthPublishing.

• Harper'sBiochemistry,K.Robert,M.D.Murray,D.K.Granner,P.A.MayesandV.I.Rodwell,McGraw-Hill/AppletonandLange.

• Watson J. D, Gann A, Baker T. A, Levine M, Bell S.P, Losick R (2013). Molecular Biology of the gene(7thedition).

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTERS-II	BTF 403	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to database management system
CLO 2	Concepts of SQL, DDL, DML and DCL statememts
CLO 3	Database programming

B. SYLLABUS:

SectionA:DatabaseConceptwithOracleM

oduleI

Introduction to Database, RDBMS Vs DBMS, Normalisation. Introduction to SQL, DDL, DML and DCLstatements, Integrity Constraint. Functions(Aggregate , Character , date) , Views , joins,Sub Queries withAny and All ,Sequences, data Dictionary, SQL reports,generatingSQLstatements,IntroductiontoLOBSControllingtheuseraccess.

ModuleII

Introduction to Database ProgrammingWith PL/SQL,Control Flow Statements (IFStatementsandLoops), Cursors(Implicit and Explicit),Function and Procedures, data base Triggers, Packages, ExceptionHandling

Section B: Programming With Visual basic

6.0.ModuleIII

IntroductiontoVisualbasic,Features,Controlflowstatements,Eventhandling(click,lostfocus,Got focus,Change,loadetc.),array,ControlArray,CreatingFunctionandProcedures,modules

ModuleIV

Insert, update, delete and navigation of records using DAO and ADO, Introduction to controls like file,Directory, drive, timer, ComboBox, List Box, Progress bar, Creation of MDI form, menu, toolbar,statusbar, Tabstripcontrol.

ModuleV

AdvancedConcepts: Chart control,Flexgrid control,mapi control.Packinganddeployment,DataProject,DLLcreation,ActiveX

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- SQL,PL/SQL–TheprogrammingLanguagebyIvanBayross:BPB
- Visualbasictoadvancedbydasgupta,Publisher:BPB

References:

- OracleprogrammingwithVisualbasicbySnowdon
- IntroductiontoOracle 9ibyThomas,Publisher:BPB

VisualbasicDevelopersGuidetoADO byRussel,Publisher:BPB

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GENETICS	BTF 404	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to genes and genetic variations
CLO 2	Knowledge of Chromatin structure
CLO 3	Techniques and applications

B. SYLLABUS:

ModuleI
GENEANDGENEVARIATION
Conventional and modern views. Mendelian inheritance and exceptions; Fine structure of gene, multiplealleles, Split genes, pseudogenes, non-coding genes, overlapping genes and multi-gene families, DNAmarkers-VNTR,STR,microsatellite,SNPandtheirdetection,RFLP,RAPD,AFLP.

ModuleII
CHROMATIN STRUCTURE AND ORGANIZATION: DNA and higher level organization; centromereand kinetochore, telomere and its maintenance, Functional states of chromatin (Heterochromatin andeuchromatin),positioneffectvariegation;Numericalandstructuralchromosomalaberrations

ModuleIII
TECHNIQUES IN THE STUDY OFCHROMOSOMES,Chromosome preparations,Chromosomal,G/Q-banding, radiation hybrid, Fluorescence in situ hybridization, comparative genome hybridization(CGH),Geneidentificationusingpositionalandfunctionalcloningapproach.

ModuleIV
POPULATION GENETICS,Hardy-Weinberg principle,Linkage and linkage disequilibrium,Sourcesresponsible for changes in gene frequencies: Mutation, selection, migration and isolation; random geneticdrift;insightsintohumanmigration,naturalselectionandevolution.

ModuleV
APPLICATIONS,Humanmigration,Diseasesandtheirdiagnosis(Inbornerrorsofmetabolism,Haemoglobinopathies; Multifactorial disorders) Mitochondrial myopathies, Molecular plant breeding finemappingofQTL, Markerassistedbreeding:Genetagging.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Suggestedreadings:

1. ConceptsofGenetics.KlugW.S.andCummingsM.RPrentice-Hall10edition(2011)
2. Genetics-aConceptualApproachPierceB.A.Freeman3rdedition(2013)
3. AnIntroductiontoGeneticAnalysisGriffithA.F.etalFreeman11thedition(2015)
4. PrinciplesofGeneticsSnustadD.P.andSimmonsM.J.JohnWiley&Sons.5thedition(2009)
5. GeneticsStrickbergerM.W.Prentice-
HallPearsonIndia(2015)Reference
1. QuantitativeGenetics,GenomicsandPlantBreedingKangM.S.CABIPublishing
2. An Introduction to Human Molecular Genetics: Mechanism of Inherited Diseases Pasternak
JFitzgeraldSciencePress

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
STATISTICS	BTF 405	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Mean , median and mode
CLO 2	Statistical distribution
CLO 3	Sampling , time series and forecasting

B. SYLLABUS:

ModuleI:Introduction
Need and scope of statistics, Collection,Classification and Organization of Data. Measures of CentralTendency and Dispersion, Arithmetic Mean, Weighted Mean, Combined Mean,Corrected Mean,GeometricMean,Median,Mode,Quartiles,DecileandPercentiles.Range,InterquartileRange,MeanDeviation,StandardDeviation,VarianceandCoefficient ofVariation.Skewness,MomentsandKurtosis.

ModuleII:CorrelationandRegression
Correlation:Introduction,Importance,Types,KarlPearson'scoefficientoflinearcorrelationandSpearman's Rank correlation. Regression Analysis: Introduction, Two lines of Regression, RegressionCoefficientinabivariatefrequencydistribution,Standarderroroftheestimate.

ModuleIII:ProbabilityandProbabilityDistributions
Mathematicalconceptofprobability,Set-theoreticnotationinProbability,Rulesofcounting,PermutationsandCombinations.Derivationanduseofcommonlawsofprobability,StatisticalIndependence,Bayes'Theorem,DiscreteandContinuousVariables,RandomVariablesandtheirProbabilityDistributions-BinomialDistribution,PoissonDistribution,NormalDistribution

ModuleIV:SamplingandTestofSignificance
Sampling theory, Methods of sampling: Random sampling: Simple Random, stratified, Systematic andMulti Stage sampling, Non-Random Sampling: Purposive, Cluster, Quota, convenience and SequentialSampling.Nullhypothesis,Alternativehypothesis,Criticalregion,Levelofsignificance,Testofsignificance for large samples: Normal test for sample mean and population mean, normal test for twosamplemeans,Testofsignificanceforsmallsamples:t-distribution,F-distribution,Chi-Squaredistribution, Test of goodness of fit, Test of independence and Analysis of Variance (ANOVA) – one wayclassificationmodel.

ModuleV:TimeseriesandForecasting
IntroductiontoDemographyandvitalstatistics, analysisoftimeseries,interpolationandextrapolation,Markovchains

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage (%)	15	5	10	10	10	50

TextBooks:

- BiostatisticsbyP.N.AroraandP.K.Malhan,HimalayaPublishingHouse.
- FundamentalofBiostatistics byBernardRosner.OxfordUniversityPress
- StatisticalMethodsinBioinformatics:AnIntroductionbyG.R.Grant,W.J.Ewens.SpringerVerlag.

ReferenceBooks:

- IntroductiontoProbabilityTheorybyP.G.Hoel.HoughtonMifflinCollege
- Introduction to Statistical Theory by P.G. Hoel, S.C. Port, C.J. Schiller, R.A. Srinivasan,A. Srivasan. McGraw-HillTrade
- Schaum'sOutlineofProbability,RandomVariablesandRandomProcessesbyH.P.Hsu.McGraw-HillTrade.
- MathematicalStatisticsbyH.C.Saxena.S.Chand&Company
- Biometry–CasestudybyNicholasLangeandLouiseRyan.JohnWiley&Sons
- StatisticsofExtremes byE.J.Gumbel.ColumbiaUniversityPress.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOCHEMISTRY-II LAB	BTF 421	4:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Study about different Protein tests
CLO 2	Spectrometric methods for quantitative determination of molecular structures
CLO 3	Study of enzyme activity

B. SYLLABUS:

ModuleI

Colour reactions of proteins (Ninhydrin test, Biuret test, Xanthoprotein test etc.).Quantitativeestimationofproteins.

ModuleII

Biochemical estimation of DNABiochemicalestimationofRNA

Quantitative determination of DNA and RNA by spectrophotometric method using UVrange.

SeparationofDNAonAgrosegel.

ModuleIII

Enzyme:Enzyme activitystudyofserumalkalinephosphates

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MOLECULAR BIOLOGY LAB	BTF 422	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Gel electrophoresis
CLO 2	Isolation of molecular structures
CLO 3	Concept of bacterial Transformation

B. SYLLABUS:

ModuleI
Agarosegelelectrophoresis,
ModuleII
PreparationofDNA:genomic,Plasmid
ModuleIII
IsolationofRNA:totalRNAandmRNA
ModuleIV
Bacterialtransformation.

ExaminationScheme:

IA			EE			
ClassTest(PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTER LAB-II	BTF 423	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Table creation, updation , deletion, types of keys
CLO 2	SOL
CLO 3	Database programming

B. SYLLABUS:

ModuleI
Creation of table, Insert, Update, Delete records, Implementing the integrity constraint: Primary Key, Notnull, Foreign Key, Check, Unique.Using Implicitfunction: Date,Characterand AggregateFunction,Subqueries.

ModuleII
ImplementingViews,joins:Equi,InnerandOuter,creationofsequences, SQLreports. GeneratingSQL statements.Usermanagement:(Createuser,alteruser,object privileges,system,Privileges,grant,revoke,Role),PL/SQL:ControlStatements,WritingprogramsusingCursor, Implementing Functionsand Procedures, Implementing data base TriggersandPackages.PL/SQLTables.

ModuleIII
Visual basic: Form Creations, Working with controls from tool bar. Data baseprogrammingwiththeADO and DAO. Implementing Chart control, Flex grid, Modules, Functions,package and deployment oftheproject,Reportsusingdataproject.FileHandling,ActiveXcreation,DLLcreation

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GENETICS LAB	BTF 422	4:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about Hybridization
CLO 2	Study about Linkage
CLO 3	Concepts of Molecular markers

B. SYLLABUS:

1. Characterizationofgenes,monohybridratios,sex-linkage(VirtualFlyLab,FlyBase)
2. Humanpedigreeanalysis(BiologyLabsOnline)
3. Dihybridcrosses,independentassortment(VirtualFlyLab)
4. Linkedgenesandgenemapping
5. Molecularmarkers(BiologyLabsOnline),GenealogicalMarkers:mtDNAandtheYChromosome

* Desharnis,R.andBell,J.2001.LabManualforBiologyLabsOn-Line.AddisonWesleyLongman.
* Genetic Variation: A Laboratory Manual 2007 Weiner M.P, Gabriel S.B, Stephens J.B MotifBioSciences,NewYork•472pp

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-IV	AND 004	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

(RUSA–Govt.ofRajasthan)

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. A dailyactofgoodnessand charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringforsomeone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTF 430	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

B. SYLLABUS:

A term (or research) paper is primarily a record of intelligent reading in several sources on a particularsubject.
The students will choose the topic at the beginning of the session inconsultationwiththefacultyassigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semesterthe detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done byBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
7. Choosingasubject
8. Findingsourcesofmaterials
9. Collectingthenotes
10. Outliningthepaper
11. Writingthefirstdraft
12. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
d) The material sources should be not more than 10 years old unlessthe nature of the paper is such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
e) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
f) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
d) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
e) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
f) Checkcrossreferences.

4. Outliningthepaper
c) Reviewnotestofindmainsub-divisionsofthesubject.

d) Sort the collected material again under each main division to find sub-sections for outline so that itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose
b) mainbodyofthepaper
c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

j) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses ofrelevance to the question at hand. Sometimes, therelevance of a particular section may be clear to you but not to your readers. To avoid this,ensureyoubrieflyexplaintherelevanceofeverysection.

k) Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.
l) Checkfor properspelling,phrasingandsentenceconstruction.
m) Checkforproperformonfootnotes, quotes, andpunctuation.
n) Checktoseethatquotationsserveoneofthefollowingpurposes:
o) Showevidenceofwhatanauthorhassaid.
p) Avoidmisrepresentationthroughrestatement.
q) Saveunnecessarywritingwhenideashavebeenwellexpressedbytheoriginalauthor.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
8) Title page
9) Tableofcontents
10) Introduction
11) Review
12) Discussion&Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of thepaperandthereviewpartshouldbetwothirdsofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintherese archpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhich shouldnotbeomitted. Theseinclude:
e) summaryofquestionposed
f) summaryoffindings
g) summaryofmainlimitationsofthestudyathand
h) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs
Crystal,D.(2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures.Challenges to communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,
S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument].Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,UniversityofHamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,University CollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowoftheidea/ideas,relevanceofmaterialused/presented,outcomesvs.objectives,presentation/vivaetc.)

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PROTEOMICS	BTF 431	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Concept of protein sequencing
CLO 2	Concept of protein separation techniques
CLO 3	Proteome databases and its applications

B. SYLLABUS:

ModuleI
Introductionandscopeofproteomics;Proteinsequencingmethods,Currentconceptsofpeptidesequencing with MS-MS methods, Post translational Modification in proteins,methodsofdetectingPTMs.

ModuleII
Proteinseparationtechniques: ion-exchange,sizeexclusionandaffinitychromatography techniques,Polyacrylamide gel electrophoresis; Isoelectric focusing (IEF); Two dimensional PAGE forproteomeanalysis;Imageanalysisof2Dgels.

ModuleIII
Introductiontomass spectrometry;Strategiesforproteinidentification;Proteinsequencing;Proteinmodificationsandproteomics;

ModuleIV
Protein engineering; Protein chips and functional proteomics; Clinical and biomedical application ofproteomics;Proteomedatabase;Proteomicsindustry.

ModuleV
Applicationsofproteomeanalysisto drug;Protein-proteininteraction:Two hybrid interaction screening.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

TextBook&References:

1. R.M.Twyman,PrinciplesofProteomics,BIOSScientificPublishers,2004.
2. P.MichaelConn,HandbookofProteomicMethod.HumanaPress,Totowa,NewJersay,USA,2003.
3. L.Stryer,Biochemistry,W.H.FreemanandCo.,NewYork,2007

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Basics of Perl programming-II and Python	BTF 432	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Perl and Python programming language in data extraction and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI
Reading proteins from files, finding motifs, counting nucleotides, exploding strings into arrays, Operatingon strings. Introduction to BioPerl, Installation of Various Basic Packages, Modules and Widgets, Internet-relatedLibraries

ModuleII
A program to simulate DNA mutation, generating random DNA, Analyzing DNA, Translating DNA intoproteins. Using Random DNA find the relation between randomly generated andnaturallyoccurringDNA, RNAandProteinsequenceonvariousparameters.

ModuleIII
Introduction to Python, Introduction toscripting, An Introduction to Python,Numbersand operators,Testing Python Scripts, Variables and Data types, Complex data types: strings, tuples (Accessing tuples,Operations,Working,FunctionsandMethods),lists,anddictionaries(Accessingvaluesindictionaries,Workingwithdictionaries,Properties,Functions).

ModuleIV
Decisions and Loops, Functions, Objects and Classes, Modules:Importingmodule,Mathmodule,Randommodule,Packages,Composition,AdvancedPythontesting.

ModuleV
File Access: Printing on screen, Reading data from keyboard, Opening and closing file,Readingandwritingfiles,Functions,TextprocessingandRegularExpressions,AccessingDatabases,NetworkProgramming,Webapplications

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

Beginning Perl for Bioinformatics, Book by James Tisdall Shroff Publishers & Distributors, 01-Jan-2001MasteringPerlforBioinformatics,JamesTisdall,O'Reilly&Associates,Inc.Sebastopol,CA, USA ©2003

Patrick O'Brien, Beginning Python for Bioinformatics, O'Reilly, 2002.AlexMartelli,PythoninaNutshell,O'Reilly,2006.

Cynthia Gibas, Per Jambeck, Developing Bioinformatics Computer Skills, O'Reilly, 2001.HarveyM.Deitel,Python:HowtoProgram,PrenticeHall,2002

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MOLECULAR STRUCTURE VISUALIZATION	BTF 433	4:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Protein structures and its classification
CLO 2	Introduction to Ab initio method
CLO 3	Introduction to Useful tools and techniques

B. SYLLABUS:

ModuleI
Levels of protein structure · Primary structure · Secondary structure · Tertiary structure · Quaternarystructure, Intermolecular forces · Types of intermolecular forces · Entropy and temperature·Protein folding·LevinthalParadox.Motifsofproteinstructure·Hydrophobicandhydrophilicregions·Ramachandran plot·Alpha-helix·Betasheets·Loops· Topologydiagrams· variousstructural motifs.

ModuleII
Protein structure prediction · Impediments · Sequence considerations · Structural considerations · Energyconsideration · Energy landscape · Validation, Structure prediction of small proteins using ab initiostochasticmodels·Latticesimulation·Random-walkmodel·Self-avoidingmodel·HP-models.

ModuleIII
Structure prediction of small proteins using ab initio deterministic models · Ergodic hypothesis · Use ofNewtonianequationsofmotion·

ModuleIV
Optimization techniques: Steepest descent, GA, simulated annealing · Force fields (Amber, CHARMM).X-RaycrystallographyandNMR,Nucleicacidstructures·DNAstructures·RNAstructures.

ModuleV
Useful tools · Visualization using VMD, Pymol, Rasmol, SPDBV, CHIME, etc. Structure analysis andvalidation:Pdbsum, Whatcheck, Procheck,Verify3DandProsaII.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

TextBook&References:
1. MolecularModelling:PrinciplesandApplications(2ndEdition)AndrewR.Leach(PrenticeHall)
2. IntroductiontoProteinStructureCarlBranden,JohnTooze(Garland)
3. Proteins:Structures andMolecularPropertiesThomasE.Creighton(Freeman)

4. PrinciplesofNucleicAcidStructureStephenNeidle(AcademicPress)

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS-II	BCS 401	4:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Development of social communication skills
CLO 2	Learning about context based speaking.
CLO 3	Professional skills development.

B. SYLLABUS:

ModuleI:SocialCommunicationSkills
Small
TalkConversationalEn
glishAppropriateness
Buildingrapport

ModuleII:ContextBasedSpeaking
Ingeneralsituations
In specificprofessional
situationsDiscussion and associated
vocabularySimulations/RolePlay

Module III:ProfessionalSkills
PresentationsNe
gotiationsMeeti
ngsTelephonySk
ills

ExaminationScheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage(%)	20	20	25	10	10	10	5

CAF–
CommunicationAssessmentFileGD–
GroupDiscussion
GP–GroupPresentation

Text&References:

- EssentialTelephoninginEnglish,Garside/Garside,Cambridge
- WorkinginEnglish,Jones,Cambridge
- BusinessCommunication,Raman–Prakash,Oxford
- SpeakingPersonally,Porter-Ladousse,Cambridge

- SpeakingEffectively,JermyComfort,et.al,Cambridge
- BusinessCommunication,Raman–Prakash,Oxford

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Course Name	Course Code	LTP	Credit	Semester
Understanding Self for Effectiveness- IV (Relationship Managenment)	BSS 404	4:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand the basis of interpersonal relationship
CLO 2	To understand various communication style
CLO 3	To learn the strategies for effective interpersonal relationship

B. SYLLABUS:

ModuleI:UnderstandingRelationships
Importanceofrelationships
Roleandrelationships
Maintaininghealthyrelationships

ModuleII:BridgingIndividualDifferences
Understandingindividualdifferences
BridgingdifferencesinInterpersonalRelationship–
TACommunicationStyles

ModuleIII: InterpersonalRelationshipDevelopment
Importance of Interpersonal
RelationshipsInterpersonalRelationshipsS
kills
TypesofInterpersonalRelationships

Module IV: Theories of Interpersonal Relationships Theories: Social Exchange, Uncertainty
Reduction
TheoryFactorsAffectingInterpersonalRelationships
ImprovingInterpersonalRelationships

ModuleV:ImpressionManagement
Meaning&ComponentsofImpressionManagementImpres
sionManagementTechniques(InfluencingSkills)
ImpressionManagementTraining-SelfhelpandFormalapproaches

Module VI:End-of-SemesterAppraisal
Vivabasedonpersonaljournal
AssessmentofBehaviouralchangeasaresultoftrainingExitLe
velRatingbySelfandObserver

Text&References:

- VangelistL.Anita,MarkN.Knapp,InterPersonalCommunicationandHumanRelationships:ThirdEdition ,AllynandBacon
  - JuliaT.Wood.InterpersonalCommunicationeverydayencounter
  - Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1stEditionCassell
  - Goddard,Ken:InformativeWriting,19951stEdition,Cassell
  - HarvardBusinessSchool,EffectiveCommunication: UnitedStatesofAmerica
  - Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations(IPR)
  - Beebe,BeebeandRedmond;Interpersonal Communication,1996;AllynandBaconPublishers.

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Course Name	Course Code	LTP	Credit	Semester
FRENCH-IV	FLT 401	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

ModuleC:pp.104–139:Unités8,9

Contenulexical: Unité8:Découvrirlepassé

1. parlerdupassé,deshabitudesetdeschangements.
2. parlerdelafamille,raconter unesuite d'événements/préciserleurdateetleurdurée.
3. connaîtrequelquesmomentsdel'histoire

Unité 9:Entreprendre

1. faireunprojetdelaréalisation:(exprimerunbesoin,préciserlesétapesd'uneréalisation)
2. parlerd'uneentreprise
3. parlerdufutur

Contenugrammatical:

1. Imparfait
2. Pronom«en»
3. Futur
4. Discoursrapportéauprésent
5. Passérécent
6. Présentprogressif

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- lelivreàsuivre:Campus:Tome1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GERMAN-IV	FLG 401	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to ask and tell time
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes, daily routine using Separable verbs.
CLO 3	**Demonstrate**Student will be able to write and speak sentences using modal verbs.

B. SYLLABUS:

ModuleI:Presentperfecttense
Presentperfecttense,usageandapplicability,Usageofthistensetoindicatenearpast,Universalapplicabilityof thistenseinGerman

ModuleII:Letterwriting
Toacquaintthestudentswiththeformofwritinginformalletters.

ModuleIII:Interchangingprepositions
Usage of prepositions with both accusative and dative cases, Usage of verbs fixed with prepositionsEmphasizingontheactionandpositionfactor

ModuleIV:Pasttense
Introduction to simple past tense, Learning the verb forms in past tense, Making a list of all verbs in thepasttenseandtheparticipleforms

ModuleV:ReadingaFairyTale
Comprehensionandnarration

- Rotkäppchen
- Froschprinzessin
- DieFremdsprache

ModuleVI:Genitivecase
Genitivecase–Explaintheconceptofpossessioningenitive,Mentioningthestructureofweaknouns

Module VII:Genitiveprepositions
Discussthegenitivepropositionsandtheirusage:(während,wegen,statt,trotz)

ModuleVIII:PictureDescription
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;Secondly answer questions of general meaning in context to the picture and also talk about the personalexperienceswhichcometoyourminduponseeingthepicture.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A

Weightage(%)	20	20	20	20	15	5

C–Project+Presentation

I–Interaction/ConversationPractice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,Sprachkurs Deutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant-1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
SPANISH-IV	FLS 401	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in Spanish vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in Spanish

B. SYLLABUS:

ModuleI
Revisionofearliersemestermodules
IntroductiontoPresentContinuousTense(Gerunds)

ModuleII
TranslationwithPresentContinuousTenseIntrod
uctiontoGustar,Parecer,Apetecer,doler

ModuleIII
Imperatives(positiveandnegativecommandsofregularverbs)

ModuleIV
Coomercial/businessvocabulary

ModuleV
Simple conversation with help of texts and
vocabularyEnlarecepciondelhotel
Enelrestaurante
Enlaagenciadeviajes
Enlatienda/supermercado

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- EspañolSinFronteras(Nivel –Elemental)

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE-IV	FLC 401	4:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .

B. SYLLABUS:

ModuleI
DialoguePractice
Observe picture and answer the
questionPronunciationandintonation
Character writing and stroke
order.Electronicitems

ModuleII
Traveling – The Scenery is very
beautifulWeatherandclimate
Grammarquestionwith–"bushi….Ma?"
The construction "yao … le" (Used to indicate that an action is going to take
place)Timewords"yiqian","yiwai"(Beforeandafter).
Theadverb"geng".

ModuleIII
Goingtoafriendhouseforavisitmeetinghisfamilyandtalkingabouttheircustoms.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes
prescription.Aspectparticle"guo"showsthatanactionhashappenedsometimeinthepast.
Progressiveaspectofanactin"zhengzai"Alsotheuseif"zhe"withit.
Towelcomesomeoneandtoseeoffsomeone….Icantgotheairporttoseeyouoff…etc.

ModuleIV
Shipment. Is this the place to checking
luggage?Basicdialogueon–Wheredouwork?
Basicdialogueon–
ThisismyaddressBasicdialogueon–
IunderstandChineseBasicdialogueon–
Whatjobdoudo?
Basicdialogueon–Whattime isitnow?

ModuleV
Basicdialogue on – What day (date) is it

today?Basicdialogueon–Whatistheweather
likehere.Basicdialogueon–DoulikeChinesefood?
Basicdialogueon–IamplanningtogotoChina.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

"ElementaryChineseReader,Part-2"Lesson31-38

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
STRUCTURAL BIOLOGY	BTF 501	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Secondary structures of protein
CLO 2	Classification , structure and function of structures
CLO 3	Protein solubility and stabilization

B. SYLLABUS:

Module I: Chemistry of amino acids and peptides (side chain structure and function in proteinfoldingandfunctionality)

Secondary structure of proteins -helices, sheets,loopsand turns; Structural and functionalproteins.Tertiary structure of proteins, homo and hetero-dimers, trimers and tetramers; forces governing protein-proteininteractions;opentertiarystructure;

ModuleII:StructuralandFunctionalrelationshipsofProteins

Classification of proteins, Structure and function of an antibody, structure and function of hemoglobin,structureandfunctionofmuscleproteins, Sequenceandstructuralmotifsinproteins.

ModuleIII:Protein-ligandinteractions

Lock and key versushandshake mechanism of substrate recognition; structural basisof recognition;reactionmechanismsofenzymes, G-Proteincoupledreceptors.

ModuleIV:Proteinsolubility,proteinstabilityandstabilization

Salting in and salting out, Parameters affecting; enthalpic and entropic stabilization, mutations increasingstability, .helix capping; Native, partially denatured and denatured proteins; Protein denaturation, Physicalandchemicaldenaturants;Refolding

ModuleV:DNAstructure

covalent structure ofDNA, base pairing,hydrogen bonding,DNA melting and annealing,differencebetween AT and GC pairing, DNA models, The Watson Crick model; Crystal structure of B-DNA, majorand minor groves, dyad symmetry, base pair stacking, propellor twist, A and Z- DNA, triple strandedDNA, telomeric sequences and structure, G-quartcts, palindromic and tandemsequences,BasepairflippingandDNAbulges,DNAmethylation;Protein-DNAinteractions;drug-DNAinteractions

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- IntroductiontoProteinStructurebyC.BrandenandJTooze.GarlandPublishingCompany
- BiochemistrybyR.H.Abeles,P.A.FreyandW.A.Jencks.JonesandBartlett

References:

- Essentials ofMolecularBiologybyD.Freifelder. JonesandBartlettPublications
- GenesVIIbyB.Lewin.OxfordUniversityPress
- ProteinStructurebyM. Perutz. OxfordUniversityPress
- Proteins (Structures and Molecular Properties)by T.E. Creighton. Publishers : W.H. Freeman andCompany
- DatabaseAnnotationinMolecularBiologybyArthurM.Lesk
- FromGenestoClonesbyE.L.Winnacker
- Genes&GenomesbyM.S.PaulBerg

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
ADVANCED COMPUTATIONAL BIOLOGY-I	BTF 502	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Phylogenetic trees
CLO 2	Approaches for tree reconstruction
CLO 3	SystemsBiology concepts

B. SYLLABUS:

ModuleI:Phylogeneticprediction

Phylogenetictrees:Phylogeneticrepresentations,Definitionanddescription,varioustypesoftrees,Methods of phylogeneticanalysis: Distance method (UPGMA, The Neighbour Joining, TheFitch/Margoliashmethod)andCharacter-basedmethods(MaximumParsimony,MaximumLikelihood).

ModuleII:TreeEvaluationandpackages

Approachesfortreereconstruction: Characteroptimization,delayedandacceleratedtransformation,Reliability of trees, Bootstrap, jackknife, decay, randomization tests. Applications of phylogeny analyses,Comparison of Phylogenetic Trees obtained using DNA seq. Vs.proteinseq.Vs.Fullgenomes.Softwaresforphylogeneticanalysis:Surveyofsoftwareprogramsavailableforphylogeneticanalysis

ModuleIIIProteinstructureprediction

Proteinstructure prediction: Proteinstructures,α- Helix,β-Sheet,Loopsand coils,Proteinsecondarystructure prediction methods: The Chou-Fasman and GOR methods, Neural Network models and Nearest-Neighbor methods. Tertiary structure prediction methods: Molecular modelling, Threading, Abinitiostructureprediction.

ModuleIV:ProteinInteractionandStructure Classification

Protein-Proteininteraction,Proteinstructurepredictionsoftwares,ProteinStructuralVisualization.Ramachandaran plot,Forcesinproteininteractions.ClassesofProteinStructure,Proteinstructureclassificationdatabases:SCOP, CATH,FSSP,HSSP,MMDB,SARFdatabase.

ModuleVSystemsBiology

SystemsBiology:Overview,NetworksandGraphs,Networkstructureanddynamics.Microarray–definition,ApplicationsofMicroArraysinsystemsbiology.SelforganizingmapsandConnectivitymaps-definitionand itsuses.NetworksandPathways–Typesandmethods.Metabolicnetworks.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage(%)	15	5	10	10	10	50

Text&References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D.Gusfield. Publisher:CambridgeUniversityPress
- Biocomputinghypertextcoursebookathttp://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins A.D. Baxevanis and B.F.F.Ouellette.Publisher:Wiley-interscience.
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor LaboratoryPress
- Computational Modeling of Genetic and Biochemical Networks by J.M. Bower and H. Bolouri. MITPress
- ComputationalMolecularBiology:AnAlgorithmicApproachbyP.A.Pevzner. Publisher:MITPress
- ComputerMethodsforMacromolecularSequenceAnalysisbyR.F.Doolittle,J.N,Abelson,M.I.

Simon.Publisher:Academicpress

- EssentialsofGenomicsandBioinformaticsbyC.W.Sensen.JohnWileyandSonsInc.
- IntroductiontoBioinformaticsbyT.AttwoodandD.Parry-Smith.PrenticeHall
- Introduction

toComputationalBiology:Maps,SequencesandGenomesbyM.Waterman.ChapmanandHall

- SequenceAnalysisinMolecularBiology:TreasureTroveorTrivial PursuitbyG.V.HeijneandG.V.Heijne.AcademicPress
- SyntheticBiology,ANewParadigmforBiologicalDiscovery,areportbyBeachheadConsulting,2006
- SystemsBiology:DefinitionsandperspectivesbyL.AlberghinaH.V.westerhoff,Springer.2005

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
IMMUNOLOGY	BTF 503	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Immunology
CLO 2	Concepts of antigen and antibody
CLO 3	Compliment system , vaccines and Tumorimmunology

B. SYLLABUS:

ModuleI:Introduction
Innateand acquired immunity,Active andPassiveimmunity,Cell mediated andHumoralimmuneresponse, Primary and secondary immune response,Factors affecting individual immunity,clonal nature ofImmuneResponse.

ModuleII:
Immune system: Central and peripheral immune system, Primary lymphoid organs: Thymus and Bonemarrow,Secondarylymphoidorgans:Spleen, lymphnodeandMALT
Hematopoiesis, Cells of the immune system- Eosinophils, Neutrophils, Basophils, B and T-lymphocytes,macrophages,Nullcells,dendriticcells.Receptors:BCRandTCR,

ModuleIII:
Nature and biology of Antigen: Immunogen vs. Antigen, factors affecting immunogenicity, Hapten andcarriers,Adjuvants, Superantigens
Antibody structure, types of antibodies, Monoclonal antibodies: production and applications,Generationofantibodydiversity,

ModuleIV
MHC:StructureofMHCclassI,II&III,exogenousandendogenousantigenpresentationbyMHC,MHCrestriction,Self-toleranceinrelationtoMHC.
Autoimmunity and autoimmune diseases: Hashimoto's thyroiditis; Myasthenia gravis; RheumatoidArthritis,Anemia-Pernicious andautoimmunehemolyticanaemia.
Transplantationimmunology:typesofgrafts,mechanismandtypesofrejection,tissuetyping.

ModuleVComplement
entsystemVaccines
Tumorimmunology
Antigen-antibodyinteraction:agglutinationandprecipitation,ELISA,RIA,IFAandtheirapplications

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- BasicImmunology,A.K.AbbasandA.H.Lichtman,SaundersW.B.Company
- BasicImmunology,A.K.AbbasandA.H.Lichtman,SaundersW.B.Company

References:

- FundamentalsofImmunology,W.Paul,LippincottWilliamsandWilkins
- Immunology,W.L.Anderson,FenceCreekPublishing(Blackwell).
- Immunology:AShortCourse,E.Benjamin,R.CoicoandG.Sunshine,Wiley-LeissInc.
- Immunology,Roitt,Mosby–YearbookInc.
- KubyImmunology,R.A.Goldsby,T.J.Kindt,andB.A.Osborne,Free

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MOLEULAR MODELLING AND DRUG DESIGNING	BTF 504	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to drug designing, drug metabolism toxicity and pharmacokinetics
CLO 2	Drug Target classification, identification and validation strategies
CLO 3	QSAR: Statistical techniques

B. SYLLABUS:

ModuleI
Introduction to drug designing, drug design to discovery and development, drug metabolism, toxicity andpharmacokinetics,toxicologyconsiderations,problemsanddrawbacksondrugdiscoveryanddevelopment.

ModuleII
DrugTargetclassification,identificationandvalidationstrategies,Designanddevelopmentofcombinatorial libraries for new lead generation. Structure-based design – 'de novo' design methodologies3D-databasesearchingtechniques, docking.**I**

ModuleIII
QSAR: Statistical techniquesbehind QSAR,classical QSAR,moleculardescriptors3DQSARandCOMFA.Basicprinciplesofmolecularmodeling,moleculardynamics andsimulationtechniques.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- PrinciplesofmolecularmodelingbyAndrewLeach
- PrinciplesofDrugActionbyW.B.PrattandP.Taylor.ChurchillLivingston
- PrinciplesofMedicinalChemistrybyW.O.Foye,T.L.Lemke,andD.A.Williams.WilliamsandWilkins
- EssentialsofDrugDesigningbyV.Kothekar
- DrugDesignbyCohen

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTERS-III	BTF 505	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction toWeb page Designing
CLO 2	Introduction to Operating system
CLO 3	Introduction to Shell script, shell variables, System variables

B. SYLLABUS:

Section A: Web page DesigningModuleI

IntroductiontoHTML,Tagsforbold,italic,underline,list,marque,insertingimages,Hyperlinks,Paragraphs, Heading, Font, table creation with rowspan and colspan,Form tag, frameset,Mapping aImage, Introduction to PHP Servers: Introducing Apache, PHP, MySql, Installing Apache, PHP, MySql,Configuring Apache for PHP, Registering Domains, Parking Web sites, Publishing with FTP, SimpleAnimationcreationusingFlash.

SectionB:LinuxM oduleII

Introduction to Operating system, Functions of an OS, Featuresof Linux,Introductionto KernelandShellof Linux,DircetoryStructure,Shellcommandsfor DirectoryandFiles.

Working with the vi and Pico Editors Shell commands: - wc, sort, tail finger, find, diff, comm.,cut ,cpPaste,grep,Tee,ps,kill,in,who,ttywho,whoamI,su,chown,chmod,date,unique,touch,file.

ModuleIII

IntroductiontoShell script, shell variables,Systemvariables,Control statements,Global variables,positionalParameters, setcommand,shiftcommand,

System administrations: create, update and delete a user, Modifying and deleting groups. Introduction tofile System, Mounting and unmounting the file system, FSCK command, creating a file system usingFDISKCommand,Backtips, backupschedule,BackupTools.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- ASPin21DaysbyScott Mitchell,JamesAtkinsonpublisherSAMS
- RedHatlinux6fastandEasybyWitherSpoon,PublisherBPB

References:

- ASP 3.0ABeginner'sGuidebyMercer,TataMcGrawHill
- LinuxCompletebySybex,BPB
- Learningmacromedia Flash5byWeixelPublisher:BPB
- TeachyourselfmacromediaFlash5in24HoursbyKermanPublisher:BPB

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
STRUCTURAL BIOLOGY LAB	BTF 521	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Chemical modification of proteins
CLO 2	Introduction to Peptidemapping
CLO 3	Crystallization

B. SYLLABUS:

ModuleI
Chemicalmodificationofproteins

ModuleII
Peptidemapping

ModuleIII
Analysisofaminoacidcomposition.

ModuleIV
AnalysisandinterpretationofSpectrophotometricdatafordenaturationstudies.

ModuleV
CrystallizationofLysozyme-pHdrivenandsaltdrivencrystallization.

ModuleVI
Effectofconcentration.BMCD

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
ADVANCED COMPUTATIONAL BIOLOGY-I LAB	BTF 522	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Biological Databases
CLO 2	Tree Building using different tools,
CLO 3	Protein interaction databases

B. SYLLABUS:

ModuleI:

Biological Databases: Format & databases of Nucleic Acids & Proteins(GENBANK, EMBL, DDBJ, PIR,UNIPROT,PDB,SCOP, CATH,PRINT,Pfametc).

ModuleII:

Sequenceanalysis,Pairwiseandmultiplesequenceanalysis

ModuleIII:

PhylogeneticAnalysis

TreeBuildingusingdifferenttools,Treeevaluation,PhylipPackage,MEGA.

ModuleIV

ProteinStructurePrediction

ProteinSecondarystructureprediction,tertiarystructureprediction,structureevaluationandvalidation,Ramachandranplot.

ModuleV:MetabolicPathwaydatabases

Proteininteractiondatabases,visualizingproteininteractionnetworks,predictinginteraction.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
IMMUNOLOGY LAB	BTF 523	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Blood film preparation
CLO 2	Immunization, collection of serum.
CLO 3	Demonstrate the advanced application of ELISA.

B. SYLLABUS:

ModuleI
Bloodfilmpreparationandidentificationofcells.

ModuleII
Lymphoidorgansandtheirmicroscopicorganization.

ModuleIII
Immunization,collectionofserum.

ModuleIV
PurificationofIgGfromserum.

ModuleV
Separation ofmononuclearcellsby Ficoll-Hypaque.

ModuleVI
Con-Ainducedproliferationofthymocytes(byMTTmethod)..

ModuleVII
Elisa.

ModuleVIII
Haptenconjugationandquantitation.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MOELCULAR MODELLING AND DRUG DESIGNING LAB	BTF 524	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Structure based drug design
CLO 2	Introduction to QSAR
CLO 3	Energy minimization and simulation techniques.

B. SYLLABUS:

ModuleI
BuildingofMolecules

ModuleII
Structurebaseddrugdesign

ModuleIII
QSAR

ModuleIV
Energyminimisationandsimulationtechniques.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTER LAB-III	BTF 525	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to HTML, PHP and SQLserver
CLO 2	Designing the Dynamic web pages
CLO 3	Working with Linux commands

B. SYLLABUS:

ModuleI

DesigningtheStaticwebpagesusingHTML,Frontpage.

ModuleII

Designing the Dynamic web pages using PHP: Insert update delete and retrieval of records from aDatabase(Oracle,SQLserver, Ms–Access)throughPHP.

ModuleIII

SendingandreceivingmailusingSMTP.Designingapageusingpaging.

ModuleIV

Working with Linux commands like: ls, wc, sort, tail finger, find, diff, comm., cut, cp Paste, grep, Tee,ps,kill,in,who,ttywho,whoamI, su, chown,chmod, date, unique, touch, file.

ModuleV

DesigningtheShellScripts,create,updateanddeleteauser,Modifyinganddeletinggroups.

ExaminationScheme:

IA			EE			
ClassTest(PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-V	AND005	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

(RUSA–Govt.ofRajasthan)

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodnessand charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringfor someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTF 530	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
13. Choosingasubject
14. Findingsourcesofmaterials
15. Collectingthenotes
16. Outliningthepaper
17. Writingthefirstdraft
18. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
g) The material sources should be not more than 10 years old unlessthe nature of the paper is such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
h) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
i) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
g) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
h) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
i) Checkcrossreferences.

4. Outliningthepaper
e) Reviewnotestofindmainsub-divisionsofthesubject.
f) Sort the collected material again under each main division to find sub-sections for outline so that itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft
Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:
a) statementofpurpose
b) mainbodyofthepaper

c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

s) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses ofrelevance to the question at hand. Sometimes, therelevance of a particular section may be clear to you but not to your readers. To avoid this,ensureyoubrieflyexplaintherelevanceofeverysection.

t) Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.
u) Checkfor properspelling,phrasingandsentenceconstruction.
v) Checkforproperformonfootnotes, quotes, andpunctuation.
w) Checktoseethatquotationsserveoneofthefollowingpurposes:
x) Showevidenceofwhatanauthorhassaid.
y) Avoidmisrepresentationthroughrestatement.
z) Save unnecessary writing when ideas have been well expressed by the original author.aa)Checkforproperformontablesandgraphs.Becertainthatanytableorgraphisself-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
15) Title page
16) Tableofcontents
17) Introduction
18) Review
19) Discussion&Conclusion
20) References
21) Appendix

Generally,theintroduction,discussion,conclusionandbibliographypartshouldaccountforathirdofthepaperandthereviewpartshouldbetwothirdsofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintheresearchpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:
i) summaryofquestionposed
j) summaryoffindings
k) summaryofmainlimitationsofthestudyathand
l) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs
Crystal,D.(2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challengesto communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,
S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument].Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectives performed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa, Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,UniversityofHamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,University CollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowof theidea/ideas,relevanceofmaterialused/presented,outcomesvs.objectives,presentation/vivaetc.)

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FUNCTIONAL AND COMPARATIVE GENOMICS	BTF 531	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Human genome project
CLO 2	Next-Generation sequencing
CLO 3	Comparative and functional genomics

B. SYLLABUS:

ModuleI:IntroductiontoGenome
Genomeprojects,Humangenomeorganization,introductiontotranscriptomics,proteomics.Humangenomebrowser-ENSEMBLE.Mitochondrialgenome, CpGislands.

ModuleII:Genefamilies
Gene families: Multigene families– Classical gene families, families with conserved domains, Genesuperfamilies,RepetitiveDNAandtransposableelements,Originofgenefamilies.

Module III:Genome sequencingtechniquesandapplications
Basic genome sequencing techniques, Next-Generation sequencers, Sequencing strategies and the shotgunmethod,Massiveparallelsequencinganditsapplications.

Module IV:ComparativeGenomics
Overview of prokaryotic and eukaryotic genomes, C-value, number of genes and complexity of genomes, Conservation and diversity of genomes, Comparative genomics as an aid to gene mapping and study ofhumandiseasegenes.

ModuleV: Functionalgenomics
Functional Genomics: Sequence-Based Approaches, Microarray BasedApproaches,ComparisonofSAGE and DNA Microarrays. Differential display, Protein functions on genome-wide scale, Knock-outanalysis,Anti-senseandRNAinterference(RNAi).

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

TextBook&References:

1. RichardJReece(2003),AnalysisofGenesandGenomes,WileyPublications,
2. Mount,D.(2004)“Bioinformatics:SequenceandGenomeAnalysis”;ColdSpringHarborLaboratoryPress, NewYork.
3. Baxevanis,A.D.andFrancisOuellellette,B.F.(1998)“Bioinformatics–apracticalguidetotheanalysisofGenes andProteins”;JohnWiley&Sons,UK.
4. Comparative genomics:empiricalandanalyticalapproachestogeneorderdynamics,mapalignmentandtheevolutionofgenefamiliesbySankoff,D.&Nadeau,J.H.,Netherlands,KluwerAcademicPublishers, 2000.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TRANSCRIPTOMICS AND DATA ANALYSIS	BTF 532	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to "Omics"
CLO 2	Introduction of Bioinformatics'tools in genome sequencing
CLO 3	Applications of next generation sequencing

B. SYLLABUS:

ModuleI
Introduction to the Biological Systems and Genomics, Introduction to "Omics", Next generation genomesequencing ,Introduction ofBioinformatics'toolsin genome sequencing ,Applicationsofnextgenerationsequencinginmedicineandagriculture,Personalizedgenomicsandmedicine

ModuleII
Transcriptomics and Construction of Regulatory Networks, Next generation transcriptomics technologies,Generation of transcriptional regulatory networks,Datamining and bioinformatics software to buildtranscriptionalregulatorymodules.

ModuleIII
Introductionofdatabasesand software fortranscriptomics,High-throughputgeneticscreenstounderstandsignalingpathwaysinmodelandnon-modelorganisms,High-throughputgeneticmanipulations.

ModuleIV
Proteomics and Generation of Interactomics, High-throughput proteomics, Construction of interactomics,Bioinformatics and data visualization software for proteomics, Diseasomes, Bioinformatics methods topredictprotein-proteininteractions.

ModuleV
Microarray data: normalization and analysis.GenevestigatorandOncoMine -browsingmicroarray-derivedgeneexpressionprofiles,tissueandstage-of-development-specificpatternsofexpression,coexpression of genes, precomputed lists of differentially expressedgenes.Standaloneanalysisofpublicly available microarray expression data: GEO database, TM4 analysis suite. AssemblyofEST:CAP3program.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

1. Genomes,2ndedition,TerenceABrown.,Department ofBiomolecularSciences,UMIST,Manchester,UK,Oxford:Wiley-Liss;2002. ISBN-10:0-471-25046-5
2. Sequence-Evolution-Function:ComputationalApproachesinComparativeGenomics. KooninEV,GalperinMY. Boston:KluwerAcademic;2003.
3. Drăghici,Sorin.Dataanalysistoolsfor DNAmicroarrays.CRCPress,2003.
4. Pevsner,Jonathan.Bioinformaticsandfunctionalgenomics.JohnWiley&Sons,2015.

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Course Name	Course Code	LTP	Credit	Semester
IMMUNOINFORMATICS AND BIOCHEMICAL TECHNIQUES	BTF 533	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Immune System
CLO 2	Computational vaccinology
CLO 3	Biochemical Methods of Analysis, Electrophoresis

B. SYLLABUS:

ModuleI
Immune System: Humoral immunity, Introduction, Lymphocytes: Theirorigin and differentiation,Typesofimmune responses,B- Lymphocytesand theiractivation, structureand function ofimmunologic,immunologic classesand subclasses, generation ofantibodydiversity,Major,HistocompatibilityComplex.Immunesystem:CellularimmunityThymusderivedlymphocytes(Tcells)andtheirclassification, Antigen presenting cells(APC), Macrophages, Langerhans cells their origin and function,mechanism of phagocytosis, Identification of cell type of immune system, immunosuperresion, immmunotolerance.

ModuleII
Computational vaccinology, Quantitative approach, internationalimmunogenetics information system,generating data for databases- peptide repertoire if HLA molecules, HLA nomenclature and IMGT/HLAsequencedatabases.

ModuleIII
Immunogenetics to immunomics Functional prospects of gene and transcripts, Mathematical modelsofHIV and immune system, Immunogenomics- towardsdigital immune system,Integration ofimmunemodelsusingPetriNets,Viralbioinformatics- computationalviewsof hostandpathogen.

ModuleIV
Immunotechniques: Antiserum production, immunofluorescences, ELISA, immunoblotting, monoclonalantibodies,Fluoroscenceassistedcellsorting(Flowcytometry).
Chromatography: Definition, Principle and types: Paper, thin-layer, Adsorption, Ion-Exchange,Affinity,Gel-filteration,Gas,HPLCandFPLC.

ModuleV
Biochemical Methods of Analysis, Electrophoresis: Principles, types, moving paper Starch gel agar gel,immunoelectrophoresis Colorimertry, Flourier and Spectrometry: Principle of Beer and Lambert's law:Principle, description and application. Principle of NMR, ESR, Mass spectrometer and X-ray diffraction,FourierTransform:FourierTransformofdiscretelysampleddata,FastFourierTransform(FFT)

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

RecommendedBooks:

1. I.Roitt,EssentialImmunology,Blackwell ScientificPublications,Oxford(1991).
2. E.BenjaminandS.Leskwitz,Immunology: Ashortcourse,WileyLissNY(1991)
3. Kuby,Immunology,Fourthedition.

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Course Name	Course Code	LTP	Credit	Semester
SCIENTIFIC WRITING	BTF 534	4:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Scientific Field and Biological research
CLO 2	Computing skills for scientific research
CLO 3	Types of articles and paper format

B. SYLLABUS:

ModuleI
Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding(academicandcommercial).Plagiarism:Introduction;Toolsforthedetectionofplagiarism;Avoidingplagiarism

ModuleII
Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – ReviewofLiterature.Conceptofimpactfactor

ModuleIII:Computingskillsforscientificresearch
Web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research;internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness. Graphic designing -ApproachandSignificanceinresearch

ModuleIV
Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing,evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing theappropriatejournal(Sources,Information,Instructionstoauthors,peerreviewsystem,journalevaluation)

ModuleV
Casestudiesofareasofcurrentresearch.Formulatingaresearchplananditspresentation

ExaminationScheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage(%)	15	5	30	50

Text&References:

***References*:**

- Scientificjournalsandmagazines

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS-III	BCS 501	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Learning about linguistic skills in the field of science and technologies.
CLO 2	Leaning about reading comprehension
CLO 3	Developing skills regarding essay writing , leaflets, dialogue reports etc.

B. SYLLABUS:

ModuleI
ReadingComprehension
SummarisingParaphrasi
ng

Module
IIEssay
WritingDialogu
eReport

ModuleIIIWri
ting
EmailsBrochur
eLeaflets

ModuleIV: IntroductiontoPhonetics
VowelsCon
sonants
AccentandRhythmAc
centNeutralization
SpokenEnglishandListeningPractice

ExaminationScheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage(%)	20	20	25	10	10	10	5

CAF–
CommunicationAssessmentFileGD–
GroupDiscussion
GP–GroupPresentation

Text&References:

- EffectiveEnglishforEngineeringStudents,BCauveri,MacmillanIndia
- CreativeEnglish forCommunication,KrishnaswamyN,Macmillan
- ATextbookofEnglishPhonetics,BalasubramanianT,Macmillan

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Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness-V (Group dynamics and team building)	BSS 504	4:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To inculcate in the students an elementary level of understanding of group/team functions
CLO 2	To develop team spirit and to know the importance of working in teams
CLO 3	

B. SYLLABUS:

ModuleI:Groupformation
Definition and Characteristics, Importance of groups, Classification of groups, Stages of group formationBenefitsofgroupformation

ModuleII:GroupFunctions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizationalpoliciesetc.
Internalconditionsaffectinggroupfunctioning:Roles,Norms,Conformity,Status,Cohesiveness,Size,Intergroupconflict.GroupCohesivenessandGroupConflict,AdjustmentinGroups

ModuleIII:Teams
Meaningandnatureofteams,Externalandinternalfactorseffectingteam,BuildingEffectiveTeamsConsensus Building,Collaboration

ModuleIV:Leadership
Meaning,NatureandFunctions,Selfleadership,Leadershipstylesinorganization,LeadershipinTeams

ModuleV:Powertoempower:IndividualandTeams
MeaningandNature,Typesofpower,RelevanceinorganizationandSociety

Module VI:End-of-SemesterAppraisal
VivabasedonpersonaljournalAssessmentofBehaviouralchangeasaresultoftrainingExitLevelRatingbySelfandObserver

Text&References:

- Organizational Behaviour,Davis,K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt CollegePublishers
- Dick,McCann&Margerison,Charles:TeamManagement,1992Edition,vivabooks
- Bates,A.P.andJulian,J.:Sociology-UnderstandingSocialBehaviour
- Dressers,DavidandCans,Donald:TheStudyofHumanInteraction
- Lapiere,Richard.T–SocialChange

- Lindzey,G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology,Addison–Welsley,US.
- Rose,G.:OxfordTextbookofPublicHealth,Vol.4,1985.
- LaFastoandLarson:WhenTeamsWorkBest,2001,ResponseBooks(Sage),NewDelhi
- JWilliam Pfeiffer (ed.) Theories and Models in Applied Understanding Self for Effectiveness, Vol 2,Group(1996);Pfeiffer&Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins CollegePublishers

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FRENCH-V	FLT 501	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

ModuleD:pp.131–156Unités10,11

Contenulexical:

Unité10: Prendredesdécisions
1. Fairedescomparaisons
2. décrireunlieu,letemps,lesgens,l'ambiance
3. rédiger unecartepostale

Unité11:fairefaceauxproblèmes
1. Exposerunproblème.
2. parlerdelasanté,delamaladie
3. interdire/demander/donneruneautorisation
4. connaîtrelaviepolitiquefrançaise

Contenugrammatical:
1. comparatif-comparerdesqualités/quantités/actions
2. supposition:Si+présent,futur
3. adverbe-caractériseruneaction
4. pronom"Y"

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- **lelivreàsuivre: Campus:Tome1**

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Course Name	Course Code	LTP	Credit	Semester
GERMAN-V	FLG 501	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .

B. SYLLABUS:

ModuleI:Genitivecase
Genitive case – Explain the concept of possession in genitiveMentioningthestructureofweaknouns

Module II:Genitiveprepositions
Discussthegenitivepropositionsandtheirusage:(während,wegen,statt,trotz)

Module III: Reflexive verbs Verbs with accusative caseVerbswithdativecase
Differenceinusageinthetwocases

ModuleIV:Verbswithfixedprepositions
Verbs with accusative caseVerbswithdativecase
Differenceintheusageofthetwocases

ModuleV:Texts
A poem‘Maxi’Ate xtRocko

ModuleVI:PictureDescription
Firstlyrecognizethepersonsorthingsinthepictureandidentifythesituationdepictedinthepicture;Secondly answer questions of general meaning in context to the picture and also talk about the personalexperienceswhichcometoyourminduponseeingthepicture.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation

I–Interaction/ConversationPractice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,Sprachkurs Deutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant- 1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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Course Name	Course Code	LTP	Credit	Semester
SPANISH-V	FLS 501	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in Spanish vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in Spanish

B. SYLLABUS:

ModuleI
Revision ofearliersemestermodules

ModuleII
FutureTense

ModuleIII
Presentations in English onSpanish speaking countries'Culture SportsFoo dPeoplePo liticsSociet yGeograph y

ModuleIV
Situations:
EnelhospitalEn lacomisaria
Enlaestaciondeautobus/trenEn elbanco/cambio

ModuleV
GeneralrevisionofSpanishlanguagelearntsofar.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- EspañolSinFronteras,Greenfield

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE-V	FLC 501	4:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

B. SYLLABUS:

ModuleI
Drills
Dialoguepractice
Observe picture and answer the question.Pronunciationandintonation.
Characterwritingandstrokeorder

Module II
Intonation
Chinesefoodsandtastes–tofu,chowmian,noodle,Beijingduck,rice,sweet,sour….etc.Learningtosayphrases like – Chinese food,Western food, delicious, hotand spicy, sour, salty, tasteless, tender,nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza,milk,vitamins, to beable to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……Repetitionofthegrammarandverbstaughtinthepreviousmoduleandmakingdialoguesusingit.
Complimentofdegree“de”.

ModuleIII
Grammar the complex sentence “suiran … danshi….”Comparison – It is colder today than it was yesterday…..etc.TheExpression“chule….yiwai”.(Besides)
Names of different animals.Talking about Great Wall of ChinaShortstories

ModuleIV
Useof“huozhe”and“haishi”Is he/shemarried?
Goingforafilmwithafriend.
Havingamealattherestaurantandorderingameal.

ModuleV
Shopping–Talkingabutathingyouhavebought, howmuchmoneyyouspentonit?Howmanykindswerethere?Whatdidyouthinkofothers?
Talking about a day in your life using compliment of degree “de”. When you get up? When do you go forclass?Doyousleepearlyorlate?Howis Chinese?Doyouenjoyyourlifeinthehostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and

answerthem.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation

I–Interaction/ConversationPractice

Text&References:

- "ElementaryChineseReader"Part-IILesson39-46

SEMESTERVI

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GENOMICS	BTF 601	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Genomics
CLO 2	Introduction to Genome sequencing
CLO 3	Introduction to DNA microarray

B. SYLLABUS:

ModuleI
IntroductiontoGenomics,Sizeandstructureofgenomes indifferentorganisms
Genome sequencing, Identification of genes, Databases and web based resources for genomics researchandanalysis.

ModuleII
Geneexpressionprofiling,ApplicationsofGeneexpressionprofiling.Comparativegenomeanalysis.Alternativesplicingmodels.

ModuleIII
DNA microarray, Microarray Databases, Implications in Cancer genetics, Meta-genomics, Pharmaco-genomicsandtoxico-genomics

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:
Introduction toComputationalMolecularBiology,JoaoMeidanis,JoaoC.Setabal,
Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D.Baxevanis,B.F.FrancisOuellette

References:
Handbook ofComparativeGenomics:PrinciplesandMethodology,CeciliaSaccone,GrazianoPesoleSequence - Evolution - Function: Computational Approaches in Comparative Genomics, Eugene V.Koonin,MichaelY.Galperin
Comparative Genomics - Empirical and Analytical Approaches to Gene Order Dynamics, Map

Alignmentand the Evolution of Gene Families, David Sankoff and Joseph H. Nadeau, ComparativeGenomics,MelodyClark
Bioinformatics:SequenceandGenomeAnalysis,DavidW.Mount.
Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D.Baxevanis,B.F.FrancisOuellette.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTATIONAL PROTEOMICS	BTF 602	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Proteome analysis
CLO 2	Introduction to Protein-protein interactions
CLO 3	Structure determination techniques

B. SYLLABUS:

ModuleI:IntroductiontoProteomics
Introduction to Proteome analysis, 2D-gel electrophoresis, high-throughput proteome analysis with 2D-IEF,chromatography-HPLC,GC;aminoacidsequencing, massspectrometry,

ModuleII
Structurefunctionrelationship
Protein-protein interactions – Large molecular complexes – RNA polymerase II, ribosome; SUMO Protein-proteininteractionsinhealthanddisease.

ModuleIII
Postranslational modifications – concepts of how protein function is rapidly and dynamically modulatedthrough posttranslational modifications, how posttranslational modifications precede altered transcriptionlevels.

ModuleIV
Structure determination – experimental and theoretical methods for determination of protein molecularsize, X-ray diffraction technique, NMR spectroscopy, Databases for protein structures. Protein StructureEvaluationMethods.(VADAR,Prosa,ProcheckNT,ProcheckAQUA).

ModuleV
ProteinEngineeringTechniques.ZEBRA,Pocketoptimizer,HotSpotIdentificationTechnique.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- IntroductiontoProteinStructurebyCarl-IvarBranden,JohnTooze
- PrinciplesofProteinstructurebySchultz,G. E., andSchirmer,R.H.,ProteomicsbyDanielC.Leibler
- Proteins:StructuresandMolecularPrinciples(2ded.).byTECreighton
- OrganicspectroscopybyWilliamKemp

- Proteome Research: Two-Dimensional Gel Electrophoresis and Detection Methods (Principles andPractice),T.Rabilloud(Editor), 2000, SpringerVerlag
- Bioinformatics: A practical guide to the analysis of genes and proteins by A.D. Baxevanis and B.F.F.Ouellette.JohnWileyandSonsInc.
- Bioinformatics:FromGenomestoDrugsbyT.Lengauer.JohnWileyandSonsInc.
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor LaboratoryPress
- DatabaseAnnotationinMolecularBiology:PrinciplesandPracticebyArthurM.Lesk
- ProteomicsbyT.Palzkill.Publisher:KluwerAcademicPublishers

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Course Name	Course Code	LTP	Credit	Semester
ADVANCED COMPUTATIONAL BIOLOGY-II	BTF 603	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Computational methods for identification of polypeptides from massspectrometry
CLO 2	Proteomics informatics strategies for biomarker discovery
CLO 3	Biological networks and NGS Platforms

B. SYLLABUS:

ModuleI
GenomicsandMetagenomics:Large scalegenomesequencingstrategies.Metagenomics,basicprinciples, applications and interpretation of results. Basicconceptson identificationofdisease genes,role of bioinformatics-OMIM database, reference genome sequence, Genome mapping and types , geneexpression profiling; identification of SNPs, SNP database (DbSNP). Role of SNP in Pharmacogenomics, SNParrays.

ModuleII
Protein arrays: basicprinciples. Computational methods for identification of polypeptides from massspectrometry. Identification of proteins by PMF and MS/MS data; Database search engines for MS dataanalysis(Mascot,Sequest, andothers);

ModuleIII
Proteomics informatics strategies for biomarker discovery, analysis of protein functions and pathways.Applications of proteomics (Disease diagnosis, drug development, and plant biotechnology). Protein-proteininteractions:databasessuchasDIP,PPIserverandtoolsforanalysisofprotein-proteininteractions.

ModuleIV
Biologicalnetworks:ComplexBiologicalSystems,TypesofBiologicalnetworks,Intra-cellularnetworks:Gene-regulatorynetwork,Protein-interactionnetwork,MetabolicnetworksandSignalingnetwork;Inter-cellularnetworks:Neuronalnetworks, Networkmotifs.

ModuleV
NGSPlatforms: Introduction to NGS,Roche/454 FLX,Illumina/Solexa GenomeAnalyzer,AppliedBiosystems SOLiD system, Helicos Heliscope, PacificBiosciences/single molecule real time (SMRT)sequencing.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

1. SimpsonR.J."ProteinsandProteomics-ALaboratoryManual".ColdSpringHarbourLaboratoryPress,2002.
2. PenningtonS.R.andDunnM.J."Proteomics-FromProteinSequencetoFunction.VivaBooks,2002.
3. TwymanR.M."PrinciplesofProteomics".Taylor&Francis.2004.
4. Principles of Genome Analysis and Genomics (3rd Ed.) by Primrose, S.B. and Twyman, R.M.,BlackwellPublishingCompany, Oxford, UK.2003.
5. Bioinformatics: Sequence and Genome Analysis by Mount, D., Cold Spring Harbor LaboratoryPress,NewYork. 2004.

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Course Name	Course Code	LTP	Credit	Semester
CLINICAL RESEARCH AND PHARMACOVIGILNACE	BTF 606	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Pharmacology & Drug discovery process
CLO 2	Basics of clinical trials
CLO 3	Pharmacovigilance

B. SYLLABUS:

Module-I

BasicsofgeneralPharmacology&Drugdiscoveryprocess

Drug, Receptors, Dosage forms, routes of drug administration, drug receptor interactions, drug druginteractions,drugresistance,drugtolerance,drugdependence,Pharmacokinetic(ADME)andPharmacodynamicofdrugs,Adversedrugeffects.GeneralintroductionaboutDrugdiscoveryanddevelopmentprocess,Bioavailability/BioequivalenceStudiesandPharmacovigilance.

Module-II

Basics of Clinical trials - Basics of clinical trials, Introduction and history of clinical trials, Types ofclinical trials, Inclusion and exclusion criteria, Primary and Secondary outcome/endpoint of clinical trials,NeedsofClinicaltrialsandPhasesofclinicaltrials.

VariousKeydocuments,applicationfillingandEthicalregulationof Clinicaltrials:

- InvestigatorBrochure(IB),Protocol&AmendmentinProtocol,CaseReportForm(CRF),
- Informed Consent Form (ICF) , Essential Documents in Clinical Trial Good Clinical Practice: ICHguidelines,IndianGCPguidelines(CDCSOguidelines),
- Investigational new drug (IND) / clinical trial exception (CTX) / clinical trial authorization (CTA)application
- Newdrugapplication(NDA/ANDA)/marketingauthorizationapplication(MAA)
- ICMRGuideline-EthicalGuidelineforBiomedicalResearchonHumanSubjects&ScheduleY
- EthicalCodes–TheDeclarationofHelsinki.

Module-III

Clinical trial design: Need of clinical trial design, Treatment studies- Randomized controlledtrial,Adaptive clinical trial,Nonrandomized trial, Observational studies-Cohort study,Case control study,Cross sectionalstudy,Ecologicalstudy

Module-IV

Pharmacovigilance: Introduction to adverse drug reactions: Definitions and classification of ADRs,Detection and eporting, Causality assessment, Severity and seriousness assessment, Predictability andpreventabilityassessment,Managementofadversedrugreactions.

Introduction to pharmacovigilance: History and development of pharmacovigilance, Importance ofsafetymonitoring/Whypharmacovigilance

National and international scenario: Pharmacovigilance in India, Pharmacovigilance

globalperspective,WHOinternationaldrugmonitoringprogram.

Module-IV

Adverse drug reaction reporting: Introduction to reporting systems, Spontaneous reporting system,Reportingtoregulatoryauthorities,GuidelinesforreportingADRsinbiomedicalliterature

Drug dictionaries and coding in pharmacovigilance: WHO adverse reaction terminologies, MedDRAandStandardizedMedDRAqueries.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

ReferenceBooks

1. Methodology of Clinical Drug Trials, 2nd Edition. Spriet A., Dupin-Spriet T., Simon P. Publisher:Karger.
2. DesignandAnalysisofClinicalTrials:ConceptsandMethodologies,3rdEdition.SheinChungChow, Jen-PeiLiu.Publisher:Wiley.

3. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by JohnWiley&Sons,2007.
4. Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers MedicalPublishers(P)Ltd. 7th Edition2010.
5. DrugDiscoveryandClinicalResearch,byS.KGupta,PublishedbyJAYPEEBrothersMedicalPublishers(P)Ltd.
6. ATextbookofPharmacovigilance:ConceptandPractice,byGuruPrasadMohanta,PublishedbyPharmaMedPress/BSPBooks(2015).
7. AnIntroductionto Pharmacovigilance,byPatrickWaller,PublishedbyOctober2009,Wiley-Blackwell.

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Course Name	Course Code	LTP	Credit	Semester
COMPUTERS-IV	BTF 605	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Java
CLO 2	Java Servlets
CLO 3	exceptionhandling

B. SYLLABUS:

CourseContents:

Module I:(CoreJava)
Introduction to Java - Features, Inheritance, Strings, Packages , Interfaces; Multi- Threading, AppletProgramming:AWT-Components,Menus,Layoutmanager,etc.,EventHandling,Swings,JavaPackages -java.util,-java.io;exceptionhandling,JDBC,IntroductiontoClientServerApplication,JavaDrivers,java.sqlPackage,ExecutingSQLStatements.

ModuleII
Java Servlets, Introduction to Server Side Application Development,BasicsofServletProgramming,WebContainer,Session Tracking,ServletContext,JSP-JavaServerPages,JSPandServlets(DifferencesandSimilarity),JSP details-directives,scriplets,expressions,JSPtags.

ModuleIII:BasicsofXML Features & uses of XML.Parsers,Entities,AttributesDTD

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- CompletereferencebyHerbertSchildtTataMcGrawHill
- ProgrammingwithjavaAPrimerbyBalagurusamyPublisher:TataMcGrawHill
- ThecompleteGuidetojavabySiple.TataMcGrawHill

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GENOMICS LAB	BTF 621	4:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Introduction to** Comparative genome analysis
CLO 2	Databases and web based resources
CLO 3	Tools for analysis of human genome

B. SYLLABUS:

ModuleI
Comparativegenomeanalysis.

ModuleII
Databasesandwebbasedresourcesforgenomicsresearchandanalysis.

ModuleIII
Geneexpressionprofiling&ApplicationsofGeneexpressionprofiling

ModuleIV
Toolsforanalysisofhumangenome

ModuleV
WebbasedresourcesforMicroarrayTechnologies

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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Course Name	Course Code	LTP	Credit	Semester
COMPUTATIONAL PROTEOMICS LAB	BTF 622	4:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Protein identification
CLO 2	Databases
CLO 3	Web basedGraphics Visualisation and analysis tools

B. SYLLABUS:

ModuleI
Protein identification, physico-chemical properties, motifs and patterns, structure, folding classes,structureclassification

ModuleII
Databasesfor2DGELandMSdata.

ModuleIII
Web basedGraphicsVisualisationand analysistoolslikeProtein Explorer.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
ADVANCED COMPUTATIONAL BIOLOGY LAB-II	BTF 623	4:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Biological Databases
CLO 2	Sequence and Phylogenetic Analysis
CLO 3	Metabolic Pathway databases

B. SYLLABUS:

ModuleI: BiologicalDatabases
Format & databases of Nucleic Acids & Proteins(GENBANK, EMBL, DDBJ, PIR, UNIPROT, PDB,SCOP,CATH,PRINT, Pfametc).

ModuleII: Sequenceanalysis
Pairwiseandmultiplesequenceanalysis

ModuleIII:PhylogeneticAnalysis
TreeBuilding using differenttools,Treeevaluation,PhylipPackage,MEGA.

ModuleIV: ProteinStructurePrediction
ProteinSecondarystructureprediction,tertiarystructureprediction,structureevaluationandvalidation,Ramachandranplot.

ModuleV: MetabolicPathwaydatabases
Protein interactiondatabases,visualizingproteininteractionnetworks,predictinginteraction.

ExaminationScheme:

IA			EE			
ClassTest (PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	5	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMPUTER LAB-IV	BTF 625	4:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing Java programs
CLO 2	Designing Userinterface
CLO 3	Designing the XML programusing DTD

B. SYLLABUS:

ModuleI
Class,Object,Inheritance,Packages,Multithreading,ExceptionHandling,Strings.

ModuleII
DesigningUserinterfaceusingAWT,Swings

ModuleIII
DevelopingEventHandlingprograms

ModuleIV
Developing Java programsto Interact with the Database: Fetching, retrival, updation and deletion of theRecordsfromthedatabaselikeOrcale,SQLServer,andMsAccess.

ModuleV
ClientservercomputingwithJSPandServelets

ModuleVI
DesigningtheXMLprogramusingDTD

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-VI	AND006	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

B. SYLLABUS:

(RUSA–Govt.ofRajasthan)

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy ofgiving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringfor someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated.Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.

- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER AND INDUSTRY VISIT	BTF 630	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

B. SYLLABUS:

A term (or research) paper is primarily a record of intelligent reading in several sources on a particularsubject.
Thestudentswillchoosethetopicatthebeginningofthesessioninconsultationwith the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semesterthe detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done byBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
13. Choosingasubject
14. Findingsourcesofmaterials
15. Collectingthenotes
16. Outliningthepaper
17. Writingthefirstdraft
18. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
g) The material sources should be not more than 10 years old unlessthe nature of the paper is such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
h) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
i) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
g) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
h) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
i) Checkcrossreferences.

4. Outliningthepaper
e) Reviewnotestofindmainsub-divisionsofthesubject.
f) Sort the collected material again under each main division to find sub-sections for outline so that

itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose
b) mainbodyofthepaper
c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

s) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses ofrelevance to the question at hand. Sometimes, therelevance of a particular section may be clear to you but not to your readers. To avoid this,ensureyoubrieflyexplaintherelevanceofeverysection.

t) Readthepaper toensurethatthelanguageisnotawkward,andthatit"flows"properly.
u) Checkfor properspelling,phrasingandsentenceconstruction.
v) Checkforproperformonfootnotes, quotes, andpunctuation.
w) Checktoseethatquotations serveoneofthefollowingpurposes:
x) Showevidenceofwhatanauthorhassaid.
y) Avoidmisrepresentationthroughrestatement.
z) Save unnecessary writing when ideas have been well expressed by the original author.aa)Checkforproperformontablesandgraphs.Becertainthatanytableorgraphisself-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
15) Title page
16) Tableofcontents
17) Introduction
18) Review
19) Discussion&Conclusion
20) References
21) Appendix
Generally,theintroduction,discussion,conclusionandbibliographypartshouldaccountforathirdofthepaperandthereviewpartshouldbetwothirdsofthepaper.

Discussion
The discussion section either follows the results or may alternatively be integrated inthe results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintheresearchpaper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:
i) summaryofquestionposed
j) summaryoffindings
k) summaryofmainlimitations ofthestudyathand
l) detailsofpossibilitiesforrelatedfutureresearch

References
From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions
Monographs
Crystal,D.(2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challengesto communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles
Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument]. Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,UniversityofHamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,UniversityCollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowof theidea/ideas,relevanceofmaterialused/presented,outcomesvs .objectives,presentation/vivaetc.)

In addition to term paper Students must compulsorily undergo Industrial Visit (Cluster of5-6 Industries) for One week and they will be graded on their learning outcome of the visitforonethirdcomponentofthisTermPaper& IndustryVisit.
Evaluation will be asfollows; Term Paper:
2Credit(70Marks)
IndustryVisit:1Credit(30Marks)

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
SYSTEM BIOLOGY	BTF 631	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Systems Biology
CLO 2	Metabolomics
CLO 3	Target identification

B. SYLLABUS:

ModuleI
IntroductiontoSystemsBiology
What is systems biology? Integrating Networks. Methods of study: Microarray–definition,typesofarray, micro array analysis: Hierarchical clustering,Self-organizingmaps.Applicationsof microarraysinsystembiology.

ModuleII
Metabolomics;MetabolicPathwaysDigestionofproteinsandproteinmetabolism,Transportmetabolism,Carbo hydratemetabolism–
glycolysis,TCAcycle,PPP,glycogenesis,glycogenolysis,gluconeogenesis,PPP,ETC,Translatingbiochemical pathwaysintolinearalgebra.

ModuleIII
Whole cell simulation, Principle and levels of simulation, Virtual erythrocytes, Pathological analysis,Fermentationanalysis , Fluxbalanceanalysis,Minimalgenecomplement.

ModuleIV
Relationshipanalysis,Predictingligandbindingfunction,Guiltbyassociation,UseofgeneclusterComparativ egenomeanalysis,Bindingsurfacecomparisons,Detectingprotein–proteininteraction.

ModuleV
CreativeBioinformatics,Novelusefordatabase,UseofESTdatabase–
Unigene,Genediscovery,Primerdesign,Restrictionmapping,Pharmacophorebuilding,Positionspecificcloning,S NPdatabase,
Targetidentification,Epitopeidentification

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

References

1. BioinformaticsAPractical GuidetotheAnalysisofGenesandProteins.Ed.AndreasD.Baxevanisand B.F.FrancisOuellette.JohnWiley&Sons,Inc.,Publications(ForMicroarray).
2. Shanmughavel,P.2006.TrendsinBioinformatics,PointerPublishers,Jaipur,India.
3. Theunderlyingpathwaystructureofbiochemicalreactionnetworks.ChristopherH.Schillinget.al.1998. PNAS.95:4193-8
4. Towards metabolic phenomics: Analysis of Genomics Data Using Flux Balances.ChristopherH.Schillinget.al.1999.Biotechnology.Prog.15:288-295.
5. The Minimal Gene Complement of Mycoplasma genitalium. Claire M. Fraser et. al. 1995. Science,270:397-403.
6. Molecular ClassificationofCancer:ClassDiscoveryandClasspredictionbyGeneExpressionMonitoring.GolubT R.et.al.1999..Science,286:531–537.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOCOMPUTING METHODS OF BIOINFORMATICS	BTF 632	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Molecular modeling concepts
CLO 2	Energy Minimization
CLO 3	Molecular dynamic simulation method

B. SYLLABUS:

ModuleI
Molecular modeling concepts: Coordinate system, Potential Energy Surface, Molecular graphics andsurfaces.

ModuleII
Molecular Mechanics, Empirical Force fields: expressions for stretch, bond, torsion, etc. Description ofvarious forcefields,Forcefieldparameterization.

ModuleIII
EnergyMinimization,derivativebasedmethod(SD,CG,Newton-Raphson)ApplicationsofEnergyMinimization.

ModuleIV
Molecular dynamic simulation method: simple model, continuous Potential, constraint dynamics, MD atconstanttemperatureandpressure, MonteCarloSimulation.

ModuleV
Conformationalanalysis:systematicmethodsforexploringconformationalspace,ModelBuildingApproach ,RandomSearch,GlobalEnergyminimum,Molecularfitting.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

References

1. HöltjeHans-Dieter,SipplWolfgang,RognanDidier,FolkersGerd.MolecularModeling:BasicPrinciplesandApp

lications.Publisher:NewYork,Wiley-VCH.2003.ISBN:3527305890.

2. Friesner Richard A. Computational Methods for Protein Folding:advances in Chemical PhysicsVolume120KindleEdition.Publisher:NewYork,JohnWiley&Sons.2002ISBN:0471209554
3. Leach, Andrew. Molecular Modelling: PrinciplesandApplications. Publisher:PrenticeHall. 2001.ISBN:0582239338.
4. HöltjeHans-Dieter,FolkersGerd.MolecularModeling: BasicPrinciplesandApplications(MethodsandPrinciplesinMedicinalChemistry)Vol.5.Publisher: NewYork,Wiley-VCH,1997. ISBN:3527293841.
5. McCammon Andrew J., Harvey Stephen C. Dynamics of Proteins and Nucleic AcidsPublisher:NewYork,CambridgeUniversityPress,1987.ISBN:0521356520.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
IPR AND DRUG REGULATORY ISSUES	BTF 633	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to intellectual Property Rights
CLO 2	Patent filing procedure
CLO 3	Drug Regulatory affairs and its importance.

B. SYLLABUS:

ModuleI

a) Introduction, Types of Intellectual Property Rights (Patents, Trademarks, Copyrights, GeographicalIndications Industrial Designs and Trade secrets), Patentable Subject Matter (Novelty, Non Obviousness,Utility,enablementandBestmode)

ModuleII

History of Indian Patent Protection, Rationale behind Patent System, Objectives and Advantages of PatentSystem, and future challenges. Indian Patents Act 1970, Definitions and KeyTerminology,TypesofPatentapplications,Inventionsnotpatentable(section3and4).

ModuleIII

Patent filing procedure in India (Patent Prosecution), Specifications (Provisional and Complete), Claims-types of claimsand legal importance of claims, Grant of patent, Rights of Patentee and coownersOpposition-pre-grantoppositionandpost-grantopposition,Anticipation,Infringement,CompulsoryLicensing,revocationofpatents,andpowerofController.

PatentfilingprocedureunderPCT,advantages,patentsearchandliterature

ModuleIV

a) SalientfeaturesofIndianPatents(Amendments)Act1999,2002and2005.USandEuropeanPatentSystem,
b) Background,SalientFeaturesandImpactofInternationalTreaties/Conventionslike
   i. ParisConvention,Berneconvention
   ii. WorldTradeOrganization(WTO)
   iii. WorldIntellectualPropertyOrganization(WIPO)
   iv. TradeRelatedAspectsofIntellectualPropertyRights(TRIPS)
   v. PatentCo-operationTreaty(PCT),MandridProtocol

ModuleV

DrugRegulatoryaffairsanditsimportance.

Pharmaceutical Regulatory Procedures in India: Hierarchy and working flow of FDA in India, Role ofDCGI/CDSCOindrugcontrol,DrugControlAuthorityanditsdocumentationinthestate.

National drug regulatory requirements, national drug policy, drug and cosmeticact and rules,over viewof schedule M, schedule Y, US FDA guidelines on IND, new drug approvals(NDA), ANDA

approvals,SUPACChanges, SNDA&postmarketingsurveillance.
OverviewofGMP,GLP,ISOs-Productiondesign,certification.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

SuggestedBooks:

1. DrugRegulatoryAffairsbyDr.N.S.VyawahareandSachinItkar,NiraliPrakashan.
2. PharmaceuticalRegulatoryAffairsbyC.V.S.Subrahmanyam&J.ThimmaSetty,VallabhPrakashan.
3. QualityAssuranceofPharmaceuticsVolI&IIofWHOpublications,1999.
4. GMPsbyMehra
5. HowtoPracticeGMPbyP.P.Sharma.

6. GMP ofPharmaceuticalsbyWillingandStoker.
7. GoodManufacturingPracticesfor Pharmaceuticals, S.H.Wiling,Vol.78, MarcelDecker.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS-IV	BCS-601	4:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing communication skills in global business environment.
CLO 2	Social communication skills
CLO 3	Business communication skills

B. SYLLABUS:

ModuleI:Business/TechnicalLanguageDevelopment
AdvancedGrammar:Syntax,Tenses,Voices
Advanced Vocabulary skills : Jargons, Terminology,
ColloquialismIndividualisedpronunciationpractice

ModuleII:SocialCommunication
Building relationships through
CommunicationCommunication, Culture and
ContextEntertainmentandCommunication
Informalbusiness/TechnicalCommunication

ModuleIII:BusinessCommunication
ReadingBusiness/Technicalpress
Listening
toBusiness/Technicalreports(TV,radio)ResearchingforBusi
ness /Technology

ModuleIV:Presentations Plannin
gandgettingstartedDesign and
layout of
presentationInformationPackagin
g
MakingthePresentation

ExaminationScheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage(%)	20	20	25	10	10	10	5

CAF–
CommunicationAssessmentFileGD–
GroupDiscussion
GP–GroupPresentation

- BusinessVocabularyinUse:AdvancedMascull,Cambridge
- BusinessCommunication,Raman–Prakash, Oxford
- BusinessCommunications,Rodgers,Cambridge
- WorkinginEnglish,Jones,Cambridge
- NewInternationalBusinessEnglish,Jones/Alexander,Cambridge

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness-VI (STRESS AND COPING STRATEGIES)	BTF 604	4:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Stress and its types
CLO 2	The physiology of stress Stimulus
CLO 3	Causes and symptoms, Strategiesforstressmanagement

B. SYLLABUS:

Module I:Stress Meaning& NatureCharacteristicsTypes ofstress

ModuleII:StagesandModelsofStress

Stagesofstress

ThephysiologyofstressStimulus-orientedapproach.Response-orientedapproach.

The transactional and interact ional model.Pressure – environment fit model of stress.

ModuleIII:Causesandsymptomsofstress Personal

Organizational

Environmental

ModuleIV:Consequencesofstress Effect on behaviour and personalityEffectofstressonperformance

IndividualandOrganizationalconsequenceswithspecialfocusonhealth

ModuleV:Strategiesforstressmanagement

Importance of stress managementHealthy and Unhealthy strategiesPeer group and social supportHappinessandwell-being

Module VI:End-of-SemesterAppraisal

VivabasedonpersonaljournalAssessmentofBehaviouralchangeasaresultoftrainingExitLevelRatingbySelfandObserver

Text&References:

- Blonna,Richard;CopingwithStressinaChangingWorld:Secondedition
- Pestonjee,D.M,Pareek,Udai,Agarwal Rita;StudiesinStressAnditsManagement
- Pestonjee,D.M.;StressandCoping:TheIndianExperience
- Clegg,Brian;Instant StressManagement–Bringcalmtoyourlifenow

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FRENCH-VI	FLT 601	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and expressin French vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate comprehension** of nuance between script and sound in French

B. SYLLABUS:

ModuleD:pp.157–168–

Unité12Unité12:s'évader

1. présenter,caractériser,définir
2. parlerdelivres,delectures
3. prépareretorganiserunvoyage
4. exprimerdessentimentsetdesopinions
5. téléphoner
6. faireuneréservation

Contenugrammatical:

1. propositionrelativeavecpronomrelatif"qui","que","où"-pourcaractériser
2. faire+verbe

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- lelivreàsuivre:Campus:Tome1

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GERMAN-VI	FLF 601	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	understand and give instructions
CLO 2	understand and reply to a letter
CLO 3	speak about learning languages

B. SYLLABUS:

ModuleI:Adjectiveendings
Adjectiveendingsinallthefourcasesdiscussed sofarDefiniteandindefinitearticles
Caseswithoutarticle

ModuleII:Comparativeadverbs
Comparativeadverbsasandlike

ModuleIII:Compoundwords
To learn the structure of compound words and the correct article which they takeExploringthepossibilityofcompoundwordsinGerman

ModuleIV:Infinitive sentence
Specialusageof'to'sentencescalledzu+infinitivesentences

ModuleV: Texts
ADialogue:'EinschwierigerGast'
Atext:'AbgeschlosseneVergangenheit'

Module VI:Comprehensiontexts
Readingandcomprehendingvarioustextstoconsolidatetheusageoftheconstructionslearntsofarinthissemester.

ModuleVII:PictureDescription
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;Secondly answer questions of general meaning in context to the picture and also talk about the personalexperienceswhichcometoyourminduponseeingthepicture.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,Sprachkurs Deutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant- 1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
SPANISH-VI	FLS 601	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Identify** and **express** in Spanish vocabulary and grammar norms
CLO 2	**Interpret** different types of texts as well as cultural ideas and themes.
CLO 3	**Demonstrate** comprehension of nuance between script and sound in Spanish

B. SYLLABUS:

ModuleI
Revisionoftheearliermodules

ModuleII
PresentPerfectTense

ModuleIII
Commandsofirregularverbs

ModuleIV
ExpressionswithTenerqueandHayque

ModuleV
Enlaembajada
Emergencysituationslikefire,illness,accident,theft

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- Español,EnDirectoIA
- EspañolSinFronteras

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE-VI	FLC 601	4:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .

B. SYLLABUS:

ModuleI

Drills
Dialoguepractice
Observe picture and answer the question.Pronunciationandintonation.
Characterwritingandstrokeorder.

ModuleII

Going out to see a science exhibitionGoingtothetheatre.
Train or Plane is behind schedule.IndianEconomy-ChineseEconomy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring,summer,fall,winter,fairlyhot,very cold,veryhumid,very stuffy,neitherhotnorcold,mostcomfortable,pleasant….etc.

ModuleIII

Temperature–howtosay–WhatisthetemperatureinMayhere?

- Howistheweatherinsummerinyourarea?
- Around30degrees
- Heating,air-conditioning
- IswinterisShanghaiverycold?

Talkingaboutbirthdaysandwhereyouwereborn?
The verb “shuo” (speak) saying useful phraseslike speak very well, do not speak very well, if speakslowly then understand if speak fast then don’t understand, difficult to speak, difficult to write, speak toofast,speaktooslow,listenandcanunderstand,listenandcannotunderstand…etc.
TellthefollowinginChinese–Mynameis….Iwasbornin…(year).Mybirthdayis……Todayis …(dateanddayoftheweek).Igotowork(school)everyday.Iusuallyleavehomeat.(O’clock).Intheevening, I

usually…….(do what)?At weekend,I …….OnSundays Iusually.....
Itistoday…..Itwillsoonbemyyoungersistersbirthday.Shewasbornin…..(year).Shelivesin…….
(where).Sheisworking(or studying)……where…Shelivesin.....(where.)

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- ElementaryChineseReaderPart-2,3;Lesson47-54

SEMESTERVII

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOINFORMATICS ALGORITHMS, PYTHON AND ,MATLAB	BTF 701	4:0:0	4	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Information Technology and Computer Science to develop new algorithms that can be more efficient and accurate.
CLO 2	Understand the role of Python programming language in data extraction and analysis.
CLO 3	Understand the role of MATLAB programming language in data extraction and analysis.

B. SYLLABUS:

ModuleI
Introduction to algorithms, Difference between – Biological vs Computer algorithms, Correct vs Incorrect algorithms,IterativevsRecursivealgorithms,Fastvs Slowalgorithms,TractablevsIntractableproblems.

ModuleII
Big-O notation, Br ief about the different types of algorithm design techniques (Exhaustive search, Branch-and-Boundalgorithms,Greedyalgorithm.

ModuleIII
Dynamicprogramming,Divide-and-Conqueralgorithms,MachineLearning,Randomizedalgorithms.

ModuleIV
Advanced Python testing, File Access: Printing on screen, reading data from keyboard, Opening and closing file,Readingandwritingfiles,Functions,

ModuleV
Text processing and Regular Expressions, Application of Python on machine learning, Accessing Databases, working withBiopythonmodules, NetworkProgramming, Webapplications.

ModuleVI
MATLAB: Introduction to MATLAB: Installation, Getting used to the environment, Application and usages, MATLAB - BasicSyntax, MATLAB–Commands

ModuleVII
MATLAB–Operators,MATLAB-DataImport,MATLAB-DataOutput,MATLAB–Plotting,MATLAB–Graphics.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D.Gusfield.CambridgeUniversityPress
- Bioinformatics:APracticalGuidetotheAnalysisof GenesandProteinsbyA.D.Baxevanisand B.F.F.Quellette.Wiley–interscience.

- Bioinforamtics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor LaboratoryPress.
- EssentialsofGenomicsandBioinformatics–byC.W.Sensen.JohnWileyandSons
- IntroductiontoBioinformaticsbyT.AttwoodandD.Parry-Smity.PrenticeHall
- SequenceAnalysisinMolecularBiology:TreasureTroveor TriviablPursuitbyG.VonHeijneand G.VonHeijne.AcademicPress.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
DATA MINING	BTF 702	4:0:0	4 (L: 3 , T:1)	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic of data mining and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Demonst Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI
KnowledgeDiscoveryinDatabases,Conceptofdatamining,Needofdatamining,Dataminingfunctionalities, Datagenerationandtypesofdata.

ModuleII
Concept of Data Warehouse, Data Warehouse Architecture, Online Analytical Processing (OLAP),DevelopmentofDataWarehouselifecycle.

ModuleIII
Datapreprocessing,Basicmethodsofdatacleaning,dataintegrationandTransformation,

ModuleIV
Datareduction, dataresamplingtechniques,DiscretizationandConceptHierarchyGeneration

ModuleV
Datamining Primitives, DataMiningQueryLanguage,MiningComplex Type ofdata: Multimediadatabase,MiningSpatialdatabase,Miningtextdatabase,Architectureofdataminingsystem,multidimensionaldatamining.

ModuleVI
WorkingonWEKAandKNIME softwareforclassification,regressionalgorithmsandtheirapplicationondatasciences.

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

1. Data Mining: Multimedia, Soft Computing,and Bioinformatics by Mitra, Sushmita Acharya, Tinku,JohnWiley&SonsInc
2. Bioinformatics:TheMachineLearningApproachbyPierreBaldi,SrenBrunak
3. DataMininginBioinformatics,Series:AdvancedInformationandKnowledgeProcessing,byWang,J.T.L.; Zaki,M.J.;Toivonen,H.T.T.;Shasha,D.E.(Eds.)2005,XI,340p.,Springerpublications

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
ENTERPRENEURSHIP DEVELOPMENT	BTF 703	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Entrepreneurship
CLO 2	Concepts of Formal and informal organization
CLO 3	Project Finance

B. SYLLABUS:

ModuleI

Principlesandfunctionofmanagement,Planninganddecisionmaking,Lineandstaff relationship,managementbyobjective.

ModuleII

Formalandinformalorganization, Performanceappraisal,Traininganddevelopment.

ModuleIII

Entrepreneurshipandentrepreneurialprocess,Businessplan,Formofownershipsuitableforbusiness.

ModuleIV

Entrepreneurial motivation and leadership, entrepreneurialcompetencies, entrepreneurial development programme.

ModuleV

Project Finance: Need for finance, sources of finance (BIRAC- various programs), Venture capital, Nature and Overview,Venturecapitalprocess,locatingventurecapitalists.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- EssentialsofManagement,H.Koontz,H.WeihrichandC.O'Donnell,McGraw-Hill/Irwin
- DavidHHolt,Entrepreneurship:NewVentureCreation

References:

- ThePractice ofManagement,P.Drucker,HarperBusiness

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
R PROGRAMMING	BTF 704	4:0:0	4	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of R-programming language in data extraction and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI:R
Introduction and preliminaries of R, R-packages, Basic Syntax, Data Type, Variables, Operators, numbers andvectors

ModuleII:
Objects,theirmodesandattributes,Orderedandunorderedfactors,Arraysandmatrices,Listsanddataframes,

ModuleIII:
R-ChartsandGraph:PieChart,Barchart,Histogram,LineGraph,ScatteredGraph

ModuleIV:
R-Mean,Median&Mode,R-LinearRegression,R- MultipleRegression,R-LogisticRegression,

ModuleV:
R-NormalDistribution,R-BinomialDistribution,R-PoissonRegression.

ModuleVI:
R-AnalysisofCovariance,R-TimeSeriesAnalysis,R -NonlinearLeastSquare,

ModuleVII:
R-DecisionTree,R-RandomForest,R-SurvivalAnalysis,R-ChiSquareTests

Examination Scheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE

Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- JoshuaF.WilleyandLarryAPace(2015),BeginningR,SecondAddition,Publisher(s):ApressISBN: 9781484203736

References:

- GarrettGrolemund(2014)Hands-OnProgrammingwith R,Publisher:O'ReillyMedia,Inc.ISBN:9781449359010

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Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL TRAINING EVALUATION	BTF 750	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	research institutes/R&D Labs of industries
CLO 2	biotechnological tools and procedures and their utility in commercial applications
CLO 3	Various sindustrial/Research aspects of commercialization of biotechnological systems

B. SYLLABUS:

Methodology

The students will go to various research institutes/R&D Labs of industries to learn various biotechnological toolsand procedures and their utility in commercial applications. The aim of this training is to train the students in thevariousindustrial/Researchaspectsofcommercializationofbiotechnologicalsystems.
Thestudentswillbesupervisedbytheinternalfacultyduringthetenureoftraining.
The students shall submit a dissertation on the training undertaken which shall be evaluated by the concernedinternalfaculty.TheVivaVoceshallthenbeconductedbyanexternalExaminer

ExaminationScheme:

Dissertation:	50
VivaVoce:	50
Total:	**100**

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
DATA MINING LAB	BTF 722	4:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic of data mining and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI
Using different data samples, practical experimentation with the various stages of data mining.UseofMeta-SearchEngines.
Usingdifferentdatasamples, practicalexperimentationwiththevariousstagesofdatamining.

ModuleII
UseandresultinterpretationofPratt,MEME,Miner,andMastservers.
DemonstrationoffreedataminingSoftwarelikeWEKA,Yale,TANAGRA,DB2IntelligentMiner

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOINFORMATICS ALGORITHMS, PYTHON AND MATLAB	BTF 723	4:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Python programming language in data extraction and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI

Installationandgettingusetoenvironment,AnalysisusingPYTHON:Workingwithdictionariesandtuples.Fileaccess,workingonstring,Nucleotidecount,Proteinanalysisusingpython.

ModuleII

Installation and Analysis using Matlab on Bioinformatics toolkit: MATLAB- Data Import, MATLAB - DataOutput,MATLAB–Plotting,MATLAB–Graphics.

ExaminationScheme:

IA			EE			
ClassTest (Practical Based)	**MidTerm Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
R PROGRAMMING LAB	BTF 724	4:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of R-programming language in data extraction and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI
StatisticalAnalysisusingR,Regression,Testingmethods(ZTest, FTest, TTest, ChiSquaretest)

ModuleII
R-ChartandGraphs

ExaminationScheme:

IA			EE			
Class Test(PracticalBased)	**MidTerm Viva**	**Attendance**	**MajorExperiment**	**MinorExperiment/Spotting**	**Practical Record**	**Viva**
30	15	05	20	10	10	10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-VII	AND007	4:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues and interaction with the community and impact onsociety
CLO 2	Interaction with mentor and development of Student teacher relationship and among students, enlarge social network
CLO 3	Cooperative and Communication skills and leadership qualities and Critical thinking, Confidence andEfficiency

B. SYLLABUS:

(RUSA–Govt.ofRajasthan)

Ref:27.11,AcademicCouncilofAUR

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy of giving and sharing in young people through communityparticipation, helping them to be responsible citizens and be initiators of change for a healthy society. Adailyactofgoodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus -Happinessisnotinacquiringthings,butpermanenthappinesscomesfromgiving,sharing,andcaringforsomeone.

The faculty will inspire students for Individual Social Responsibility (ISR) and willinculcate the qualitiesofcompassion,an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to beappreciated. Anaimandavisionaretobedevelopedinstudents.

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:
Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTF 730	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Developing skills regarding subjects, material source and notes.
CLO 2	Writing skills of first paper draft.
CLO 3	Knowledge regarding volumes, articles, e-book, etc.

B. SYLLABUS:

A term (or research) paper is primarily a record of intelligent reading in several sources on a particularsubject.
The students will choose the topic at the beginning of the session inconsultationwiththefacultyassigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semesterthe detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done byBoardofexaminerscomprisingofthefaculties.

GUIDELINESFORTERMPAPER

Theprocedureforwritingatermpapermayconsistsofthefollowingsteps:
19. Choosingasubject
20. Findingsourcesofmaterials
21. Collectingthenotes
22. Outliningthepaper
23. Writingthefirstdraft
24. Editing&preparingthefinalpaper

1. ChoosingaSubject
Thesubjectchosenshouldnotbetoogeneral.

2. FindingSourcesofmaterials
j) The material sources should be not more than 10 years old unlessthe nature of the paperis such thatitinvolvesexaminingolderwritingsfromahistorical pointofview.
k) Beginbymakingalistofsubject-headingsunderwhichyoumightexpectthesubjecttobelisted.
l) Thesourcescouldbebooksandmagazinesarticles,newsstories,periodicals,scientificjournalsetc.

3. Collectingthenotes
Skimthroughsources,locatingtheusefulmaterial,thenmakegoodnotesof it,includingquotesandinformationforfootnotes.
j) Getfacts,notjustopinions.Comparethefactswithauthor'sconclusion.
k) Inresearchstudies,noticethemethodsandprocedures,results&conclusions.
l) Checkcrossreferences.

4. Outliningthepaper

g) Reviewnotestofindmainsub-divisionsofthesubject.

h) Sort the collected material again under each main division to find sub-sections for outline so that itbegins to look more coherent and takes on a definite structure. If it does not, try going back andsortingagainformaindivisions,toseeifanothergeneralpatternispossible.

5. Writingthefirstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what itspurposeis. Youmayfollowthefollowing:

a) statementofpurpose

b) mainbodyofthepaper

c) statementofsummaryandconclusion

Avoidshort, bumpysentencesandlongstragglingsentenceswithmorethanonemainideas.

6. Editing&Preparingthe finalPaper

bb) Before writing a term paper, you should ensure you have a question which you attempt toanswer in your paper. This question should be kept in mind throughout the paper. Includeonly information/ details/ analyses of relevance to the question at hand. Sometimes, therelevanceofaparticularsectionmaybecleartoyoubutnottoyourreaders.Toavoidthis,ensurey oubrieflyexplaintherelevanceofeverysection.

cc)Readthepapertoensurethatthelanguageisnotawkward,andthatit"flows"properly.dd)Checkfor properspelling,phrasingandsentenceconstruction.
ee)Checkforproperformonfootnotes,quotes,andpunctuation.
ff)Checktoseethatquotationsserveoneofthefollowingpurposes:
gg)Showevidenceofwhatanauthorhassaid.hh)Avoid misrepresentationthroughrestatement.
ii)Saveunnecessarywritingwhenideashavebeenwellexpressedbytheoriginalauthor.
jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Termpapersshouldbecomposedofthefollowingsections:
22) Title page
23) Tableofcontents
24) Introduction
25) Review
26) Discussion&Conclusion
27) References
28) Appendix

Generally,theintroduction,discussion,conclusionandbibliographypartshouldaccountforathirdofthepaperandthereviewpartshouldbetwothirds ofthepaper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section.Thesectionshouldconsistofadiscussionoftheresultsofthestudyfocusingonthequestionposedintheresearchpaper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded.Thereareanumberofkeycomponentswhichshouldnotbeomitted. Theseinclude:
m) summaryofquestionposed
n) summaryoffindings
o) summaryofmainlimitationsofthestudyathand
p) detailsofpossibilitiesforrelatedfutureresearch

References

From the very beginning of a research project, you should be careful to note all details of articlesgathered.
ThebibliographyshouldcontainALLreferencesincludedinthepaper.Referencesnotincludedinthetextinany formshouldNOTbeincludedinthebibliography.
Thekeytoagoodbibliographyisconsistency.Chooseaparticularconventionandsticktothis.

Conventions

Monographs
Crystal,D. (2001),Languageandtheinternet.Cambridge:CambridgeUniversityPress.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challengesto communication in a secondlanguage.Berlin/NY:MoutondeGruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German theabbreviationusedis (Hrsg.)forHerausgeber].

EditedArticles

Schmidt, R./Shimura,A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials fromtheU.S.,Japan,China,andKorea.In:Gass,S./Neu,J.(eds.)(1996),Speechactsacrosscultures. Challengestocommunicationinasecondlanguage.Berlin/NY:MoutondeGruyter:285-316.

JournalArticles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric.Journalofconsumerresearch19, 180-197.

ElectronicBook
Chandler,D.(1994),Semioticsforbeginners[HTMLdocument].Retrieved[5.10.'01]fromtheWorldWideWeb,http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as aForeignLanguageJournal[online]1.Retrieved[12.09.'00]fromtheWorldWideWeb,http://www.gfl-journal.com/.

OtherWebsites
Verterhus,S.A.(n.y.),AnglicismsinGermancaradvertising.Theproblemofgenderassignment[HTMLdocument]. Retrieved[13.10.'01]fromtheWorldWideWeb,http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers
Takahashi, S./DuFon, M.A. (1989),Cross-linguistic influence in indirectness: The case of Englishdirectivesperformed by native Japanese speakers. Unpublished paper, Department of English as a SecondLanguage, UniversityofHawai'iatManoa,Honolulu.

UnpublishedTheses/Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritikund AblehnungimDeutschenundEnglischen.UnpublishedMAthesis,Universityof Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracyamongstadultlearnersofGermanasaforeignlanguage.UnpublishedPhDdissertation,University CollegeDublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables andgraphsnotincludedinthemaintextduetotheirsubsidiarynatureortospaceconstraintsinthemaintext.

AssessmentScheme:

ContinuousEvaluation
40%
(Basedonabstractwriting,interimdraft, generalapproach,researchorientation,readingsundertakenetc.)

FinalEvaluation
60%
(Based on the organization ofthe paper,objectives/problem profile/ issue outlining, comprehensivenessof theresearch,flowof theidea/ideas,relevanceofmaterialused/presented,outcomesvs.objectives,presentation/ vivaetc.)

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BIOJAVA	BTF 731	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	IntroductiontoBioJava
CLO 2	BasicSequenceManipulation
CLO 3	Weight Matrices and Dynamic Programming

B. SYLLABUS:

ModuleI
IntroductiontoBioJava,Installationandgettingstarted

ModuleII:BasicSequenceManipulation
WorkingwithsequencesSubSequence,Transcribe,Reverse,ChangeName,SequenceEdit,Regex,Translation,Translation:Single,Translation:SixFrames,Proteomics,AAindex
SequenceI/O Readingandwritingfiles,CreativefileparsingwithRichSeqIOListener
WriteinFasta,ReadFasta,ReadGES,GbtoFasta,ABItoSequence,SeqIO:Echo
AnnotationAnnotationsandComments,Annotations:List,Filter
Location&Feature
Locations:Point,Range,Circular,Feature,Filter,Locations:Remove

Module III:Blast&Fasta
Blast:Parser,Fasta:Parser,Blast:Extract,Blast:Echo

ModuleIV:Counts&Distribution
Count:Residues,Count:Frequency,ToDistrib,RandomSeqs,Entropy,Emissionf,CustomBioJava:Cook Book:Distribution:XML,Distribution:Gibbs,Distribution:Bayes,Distribution:Composition
WeightMatricesand DynamicProgramming
DP:WeightMatrix,DP:HMM,DP:PairWise,DP:PairWise2
UserInterface
ViewAsTree,ViewInGUI,Coordinates,Features,ProteinPeptideFeatures

ModuleV:BiosqlandDatabase
BioSQLandHibernate.,BioSQLSetupPostGre,BioSQL:SetupOracle,BioSQL:Manage
ProteinStructure
PDB:read,PDB:mutate

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- TheCompleteReferenceJAVA2:5th.ed.BySchildtHerbert

References:

- CoreJava:AdvancedFeatures,Horstmann
- JavaServletProgrammingHunterJ, Crauford
- JavaServerProgrammingJ2EEeditionAllamaraju,et.al.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
OPTIMIZATION ALGORITHM	BTF 732	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to Markov chain Monte Carlo methods
CLO 2	Linear programming
CLO 3	Contrastive divergence optimization

B. SYLLABUS:

ModuleI
MarkovchainMonteCarlomethods(MCMC)andtheirapplicationsinsequencemotifsearch

ModuleII
Incremental improvement algorithms (hill climbing,simulated annealing, genetic algorithm, gradientdescent) and their applications to travel sales person problem. Dynamic programming and itsapplicationsingraphtheoryandsequencealignment

ModuleIII
Linear programming, integer programming and its application to filtering protein contact map, NP-hardoptimizationproblems,computationallowerbounds, bigdataalgorithms

ModuleIV
Quadraticprogramming,Lagrangetheoryofconstrainedoptimizationanditsapplicationsinkernelmethods.

ModuleV
Contrastivedivergenceoptimizationanditsapplicationindeeplearningnetworks

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

- D. Williamson and D. Shmoys, The Design of Approximation Algorithms, Cambridge UniversityPress,NewYork,2011.

. Michael R. Garey and David S. Johnson, Computers and Intractability. A Guide to the Theory of NP-Completeness Freeman, 1979.

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Course Name	Course Code	LTP	Credit	Semester
BIOPERL	BTF 733	4:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Perl programming language in data extraction and analysis.
CLO 2	Perform various applications on test data developed or extracted in lab.
CLO 3	Understand the impact of data extraction in research and able to have idea to develop new tools for Bioinformatics.

B. SYLLABUS:

ModuleI
IntroductiontoBioPerl, BasicsofPackages,ModulesandWidgets, Internet-relatedLibraries

ModuleII
ModulesandUtilities,CPAN,WebProgrammingwithPerlScript.

ModuleIII
ApplicationofBioperl inBioinformatics,

ModuleIV
ManipulationofBLASToutputwithBioPerlProgramming.

ModuleV
CreatingUserInterfacewithPERL/Tk,PerlModuleExtension

ExaminationScheme:

Components	Mid Term	Attendance	Assignment/Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text&References:

Text:

- MasteringPerlforBioinformatics,JamesD.Tisdall

References:

- BeginningPerlforBioinformatics,JamesTisdall

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS-V	BCS 701	4:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Academic language proficiency
CLO 2	Development of public speaking skills, business conversations etc
CLO 3	Resume and covering letter writing skills development

B. SYLLABUS:

ModuleI
IntroductiontoPublicSpeaking,BusinessConversation,Effective PublicSpeaking,ArtofPersuasion

ModuleII:SpeakingforEmployment
Types of Interview, Styles of Interview, Facing Interviews-Fundamentals and Practice SessionConductingInterviews-
FundamentalsandPracticeSession,QuestionAnsweronVariousDimensions

ModuleIII
ResumeWriting,CoveringLetters,InterviewFollowUpLetters

ModuleIV:BasicTelephony Skills
GuidelinesforMakingaCall,GuidelinesforAnsweringaCall

ModuleV:WorkPlaceSpeaking
Negotiations,ParticipationinMeetings,KeynoteSpeeches

ExaminationScheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage(%)	20	20	25	10	10	10	5

CAF–
CommunicationAssessmentFileGD–
GroupDiscussion
GP–GroupPresentation

Text&References:

- JermyComfort,SpeakingEffectively,et.al,Cambridge
- Krishnaswamy,N,CreativeEnglishforCommunication,Macmillan
- RamanPrakash,BusinessCommunication,Oxford.
- Taylor,ConversationinPractice

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness-VII (Individual, Society and Nation)	BSS 704	4:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To develop an understanding the concept of stress its causes, symptoms and consequences.
CLO 2	To develop an understanding the consequences of the stress on one's wellness, health, and work performance.
CLO 3	

B. SYLLABUS:

ModuleI:Individualdifferences&Personality
Personality: Definition& Relevance, Importance of nature & nurture in Personality DevelopmentImportanceandRecognitionofIndividualdifferencesinPersonality,Accepting andManagingIndividualdifferences (adjustment mechanisms), Intuition, Judgment,Perception& Sensation (MBTI),BIG5 Factors

ModuleII: ManagingDiversity
DefiningDiversity,AffirmationActionandManagingDiversity
IncreasingDiversity inWorkForce,BarriersandChallengesin ManagingDiversity

ModuleIII:Socialization
NatureofSocialization,SocialInteraction,InteractionofSocialization
Process,ContributionstoSocietyandNation

Module IV:PatriotismandNationalPride
Senseofprideandpatriotism,Importanceofdisciplineandhardwork,Integrityandaccountability

ModuleV:HumanRights, Values andEthics
Meaning and Importance of human rights, Human rights awareness, Values and Ethics- Learning basedonprojectworkonScriptureslike-Ramayana,Mahabharata,Gitaetc.

Module VI:End-of-SemesterAppraisal
Viva based on personal journal, Assessment of Behavioural change as a result of training, **Exit LevelRatingbySelfandObserver**

Text&References:

- Davis,K.OrganizationalBehaviour,
- Bates,A.P.andJulian,J.:Sociology-UnderstandingSocialBehaviour
- Dressler,DavidandCans,Donald:TheStudyofHumanInteraction
- Lapiere,Richard.T–SocialChange
- Lindzey,G.andBorgatta,E:SociometricMeasurementintheHandbookofSocialPsychology,Addiso

n–Welsley,US.
- Rose,G.:OxfordTextbookofPublicHealth,Vol.4,1985.
- RobbinsO.B.Stephen;OrganizationalBehaviour

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FRENCH-VII	FLT 701	4:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French

B. SYLLABUS:

CourseContents:

ModuleA:Unités1–3:pp.06-46

Contenulexical:

Unité1:Rédigeretprésentersoncurriculumvitae
ExprimeruneopinionCaractériser,mettreenvaleur
Parlerdesrencontres,deslieux,desgens

Unité 2: Imaginer - Faire des projetsProposer-conseiller
ParlerdesqualitésetdesdéfautsFaire une demande écriteRaconter une anecdoteAméliorersonimage

Unité3: Exprimerlavolontéetl'obligationFormulerdessouhaits
Exprimerunmanque/unbesoin
Parlerdel'environnement,desanimaux,descatastrophesnaturelles

Contenugrammatical:

1. Lepassé:passécomposé/imparfait
2. Pronomscomplémentsdirects/indirects,y/en(idées/choses)
3. Propositonsrelativesintroduitesparqui,que,où
4. Comparatifetsuperlatif
5. Leconditionnelprésent
6. Situerdansletemps
7. Féminindesadjectifs
8. Laprisedeparoles:expressions
9. Lesubjonctif:volonté,obligation

ExaminationScheme:

Components	CT1	CT2	C	I	V	A

Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&Références:

- **le livreàsuivre :Campus:Tome2**

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
GERMAN-VII	FLG 701	4:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .

B. SYLLABUS:

ModuleI:Dass-Sätze
Explaintheuseoftheconjunction"-that",whereverbcomesattheendof thesentence

ModuleII:IndirekteFragesätze
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, whereagaintheverbfallsinthelastplaceinthatsentence.

ModuleIII:Wenn-Sätze
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of thesentence.

ModuleIV:Weil-Sätze
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in thesentence.

ModuleV:Comprehensiontexts
Readingandcomprehendingvarioustextstoconsolidatetheusageoftheconstructionslearntsofarinthissemester.

ModuleVI:PictureDescription
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;Secondly answer questions of general meaning in context to the picture and also talk about the personalexperienceswhichcometoyourminduponseeingthepicture.

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- WolfgangHieber,LernzielDeutsch
- Hans-HeinrichWangler,Sprachkurs Deutsch
- SchulzGriesbach,DeutscheSprachlehrefürAusländer
- P.LAneja,DeutschInteressant- 1,2&3
- Rosa-MariaDallapiazzaetal,TangramAktuellA1/1,2
- Braun,Nieder,Schmöe,DeutschalsFremdsprache1A,Grundkurs

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Course Name	Course Code	LTP	Credit	Semester
SPANISH-VII	FLS 701	4:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on Microorganisms and their use in different industries
CLO 2	Acquire industrial skills of microbial culture, growth, and practices
CLO 3	Demonstrate the advanced application of Microbes in emerging industrial sectors

B. SYLLABUS:

ModuleI
Revisionofearliersemestermodules

ModuleII
Zodiacsigns.Moreadjectives…todescribesituations,stateofminds,surroundings,peopleandplaces.

ModuleIII
Variousexpressionsusedontelephonicconversation(formalandinformal)

ModuleIV
Being abletoread newspaperheadlinesandextracts(Materialtobeprovidedbyteacher)

ModuleV
Negative commands(ARendingverbs)

ModuleVI
Revision of earlier sessions and introduction to negative ER ending commands,introduction to negativeIRendingverbs

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:

- EspañolEnDirectoIA,1B
- EspañolSinFronteras
- Materialprovidedbytheteacher fromvarioussources

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Course Name	Course Code	LTP	Credit	Semester
CHINESE-VII	FLC 701	4:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses.

B. SYLLABUS:

ModuleI
Drills
Dialoguepractice
Observe picture and answer the question.Aboutchinapart–ILesson1,2.

ModuleII
PronunciationandintonationCharacterWritingandstrokeorder.

ModuleIII
Asksomeonewhathe/sheusuallydoesonweekends?Visitingpeople,Party,Meeting,Afterwork….etc.

ModuleIV
Conversationpractice
Translation from English to Chinese and vise-versa.Shortfables.

ModuleV
A brief summary of grammar.The optative verb "yuanyi".Thepronoun"ziji".

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage(%)	20	20	20	20	15	5

C–Project+Presentation
I–Interaction/ConversationPractice

Text&References:
Kantushuohua"Part-ILesson1-7

SEMESTERVIII

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Course Name	Course Code	LTP	Credit	Semester
MAJOR PROJECT	BTF 860	4:0:0	20	8

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Research experience to a professional problem-solving activity
CLO 2	genuine exploration of the unknown
CLO 3	completion of reports

B. SYLLABUS:

GUIDELINESFORPROJECT/DISSERTATIONFILE

Research experience is as close to a professional problem-solving activity asanythingin the curriculum.It provides exposure to research methodology and an opportunity to work closely with a faculty guide. Itusually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-artinstrumentation.

Research isgenuine exploration of the unknown that leadsto newknowledge which often warrantspublication. But whether or not the results of a research project are publishable, the project should becommunicatedintheformofaresearchreportwrittenbythestudent.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initialdraftsshouldbecritiquedbythefacultyguideandcorrectedbythestudentateachstage.

TheFileistheprincipalmeansbywhichtheworkcarriedoutwillbeassessedandthereforegreatcare shouldbetakeninitspreparation.

Ingeneral,theFileshouldbecomprehensiveandinclude:

- Ashortaccountof theactivitiesthatwereundertakenaspartof theproject;
- Astatementabouttheextenttowhichtheprojecthasachieveditsstatedgoals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part oftheproject;
- Any activities planned but not yet completed as part of the project, or as a future initiative directlyresultingfromtheproject;
- Anyproblemsthathavearisenthatmaybeusefultodocumentforfuturereference.

ReportLayout

Thereportshouldcontainthefollowingcomponents:

- **TitleorCoverPage**

The title page should contain the following information: Project Title; Student's Name; Course; Year;Supervisor's Name.

- **Acknowledgements**(optional)

Acknowledgmenttoanyadvisoryorfinancialassistancereceivedinthecourseofworkmaybegiven.

- **Abstract**

A good "Abstract" should be straight to the point; nottoodescriptive butfullyinformative.Firstparagraph should state what was accomplished with regard to the objectives.The abstract doesnot haveto be an entire summary of the project, but rather a concise summary of the scope and results of theproject

- **TableofContents**

Titlesandsubtitlesaretocorrespondexactlywiththoseinthetext.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of therest of the report should be provided. The introduction should aim to catch the imagination ofthe reader,soexcessivedetailsshouldbeavoided.

- **Materials andMethods**

Thissectionshouldaimatexperimentaldesigns,materialsused.Methodologyshouldbementionedindetailsin cludingmodificationsifany.

- **ResultsandDiscussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section,emphasis should be given on what has been performed and achieved in the course of the work, rather thandiscuss in detail what is readily available in text books. Avoid abrupt changes in contents from section tosection and maintain a lucid flow throughout the thesis. An opening and closingparagraphineverychaptercouldbeincludedtoaidinsmoothflow.

Note that in writing the various secions, all figures and tables should as far as possible be next to theassociated text, in the same orientation as the main text, numbered, andgivenappropriatetitlesorcaptions. All major equations should also be numbered and unless it is really necessary never write in"point"form.

- **Conclusion**

Aconclusionshouldbethefinalsectioninwhichtheoutcomeoftheworkismentionedbriefly.

- **Futureprospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis andanyproblemthathavearisenthatmaybeusefultodocumentforfuturereference.

- **References/Bibliography**

This should include papers and books referred to in the body of the report. These should be orderedalphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if theyare,abbreviations mustcomplywithaninternationallyrecognisedsystem.

Examples

Forresearcharticle

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002)Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7.*ClinMicrobiolInfect*,**8**(suppl1):116–117.

Forbook

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium Meliloti*. SYMBIOTIC NITROGENFIXATIONPLANTS(editorP.S.NutmanIBP),**7**:63-67

ASSESSMENTOFTHEPROJECT/DISSERTATIONFILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical meritoftheprojectandtheprojectexecution.

Technicalmeritattempts toassess thequalityanddepthoftheintellectualeffortsputintotheproject.Projectexecutionisconcernedwithassessing howmuchworkhasbeenputin.

TheFileshouldfulfillthefollowing***assessmentobjectives:***

Range of Research Methods used to obtain informationExecutionofResearch

DataAnalysis

AnalyseQuantitative/QualitativeinformationC ontrolQuality

DrawConclusions

ExaminationScheme:

Dissertation	50
VivaVoce	50
Total	**100**

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY

Bachelor of Technology (Food Technology)

Programme Code: 12126 (BTD)

Duration – 4 Year Full Time

Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2021 Batch

PROGRAMME LEARNING OUTCOMES

1. Graduates will be trained in soft skills and business communication to maintain good professional and personal relationship.
2. Graduates will have laboratory technical skills to measure, control and modify chemical and physical properties of foods and processed food products and ensure the quality and safety of food products.
3. Graduates will be able to understand biochemical processes during post-harvest storage of food materials. They will also be able to develop new food products e.g. nutraceuticals.
4. Graduates will understand engineering principles of unit operations and unit processes. They will be able to transform raw materials into food products/ processed food products for value addition.
5. Graduates will be able to understand processing, packaging and product technology for fruits, vegetables, dairy, meat, sea-foods (fish and prawns) and cereals as also of fermented food products.

Credit Summary Sheet

B. Tech Food Technology						
Semester	**CC**	**DE**	**VA**	**NTCC**	**OE**	**Total**
1	16	3	4	2	-	25
2	16	3	4	2	3	28
3	17	3	4	2	3	29
4	18	3	4	2	3	30
5	18	3	4	2	3	30
6	18	3	4	2	3	30
7	24	3	4	2	-	33
8	20	-	-	-	-	20
Total	147	21	**28**	**14**	**15**	**225**

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AMITY INSTITUTE OF BIOTECHNOLOGY

Minor Track: Food Processing

Course Code		Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
BTD233		Confectionary and Sugar Technology	DE	3	-	-	3
BTD 301		Principles of Food Processing	CC	3	-	-	3
BTD432		Enzymes in Food Processing	DE	3	-	-	3
BTD 501		Food Quality-Analysis & Assurance	CC	3	-	-	3
BTD631		Advanced food technology	DE	3	-	-	3
	TOTAL						15

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Programme Structure

B. Tech. Food Technology: I- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD101	Applied Mathematics - I	CC	3	1	-	4
BTD102	Applied Physics - I	CC	2	-	-	2
BTD103	Applied Chemistry - I	CC	2	-	-	2
BTD104	Introduction to Computers	CC	2	-	-	2
BTD105	Life Sciences	CC	2	-	-	2
BTD122	Applied Physics - I -Lab	CC	-	-	2	1
BTD123	Applied Chemistry - I-Lab	CC	-	-	2	1
BTD124	Introduction to Computers-Lab	CC	-	-	2	1
BTD125	Engineering Graphics-Lab	CC	-	-	2	1
DE Electives: Student must select 1 course from the list of following DE electives						
BTD130	Term Paper	DE	3	-	-	3
BTD131	Biomolecules: Structure and Function	DE				
BTD132	Basics in Plant Biotechnology	DE				
BTD133	Basics in Food Technology and Post-Harvest Management	DE				
BCS 101	English	VA	1	-	-	1
AND001	ANANDAM-I	NTCC	-	-	-	2
BSS 104	Behavioral Science I (Self Development and Interpersonal Skills)	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**25**

B.Tech Food Technology: II- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD201	Applied Mathematics - II	CC	3	1	-	4
BTD202	Applied Physics - II	CC	2	-	-	2
BTD203	Applied Chemistry - II	CC	2	-	-	2
BTD204	Object Oriented Programming in C++	CC	2	-	-	2
BTD 205	Thermodynamics	CC	3	-	-	3
BTD222	Applied Physics - II -lab	CC	-	-	2	1
BTD223	Applied Chemistry - II-lab	CC	-	-	2	1
BTD224	Object Oriented Programming in C++ -lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD230	Term Paper	DE	3	-	-	3
BTD231	Specialty Foods	DE				
BTD232	Plant Resource Utilization	DE				
BTD233	Confectionary and Sugar Technology	DE				
OE	Open Elective-I	OE	3	-	-	3
BCS 201	English	VA	1	-	-	1
AND002	ANANDAM-II	NTCC	-	-	-	2
BSS 204	Behavioral Science – II (Problem Solving and Creative Thinking	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**28**

B.Tech Food Technology: III- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD 301	Principles of Food Processing	CC	3	1	-	4
BTD 302	General Biochemistry	CC	3	-	-	3
BTD 303	General & Applied Microbiology	CC	3	1	-	4
BTD 322	General Biochemistry –Lab	CC	-	-	2	1
BTD 323	General & Applied Microbiology -Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD330	Term Paper	DE	3	-	-	3
BTD331	Food Rheology & Texture	DE				
BTD332	Industrial Crops	DE				
BTD333	Nanotechnology and its application in Food	DE				
OE	Open Elective-III	OE	3	-	-	3
EVS001	Environmental Sciences	CC	4	-	-	4
BCS 301	Communication Skills – I	VA	1	-	-	1
AND003	ANANDAM-III	NTCC	-	-	-	2
BSS 304	Behavioral Science III (Interpersonal Communication)	VA	1	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**29**

B.Tech Food Technology: IV- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD 401	Food Chemistry	CC	3	-	-	3
BTD 402	Food Microbiology	CC	3	-	-	3
BTD 403	Principles of Heat & Mass Transfer	CC	3	1	-	4
BTD 404	Mechanics of Fluids	CC	3	1	-	4
BTD 421	Food Chemistry -Lab	CC	-	-	2	1
BTD 422	Food Microbiology-Lab	CC	-	-	2	1
BTD 423	Principles of Heat & Mass Transfer-Lab	CC	-	-	2	1
BTD 424	Mechanics of Fluids-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD430	Term Paper	DE	3	-	-	3
BTD431	Computer simulation & modeling in food processing	DE				
BTD432	Enzymes in Food Processing	DE				
BTD433	Marketing Management for food	DE				
OE	Open Elective-IV	OE	3			3
BCS 401	Communication Skills – II	VA	1	-	-	1
AND004	ANANDAM-IV	NTCC	-	-	-	2
BSS 404	Behavioral Science-IV (Relationship Management)	VA	1	-	-	1
FLT 401 FLG 401 FLS 401 FLC 401	Foreign Language - IV French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

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B. Tech Food Technology: V- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD 501	Food Quality- Analysis & Assurance	CC	2	-	-	2
BTD 502	Processing of Fruits & Vegetables	CC	3	-	-	3
BTD 503	Processing of Milk & Milk Products	CC	3	-	-	3
BTD 504	Food Engineering - I	CC	3	-	-	3
BTD 505	Statistics for Biology	CC	3	-	-	3
BTD 521	Food Quality- Analysis & Assurance -Lab	CC	-	-	2	1
BTD 522	Processing of Fruits & Vegetables -Lab	CC	-	-	2	1
BTD 523	Processing of Milk & Milk Products -Lab	CC	-	-	2	1
BTD 524	Food Engineering - I –Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD530	Term Paper	DE	3	-	-	3
BTD531	Refrigeration & Air Conditioning	DE				
BTD532	Malting & Brewing Technology	DE				
BTD533	Infestation Control and Grain Storage	DE				
BTD534	Scientific Writing	DE				
OE	Open Elective-V	OE	3			3
BCS 501	Communication Skills – III	VA	1	-	-	1
AND005	ANANDAM-V	NTCC	-	-	-	2
BSS 504	Behavioral Science – V (Group Dynamics & Team Building)	VA	1	-	-	1
FLT 501	Foreign Language - V	VA	2	-	-	2

FLG 501 FLS 501 FLC 501	French German Spanish Chinese					
	TOTAL					**30**

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B. Tech Food Technology: VI- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD 601	Food Engineering - II	CC	3	1	-	4
BTD 602	Processing of Cereals, Pulses & Oilseeds	CC	3	-	-	3
BTD 603	Processing of Meat, Fish & Poultry Products	CC	3	-	-	3
BTD 604	Food Additives	CC	2	-	-	2
BTD 605	Food Plant Sanitation	CC	2	-	-	2
BTD 621	Food Engineering – II -Lab	CC	-	-	2	1
BTD 622	Processing of Cereals, Pulses & Oilseeds-Lab	CC	-	-	2	1
BTD 623	Processing of Meat, Fish & Poultry Products-Lab	CC	-	-	2	1
BTD 624	Food Additives-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD630	Term Paper & Industry Visit	DE	3	-	-	3
BTD631	Advance Food Technology	DE				
BTD632	Engineering Properties of Food Materials	DE				
BTD633	Food Product Development	DE				
OE	Open Elective-VI	OE	3			3
BCS 601	Communication Skills – IV	VA	1	-	-	1
AND006	ANANDAM-VI	NTCC	-	-	-	2
BSS 604	Behavioral Science-VI (Stress and Coping Strategies)	VA	1	-	-	1
FLT 601 FLG 601	Foreign Language - VI French German	VA	2	-	-	2

FLS 601 FLC 601	Spanish Chinese					
	TOTAL					**30**

Note: After completion of the End Term Examination the students must compulsorily undergo Industrial Training of 1 month. The evaluation of this training would be carried out in VII sem.

For domain elective: BTD630- Term Paper & Industry Visit: In addition to term paper Students must compulsorily undergo Industrial Visit (Cluster of 5-6 Industries) for One week and they will be graded on their learning outcome of the visit for one third component of this Term Paper & Industry Visit.

Evaluation will be as follows;

Term Paper: 2 Credit (70 Marks)

Industry Visit: 1 Credit (30 Marks)

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B. Tech Food Technology: VII- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD 701	Principles of Food Biotechnology	CC	2	1	-	3
BTD 702	Packaging of Food Products	CC	2	1	-	3
BTD 703	Principles of Human Nutrition	CC	2	1	-	3
BTD 704	Technology of Spices, Plantation Crops & Flavors	CC	4	-	-	4
BTD 705	Food Equipment and Plant Design	CC	3	1	-	4
BTD750	Industrial Training Evaluation	CC	-	-	-	3
BTD 721	Principles of Food Biotechnology -Lab	CC	-	-	2	1
BTD 722	Packaging of Food Products-Lab	CC	-	-	2	1
BTD 723	Principles of Human Nutrition-Lab	CC	-	-	2	1
BTD 724	Technology of Spices, Plantation Crops & Flavors-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTD730	Term Paper	DE	3	-	-	3
BTD731	Food Adulteration	DE				
BTD732	Management of Food Industry Waste	DE				
BTD733	Food Beverages	DE				
BCS 701	Communication Skills – V	VA	1	-	-	1
AND007	ANANDAM-VII	NTCC	-	-	-	2
BSS 704	Behavioral Science-VII (Individual, Society and Nation)	VA	1	-	-	1

FLN701 FLG 701 FLS 701 FLC 701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**33**

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B.Tech Food Technology : VIII- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
BTD860	Major Project/Dissertation	CC	-	-	-	20
	TOTAL					**20**

Course Name	Course Code	LTP	Credit	Semester
APPLIED MATHEMATICS – I	BTD101	3:1:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Apply Leibnitz's theorem, Taylor's theorem and mean value theorems
CLO 2	Find Asymptotes & curvature, tangents & normals, maxima & minima and approximate calculation of a function.
CLO 3	Differentiate the implicit function, partial derivatives of multi-variable functions and differentiation under integration sign.
CLO 4	Find the length, area, volumes and solid of revolution using integration
CLO 5	Solve the improper integrals and multiple integrals
CLO 6	Recognize and solve the ordinary differential equations

B. SYLLABUS

Module I:- Differential Calculus

Derivative of a function, Derivatives at a point, Fundamental rules for differentiation: Product Rule, Quotient Rule and Chain Rule, Differentiation of Implicit Functions, Parametric forms and Logarithmic Differentiation, Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's and Maclaurin's Theorem, Asymptote & Curvature, Partial Differentiation, Euler's Theorem, Maxima and Minima

Module II:- Integral Calculus

Fundamental Integral Formulae, Methods of Integration: Integration by Substitution, By Parts, Partial Fractions, Definite Integral and its Properties, Reduction Formulae, Application to length, Area and Volume.

Module III:- Ordinary Differential Equations

Definition of Order and Degree of differential equation, Formation of ODEs, Solution of Differential Equation of 1st Order and 1st Degree: Variable Separation, Homogeneous Differential Equations, Linear Differential Equations, Exact Differential Equations, General Linear ODE of Second Order, Solution of Homogeneous Equation, Solution of Simple Simultaneous ODE

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Narayan, S. (2005). Differential Calculus. S. Chand, 30th Revised edition.
2. Narayan, S. (2005). Integral Calculus, S. Chand, New Delhi.
3. Forsyth, A. R. (2013). A Treatise on Differential Equations, BoD–Books on Demand.
4. Dass, H. K. (2008). Advanced Engineering Mathematics, S. Chand, New Delhi.

Course Name	Course Code	LTP	Credit	Semester
APPLIED PHYSICS - I	BTD102	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an understanding of the various concepts of vector analysis and of electrostatics.
CLO 2	Solve simple problems on vector analysis and Gauss' law
CLO 3	Define space and time and understand the variations in other related fundamental quantities such as mass, velocity and force.
CLO 4	Solve simple problems related to the above concepts on relativity.
CLO 5	Define and understand the various terms and principles involved in SHM.
CLO 6	Solve numerical problems on the concept of SHM
CLO 7	Explain and interpret the wave nature of light.
CLO 8	Solve simple problems on the applications of wave nature of light.
CLO 9	Laboratory Work: The student will develop good experimental technique, including proper setup and care of equipment, conducting experiments and analyzing results in order to observe physical phenomena, assess experimental uncertainty, and make meaningful comparisons between experiment and theory

B. SYLLABUS

Module I: Electrostatics
Brief introduction of Vectors, gradient of a scalar field, divergence and curl of vector field, Electric flux, Gauss's law, Statements of Gauss divergence and Stokes theorem

Module II: Relativity
Michelson-Morley experiment, Inertial & non-inertial frames, Special theory of Relativity, Relativistic space-time transformation, Transformation of velocity, Variation of mass with velocity, Mass-energy equivalence

Module III: Oscillations & Waves
Simple harmonic motion – equation and energy conservation, superposition of two SHMs, Lissajous figures, damped and forced oscillations – equations, amplitude and frequency response, LCR Circuit, resonance, sharpness of resonance, equation of motion for plane progressive waves, superposition of waves

Module IV: Wave Nature of Light
Interference: Conditions of interference, division of wavefront, Fresnel's biprism, division of amplitude, interference due to thin films, Newton's rings
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, Transmission grating and its resolving power.

Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. French, A. P. (1971). Vibrations and Waves, CRC press.
2. William, C., William, C., Elmore., & Mark, A. (1969). Physics of Waves. Courier Corporation Elmore, Heald.
3. Griffiths, D. J., Jackson, J. D., & Jackson, J. D. (1962). Introduction to Electrodynamics, Vol. 3, New York etc, Wiley.
4. Ghatak, A. K., & Thyagarajan K. (1989). Optical Electronics, Cambridge University Press..

Course Name	Course Code	LTP	Credit	Semester
APPLIED CHEMISTRY- I	BTD103	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	**Investigate:** the types of bonds present between molecules, their interaction with each other, their solubility, polarity and structure and orientation in space
CLO 2	**Understand:** the working of engines, its efficiency and basic concepts of thermodynamic processes
CLO 3	**Understanding** molecular geometry also helps scientist to understand the shapes of more complex molecules such as proteins and DNA. The shapes of these molecules play incredibly important roles in determining the jobs performed by these molecules in our bodies
CLO 4	**Create:** the structure of the organic compounds by predicting their UV-, IR- & NMR Spectra
CLO 5	**Recognize & Predict:** the structure and reactivity of the following classes of biologically important organic molecules: carbohydrates, amino acids, proteins, and lipids
CLO 6	**Apply:** Spectroscopic techniques basically used for the structure elucidation and their applications in various industries, a working knowledge of ultraviolet-visible (UV-Vis) spectroscopy, infrared (IR) spectroscopy and nuclear magnetic resonance (NMR) spectroscopy, the equilibrium concept, types of acids, bases, acidity and basicity, in which direction reaction will move, effect of temperature and pressure on the reaction
CLO 7	**Develop:** Mechanisms that give rise to the infrared absorption bands and identify to which functional groups each correspond
CLO 8	**Demonstrate** the mechanism of the reaction and the effect of temperature and pressure

B. SYLLABUS

Module I: Chemical Bonding

Types of bonds: Ionic, Covalent and Co-ordinate bond; Fajan's rule; Hybridisation; H-bonding; Valence bond and Molecular orbital theory for diatomic molecule.

Module II: Organic Mechanism

Electronegativity and dipole moment; Electron Displacement Effects: Inductive Effect; Mesomeric Effect; Electromeric Effects; Fission of covalent bonds; Intermediates of Organic reactions; Carbonium, Carbanion, Free Radical and Carbene; Types of organic reactions; Substitution, Elimination, Addition.

Module III: Instrumental method for Analysis

Introduction; Principles of spectroscopy; Laws of Absorbance; IR: Principal Instrumentation; Application; UV: Principle, Instrumentation and Application; NMR Principle and Instrumentation; Application; Chromatography; GC: Principle, Instrumentation and Application; HPLC: Principle, Instrumentation and Application.

Module IV: Thermodynamics

Introduction; Terminology; First Law; Heat Capacity; Calculation of thermodynamic quantities; Adiabatic and Isothermal Process; Reversible and Irreversible Process; Second law of Thermodynamics; Standard State; Gilbb's Helmholtz equation; VantHoff Isotherm and Isochore; Maxwell Relation; Third law of Thermodynamics; Chemical Potential; Activity and Activity Coefficient; Coupled Reactions.

Module V: Chemical Equilibrium

Introduction; Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; Acid-Base Concept; Weak acid and Weak base and their salts; Solubility Product; pH and pOH, Buffer Solution, Buffer Action.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Jain, P. C., & Jain M. (1998). Engineering Chemistry.
2. Chawla S. (2002). A Text book of Engineering Chemistry, Dhanpat Rai and Co.(Pvt.) Ltd., Educational and Technical Publishers, Delhi.
3. Morrison, R. T., & Boyd, R. N. (1992). Organic Chemistry, 6th.
4. Puri, B. R., Sharma, L. R., & Pathania S. M. (1993). Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., New Delhi.
5. Finar, I. L. (1973). Organic Chemistry, Vol. 1.

Course Name	Course Code	LTP	Credit	Semester
INTRODUCTION TO COMPUTERS	BTD: 104	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate working of various components and applications of computer.
CLO 2	Apply the principles of procedure-oriented programming for various fields.
CLO 3	Create computer programs for various applications using C language.

B. SYLLABUS

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Precedence of Arithmetic operators, Operator precedence of Arithmetic Operators, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types(automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structures and Unions. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Kanetkar, Y. (2001). Let us C, BPB Publications, 2nd Edition.
2. Balagurusamy, E. (2004). Programming in ANSI C, Tata McGraw-Hill Education.
3. Herbert, S. (2002). The Complete Reference, Osbourne Mcgraw Hill, 4th Edition.
4. Raja Raman V. (1995). Computer Programming in C , Prentice Hall of India.

Course Name	Course Code	LTP	Credit	Semester
LIFE SCIENCES	BTD: 105	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop foundational knowledge of life sciences.
CLO 2	Critically evaluate the current scientific findings and correlate it to the theoretical knowledge base.
CLO 3	Identify scientific problems and formulate solutions by taking into account relevant facts.
CLO4	Apply theoretical knowledge in practical application.

B. SYLLABUS

Module I: Cell Biology

Introduction to cell biology, Organization of cell (Inorganic-Water and Ions; Organic-Proteins, Lipids and Carbohydrates constituents), Physical structure of the cell-Brief introduction to the Cell Membrane, Cytoplasm and its Organelles (Nucleus, Mitochondria, Golgi, Endoplasmic Reticulum, Lysosomes, Peroxisomes, Ribosomes, Chloroplasts)
Cell cycle.

Module II: Introduction to Cell Physiology

Transport of substances through the cell membrane- Osmosis, Diffusion and its types, Active transport (Sodium-potassium pump) and Passive transport
Membrane potential, Measuring Membrane Potential, Action Potential
Electrocardiogram (ECG)
Electromyography (EMG)
Electroencephalography (EEG)

Module III: Environmental Biotechnology

Biosensors, Biochips and Biofilms
GMO's and Biofertilizers
Biofuels
Gene Therapy, Stem cell and Nanobiomolecules
Bio Informatics- Introduction and Applications

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Sodhi, G. S. (2005). Fundamental Concepts of Environmental Chemistry, Alpha Science Int'l Ltd.
2. Sharma, B. K., & Kaur, H. (2001). An Introduction to Environmental Pollution, Krishna prakashan media (p) Ltd.
3. Berg, J. M., Tymoczko, J. L., & Stryer L. (2011). Biochemistry, WH Freeman and Co., New York.
4. Lodish, H. (2008). Molecular Cell Biology by. Macmillan, (2008).

Course Name	Course Code	LTP	Credit	Semester
APPLIED PHYSICS – I-Lab	BTD: 122	0:0:2	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Define the quantities related to electrostatics and electromagnetism
CLO 2	Impart knowledge of oscillation and waves in a broader context.
CLO 3	Understand some of the applications of wave nature of light.

B. SYLLABUS

1. To determine the wavelength of sodium light by Newtons's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Grif/fth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

SUGGESTED READINGS

- Griffiths, D. J., Jackson, J. D., & Jackson, J. D. (1962). Introduction to Electrodynamics, Vol. 3, New York etc, Wiley.
- Ghatak, A. K., & Thyagarajan K. (1989). Optical Electronics, Cambridge University Press..

Course Name	Course Code	LTP	Credit	Semester
APPLIED CHEMISTRY – I -Lab	BTD: 123	0:0:2	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Find out the pH of different solutions and analytical studies through titration
CLO 2	Able the studies of absorption and surface tension in different solvents
CLO 3	Find out the conductivity in different ions containing solutions
CLO 4	Analysis of elements
CLO 5	Separate the dyes through chromatography

B. LIST OF PRACTICALS

1. Titration of phosphoric acid and sodium hydroxide solution using pH meter.
2. Verification and application of Beer's Law.
3. Spectroscopic analysis of iron in water sample.
4. Conductometric titration.
5. Determination of water modules of crystallization in Mohr's salt.
6. (A) Determination of surface Tension of liquid.
7. (B) Application of surface tension method in mixture analysis.
8. Application of distribution law in the determination of equilibrium constant.
9. Analysis of iron ore.
10. Plant pigments separation by paper chromatography.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

Course Name	Course Code	LTP	Credit	Semester
INTRODUCTION TO COMPUTERS -Lab	BTD: 124	0:0:2	1	1

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate working of various components and applications of computer
CLO 2	Apply the principles of procedure-oriented programming for various fields
CLO 3	Create computer programs for various applications using C language

B. LIST OF PRACTICALS

Module I
DOS commands

Module II
Creation of batch files

Module III
C program involving problems like finding the nth value of cosine series, Fibonacci series etc.

Module IV
C programs including user defined function calls

Module V
C programs involving pointers and solving various problems with the help of those.

Module VI
File handling

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

Course Name	Course Code	LTP	Credit	Semester
ENGINEERING GRAPHICS -Lab	BTD: 125	0:0:2	1	1

B. LIST OF PRACTICALS

Module I: General

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface

Development of simple objects with and without sectioning. Isometric Projection

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

SUGGESTED READING

1. Engineering drawing by Shah, Mahendrakumar Budhichand, and Bachubhai Chhibubhai Rana Pearson Education India, (2009).
2. Geometric Dimensioning & Tolerancing by Gill, Pritam Singh. . Seagull Books Pvt Ltd, (2009).
3. Engineering Drawing by Bhatt, N. D. Engineer 4 (1980).

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTD: 130	3:0:0	3	1

B. GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

b) Begin by making a list of subject-headings under which you might expect the subject to be listed.

c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.

b) In research studies, notice the methods and procedures, results & conclusions.

c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.

b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Course Name	Course Code	LTP	Credit	Semester
BIOMOLECULES: STRUCTURE AND FUNCTION	BTD: 131	3:0:0	3	1

B. SYLLABUS

Module I

Carbohydrates: Chemical structures, nature, properties of carbohydrates, requirements of carbohydrates, importance of carbohydrates in biological system.

Module II

Proteins and Amino acids: Proteins structures and classification, Zwitterion's nature, solubility, primary, secondary and tertiary structure, essential and non-essential amino acids and their importance.

Module III

Enzymes: Classification, Characteristics. Factors affecting enzyme activity. Enzyme kinetics, activation and inhibition. Non- protein enzymes, application of enzymes in biological systems.

Module IV

Lipids: Structure, Classification, Properties and Function of lipids, role of lipids in food processing, fats and oils their properties

Module V

Bioenergetics: Thermodynamic System, I and II law of Thermodynamics. Free energy, standard free energy change. Redox potential. High energy Phosphate compounds. Free energy of Hydrolysis of ATP, and sugar phosphates

C. SUGGESTED READING

1. Granner, D. K., Murray, R. K., Mayes, P. A., & Rodwell, V. W. (1988). Harper's Biochemistry (Vol. 21). Appleton & Lange.
2. Stryer, L. (2006). Biochemistry by, Publisher Freeman and Company, 3rd Edition.
3. Cooper, T.G. (2007). Tools of Biochemistry by Publisher John Wiley and Sons Inc, 3rd edition.
4. Thomas F. (1995). Cellular Biophysics I & II. Weiss publisher , MIT Press, 2nd edition.
5. Segal, I.H. (2001). Biochemical calculations by Publisher John Wiley and Sons, 3rd edition (2001)
6. Lehninger, A.L. Nelson, D.L. Cox, M.M (2008). Principles of Biochemistry, Worth Publishing, 3rd edition.

Course Name	Course Code	LTP	Credit	Semester
BASICS IN PLANT BIOTECHNOLOGY	BTD 132	3:0:0	3	1

B. SYLLABUS

Module I

Plant Tissue Culture applications – micropropagation, from Callus to plant, somatic embryogenesis, somaclonal variation, valuable germplasm, chemicals from plants, genetically engineered plants.

Module II

Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance, plants as bioreactors.

Module III

Genetic modification in Agriculture – transgenic plants, genetically modified foods, application, future applications, ecological impact of transgenic plants, ethical issues related to GM crops.

Module IV

Genetically modified foods – organic foods, types of organic foods, identifying organic foods, organic food & preservatives.

Module V

Genetic modification in Food industry – background, history, controversies over risks, application, future applications.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

- Razdan, M.K. (2010). An Introduction to Plant Tissue Culture by Oxford and IBH Publishing 3rd edition.
- Dodds, J.H. & Roberts, L.K. (2006). Experiments in Plant Tissue Culture by publisher Cambridge University Press, 3rd edition.
- Caldenty, K.M.O. Barz, W.H. (2001). Plant Biotechnology and Transgenic Plants Wills, Marcel Dekker, 2nd edition.
- Plant Biotechnology by J. Hammond, P.McGarvy and V. Yusibov publisher Springer Verlag, 3rd edition (2010)
- Fu, T-J., Singh, J and Curtis, W.R. (2008). Plant Cell & Tissue Culture for the Production of Food Ingredients publisher Kluwer Adacemic/Plenum Press 4th edition.

Course Name	Course Code	LTP	Credit	Semester
BASICS IN POST HARVEST MANAGEMENT AND FOOD TECHNOLOGY	BTD 133	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Having in depth knowledge of post-harvest physiology and processing of agricultural crops and agricultural waste management
CLO 2	able to understand the status, scope and challenges of food industry.
CLO 3	Able to know the principles of food processing and preservation to increase the self-life of food products and enhancing the quality and safety characteristics.

B. SYLLABUS

Module I: Post Harvest
Introduction to Post-harvest technology: Importance of post-harvest management of food, post-harvest management of fruits and vegetables, cereals, and other agricultural produces

Module II: Post-harvest changes
Causes of post-harvest losses; Maturity, ripening and biochemical changes after harvesting in fruits and vegetables, climacteric and non-climacteric fruits and their post-harvest handling.

Module III: Reduction of post-harvest losses
Post-harvest loss reduction technology including aspects of packaging, storage, post-harvest treatment. MAP, CAS of food commodities.

Module IV: Basics in Food Technology
Introduction to food science and technology, Historical evolution of food processing technology, General principles, and methods of food processing

Module V: Food preservation
General introduction to food preservation, principles, and methods of food preservation

SUGGESTED READING

- Verma, L. R., & Joshi, V. K. (Eds.). (2000). Postharvest technology of fruits and vegetables: handling, processing, fermentation, and waste management(Vol. 2). Indus Publishing.
- Goel, A.K & Kumar, R. (2007).Post harvest management and value addition by Daya Publishing House 2th edition.
- Kader, A. A. (2002). Postharvest technology of horticultural crops (Vol. 3311). UCANR Publications., 2nd edition.
- Lal, G., Siddappa, G. S., & Tandon, G. L. (2000). Preservation of fruits and vegetables. ICAR, 6th Edition

Course Name	Course Code	LTP	Credit	Semester
ENGLISH	BCS 101	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems
All the Worlds a Stage

SUGGESTED READING

1. Madhulika Jha, Echoes, Orient Long Man
2. Ramon & Prakash, Business Communication, Oxford.
3. Sydney Greenbaum Oxford English Grammar, Oxford.
4. Successful Communications, Malra Treece (Allyn and Bacon)
5. Effective Technical Communication, M. Ashraf Rizvi.

Course Name	Course Code	LTP	Credit	Semester
BEHAVIOURAL SCIENCE – I (UNDERSTANDING SELF FOR EFFECTIVENESS)	**BSS104**	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate awareness of self and the process of self-exploration.
CLO 2	Demonstrate knowledge of strategies for developing a healthy self-esteem.
CLO 3	Recognize the importance of attitudes and its effect on personality.
CLO4	Identify the difference between healthy and unhealthy expression of emotions and develop emotional competence necessary for personal and professional life.

B. SYLLABUS

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P-** Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

1. Organizational Behaviour, Davis, K.
2. Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
3. Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
4. Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
5. Dressler, David and Cans, Donald: The Study of Human Interaction
6. Lapiere, Richard. T – Social Change
7. Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
8. Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
9. LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
10. J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
11. Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Course Name	Course Code	LTP	Credit	Semester
French	FLT 101/111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2

Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1: Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps

1. dire la date et l'heure

Contenu grammatical:

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)

   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READING

1. le livre à suivre : Campus: Tome 1

Course Name	Course Code	LTP	Credit	Semester
German	FLG 101/111	1:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I: Introduction

Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel

To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics

Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles

The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions

To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.; The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.; "Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READING

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS 101/111	1:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to 'Saludos' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb llamarse and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to SER and ESTAR (both of which mean To Be).Revision of 'Saludos' and 'Llamarse'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of Ser and Estar.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Español, En Directo I A
2. Español Sin Fronteras

Course Name	Course Code	LTP	Credit	Semester
FOREIGN LANGUAGE CHINESE	FLC- 101/111	1:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self-introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self-introduction, family description etc.

B. SYLLABUS

Module I

Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II

Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III

Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV

Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".

How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V

Family structure and Relations. Use of "you" – "mei you". Measure words, Days and Weekdays. Numbers.
Maps, different languages and Countries.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

"Elementary Chinese Reader Part I" Lesson 1-10

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND001	1:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

AMITY INSTITUTE OF BIOTECHNOLOGY

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Course Name	Course Code	LTP	Credit	Semester
APPLIED MATHEMATICS – II	BTD: 202	1:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	demonstrate basic knowledge of Quantum theory and apply it to other phenomenon as observed in sub-atomic Physics
CLO 2	solve simple problems in Quantum Theory.
CLO 3	identify and analyse the various spectra as observed during electronic transitions
CLO4	analyse the way nature has endowed properties to materials

B. SYLLABUS

Module I: Linear Algebra

Definition of a Matrix, Operations on Matrices Determinants, Elementary Operations, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination and Gauss Jordan – Method, Eigen values and Eigen Vectors of Matrix, Caley-Hamilton theorem, Diagonalization of a matrix.

Module II: Complex Number

Definition of Complex Number, Equality, Conjugate and Modulus of a Complex Number, Polar form of a Complex Number, De-Moivre's Theorem, Roots of a Complex Number, Exponential and Circular function of a Complex Number, Hyperbolic Functions and their inverses.

Module III: Vector Calculus

Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plain (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof)

Module IV: Probability and Statistics

Frequency Distribution, Arithmetic Mean, Median, Partition Values, Mode, Variance and Standard Deviation, Curve Fitting, Principle of least squares, Linear regression.

Introduction to Probability, Addition and Multiplication theorem of Probability, Random variables and Probability Distribution,Expected values, Binomial distribution, Poisson distribution and Normal.

Distribution and their Applications.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Dass, H.K. (2011). Higher Engineering Mathematics, S. Chand, Delhi.
2. Mishra, S. (2013). Fundamentals of Mathematics Funcations a: Functions and Graphs. Pearson Education, First ed.

Course Name	Course Code	LTP	Credit	Semester
APPLIED PHYSICS - II	BTD: 201	1:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Solve system of linear equations; be familiar with the definition and properties of matrix; find the eigenvalues and eigenvectors of a square matrix.
CLO 2	Investigate the properties of vectors and study their differentiation and integration properties.
CLO 3	Calculate the measure of central tendency and doing curve fitting.
CLO4	Develop knowledge of basic discrete and continuous distributions (Binomial, Poisson, Normal) and how to work with them.
CLO5	Apply the method to use complex numbers and complex valued functions and hyperbolic functions.

B. SYLLABUS

Module I: Wave Mechanics

de-Broglie matter waves, wave nature of particles, phase and group velocity, Heisenberg uncertainty principle, wave function and its physics interpretation, Operators, expectation values. Time dependent & time independent SchrÖdinger wave equation for free & bound states, square well potential (rigid wall), Concept of step potential.

Module II: Atomic Physics

Vector atom model, LS and j-j coupling, Zeeman effect & Paschen-Back effect, Bragg's law, X-ray spectra and energy level diagram, Laser – Einstein coefficient, population inversion, condition of light amplification, He-Ne and Ruby laser

Module III: Solid State Physics

Sommerfield's free electron theory of metals, Fermi energy, Energy bands in solids, physics of semi-conductors, doping, intrinsic and extrinsic semiconductors, Depletion layer, characteristics of PN junction, Forward and reverse baising, Breakdown voltage, Superconductivity, Meissner effect, Introduction to Nanomaterials

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Beiser, A. (2002). Concept of Modern Physics, McGraw-Hill Higher Education; 6th edition.
2. Agarawal & Goel. (2011). Applied Physics II, Pragati Prakashan.
3. Pallai, S. O. (2009). Solid State Physics, New Academic Science Ltd; 6 edition.
4. Wehr & Richards. (1984). Physics of Atom, Addison-Wesley, 4 edition.

Course Name	Course Code	LTP	Credit	Semester
OBJECT ORIENTED PROGRAMMING IN C++	BTD: 204	1:0:0	2	2

B. SYLLABUS

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Venugopal, A.R., & Ravishanker, T. (1997). Mastering C++, TMH Publications.
2. Balagurusamy E. (2013). Object Oriented Programming with C++, TMH; Sixth edition.
3. Parasons. (1999). Object Oriented Programming with C++, BPB Publication.
4. Lawlor, S. C. (2002). The Art of Programming Computer Science with C++,Vikas Publication.

Course Name	Course Code	LTP	Credit	Semester
THERMODYNAMICS	BTD: 205	1:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Ability to acquire and apply fundamental knowledge of mathematics,
CLO 2	Ability to acquire and apply science and engineering principles to solve complex thermal engineering problems related to food engineering

B. SYLLABUS

Module I: Basic concepts

Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth law of Thermodynamics, Work and heat, Flow work.

Module II: First Law of Thermodynamics

Mechnical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes.

Module III: Second Law of Thermodynamics and Entropy

Heat Engine, Heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle-Carnot Cycle, Clausius inquality, entropy, entropy change during different processes, Principle of entropy incease, concepts of availability, irreversibility.

Module IV: Air-Cycles

Carnot cycle, Otto cycle, Diesel cycle, Dual cycle; Reversed Carnot cycle.

Module V: Properties of Steam

Use of steam tables, wet steam, superheat steam, different processes of vapor, mollier Diagram.

Module VI: Reciprocating Air Compressors

Single stage compressor, Isothermal efficiency, adiabatic efficiency, clearance volume, volumetric efficiency, multi-stage compression with intercooling.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. P K Nag, "Engineering Thermodynamics", Tata McGraw Hill
2. Sonntage/ Vanhylene, "Fundamentals of Thermodynamics", Wiley.
3. Rahul Gupta, "Engineering Thermodynamics", Asian Books P Ltd.
4. Gordon Rosers, "Yon Mahew; Engineering Termodynamics", Addison Wesley.
5. Y V C Rao, "Engineering Thermodynamics", Khanna Publications.
6. E Gutra, "Basic Thermodynamics", Narosa Publications.
7. M L Mathur, "Mehtra F.S. Thermal Engineering", Jain Brothers.
8. Onkar Singh "Applied Engineering", New Age Publications.
9. Dhomkundwar Kothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications.
10. S K Kulshretha, "Engineering Thermodynamics", Vikas Publications.

Course Name	Course Code	LTP	Credit	Semester
APPLIED PHYSICS – II -Lab	BTD: 222	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Solve system of linear equations; be familiar with the definition and properties of matrix; find the eigenvalues and eigenvectors of a square matrix.
CLO 2	Investigate the properties of vectors and study their differentiation and integration properties.
CLO 3	Calculate the measure of central tendency and doing curve fitting.

B. LIST OF PRACTICALS

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ("g") using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (Solar cell).

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

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Course Name	Course Code	LTP	Credit	Semester
APPLIED CHEMISTRY – II -Lab	BTD: 223	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Find out the viscosity and viscosity index of oil
CLO 2	Flash point and fire point of fuel.
CLO 3	Calculate the hardness of water, dissolved oxygen and residual chlorine
CLO4	Synthesise the polymer with calculation of polymer weight like urea resin

B. LIST OF PRACTICALS

- Determining the viscosity index of lubricating oil by using Redwood viscometer.
- Determining the flash point and fire point of lubricating oil.
- Determination of Hardness of Water.
- Chemical Analysis of Water like Alkalinity, residual Chlorine.
- Synthesis of Urea Formaldehyde resin.
- Determination of Molecular weight of Polymer.
- Determination of Ion exchange capacity of a region.
- Determination of dissolved Oxygen in Water.
- Determination of Iodine value in water.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

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Course Name	Course Code	LTP	Credit	Semester
OBJECT ORIENTED PROGRAMMING IN C++ -Lab	BTD: 224	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO4	
CLO5	

B. LIST OF PRACTICALS

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

EXAMINATION SCHEME:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

SUGGESTED READING

- Text Book of Practical Chemistry by K.K. Saxena & K.D. gupta.
- Practical Chemistry by O.P. Pandey, D.N. Bajpai & S. Giri.

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTD 230	1:0:0	3	2

B. GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

7. Choosing a subject
8. Finding sources of materials
9. Collecting the notes
10. Outlining the paper
11. Writing the first draft
12. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

e) Begin by making a list of subject-headings under which you might expect the subject to be listed.

f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.

e) In research studies, notice the methods and procedures, results & conclusions.

f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.

d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
i) Check for proper spelling, phrasing and sentence construction.
j) Check for proper form on footnotes, quotes, and punctuation.
k) Check to see that quotations serve one of the following purposes:
   (iv) Show evidence of what an author has said.
   (v) Avoid misrepresentation through restatement.
   (vi) Save unnecessary writing when ideas have been well expressed by the original author.
l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

8) Title page
9) Table of contents
10) Introduction
11) Review
12) Discussion & Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

SUGGESTED READING

1. Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.
2. Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter. [(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].
3. Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.
4. McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

5. Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.
6. Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.
7. Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

8. Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.
9. Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
10. Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Course Name	Course Code	LTP	Credit	Semester
SPECIALITY FOODS	BTD 231	1:0:0	3	2

B. SYLLABUS

Module I:
Introduction
Need and scope of specialty foods, Therapeutic foods, Modification of diets in disorders, feeding purposes, Disease oriented of different organs e.g. digestive tract, liver, cardiovascular system, kidney, metabolic disorders, allergy, endocrine disorders, Supplementary foods.

Module II
Specialty food based on ease in preparation for cost health benefits: Functional foods, Convenience food, Health care and medical benefits, Nutritional status, Low cost foods

Module III
Specialty foods based on sources and process: Cereals and millets, Legumes and pulses, Fruits and vegetables, Animal food sources, By-product based, Non-conventional sources, organic, inorganic farming, Innovate process technology, Food additives basis, bioactive components, Novel nutraceuticals products, Packaging techniques.

Module IV
Specialty food based on genetics:
Genetically modified foods, transgenic foods, Biotechnological aspects of detoxification.

Module V
Specific consumers oriented foods
Fast foods, Defense persons, Space/astronaut, High altitude mountain climbers, Sports foods.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Bamji MS, Rao NP & Reddy V. (2003). Textbook of Human Nutrition 4th ed Publisher Oxford & IBH.
2. Joshi SA. (1999). Nutrition and Dietetics 4th ed. Tata McGraw Hill.
3. Khanna K, Gupta S,Passi SJ, Seth R & Mahna R. (1997). Nutrition and Dietetics, 4th ed. Phoenix Publ. Essentials of Foods and Nutrition Vol. II by Swaminathan M. Publisher Ganesh & Co. 7th edition (1994)

4. Zhao, Y. (2002). Specialty Foods: Processing Technology, Quality, and Safety, 3rd ed Publisher CRC Press

Course Name	Course Code	LTP	Credit	Semester
PLANT RESOURCE UTILIZATION	BTD 232	1:0:0	3	2

B. SYLLABUS

Module I: Cereals and Legumes and fruits

Wheat and Rice, Role of dwarf varieties in green revolution; brief account of millets and pseudocereals.

General account of legumes, importance to man and ecosystem; chief pulses grown in India. Mango, Papaya, citrus fruits etc.

Module II: Sugars and starches

Ratooning and nobilization of sugarcane, products and by products of sugarcane industry; Potato (Tuber anatomy and propagation methods) and comparative account with cassava

Module III: Beverages

Tea, coffee and cocoa, their processing and some common adulterants.

Module IV: Essential Oils

General account and comparison with fatty oils.

Module V: Drug Yielding Plants and Fibers

Therapeutic and habit forming drugs with special reference to Cinchona, Digitalis, Rauvolfia, Papaver and Cannabis. Classification based on the origin of fibers, Tetraploid cotton and Jute

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Kochhar, S.L. (2002). Economic Botany 3rd ed. Tropic Publisher Macmillan and Co. New Delhi.
2. Wickens, G.E. (2004). Economic Botany: Principles and Practices 3rd ed. Publishers Springer.
3. Slater, A., Scott, N.W. & Fowler, M.R. (2008). Plant Biotechnology: The Genetic Manipulation of Plants, 4th ed. Publisher Oxford University Press.

Course Name	Course Code	LTP	Credit	Semester
SUGAR AND CONFECTIONARY TECHNOLOGY	BTD 233	1:0:0	3	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Gives idea about applied technology of confectionary products
CLO 2	Learn the various the manufacturing technology of confectionary products
CLO 3	Understand the equipments used for manufacturing of confectionary products

B. SYLLABUS

Modules I Introduction of sugar and Confectionary, Present status and future scope of sugar and confectionery industries.

Modules II Properties of ingredients Sugar:
sugar qualities, physical, chemical, optical properties of sugar. Other Ingredients: Properties of invert sugar, glucose syrup, dextrose, fructose, lactose, caramel, maltose, honey, sorbitol, xylitol, iso malt, soy maltose, polydextrose, lactitol, maltitol, Additives used in confectionery.

Modules III Sugar, Cocoa and Chocolate processing
Sugar : Processing of sugar, Cocoa : cocoa bean processing, roasting, fermentation, production of cocoa butter, cocoa powder, its quality Chocolate : Ingredients, mixing, refining, conching, tempering, moulding, cooling, coating, fat bloom

Modules IV High boiled sweets:
Introduction, composition, properties of high boiled sweets, preparation of high boiled sweets, traditional, batch and continuous method of preparation. different types of higher boiled sweets, recipes

Modules V Toffee, Fudge and Caramel and other confectionary items:
Definition, composition, types of ingredient and their role, batch and continuous method of Toffee, Fudge and Caramel

Lozenges, Fondant and Chewing Gums: definition recipe, method of manufacture, compositions, factors affecting quality, industrial production, checklist of faults

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Jackson, E.B. (2002). Sugar Confectionery Recipes and Methods, 4th ed. publisher Jackson Associates.
2. Francis, F.J (2000). Wiley Encyclopedia of Food Science & Technology. 3rd ed. Publisher, John Wiley & Sons.
3. Lees, R. & Jackson, E.B. (2002). Sugar Confectionery & Chocolate Manufacture. 4th ed. Jackson Associates.

Course Name	Course Code	LTP	Credit	Semester
ENGLISH	BCS 201	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Participate in conversation and in small- and whole-group discussion
CLO 2	Explore and use English as medium of communication in real life situation
CLO 3	Discuss topics and themes of a reading, using the vocabulary and grammar of the lesson
CLO4	Identify features of a reading textbook and utilize them as needed
CLO5	Prepare and deliver organized presentations in small groups and to whole class
CLO6	Apply sentence mechanics and master spelling of high frequency words

B. SYLLABUS

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation
Module IV: Communication
The process and importance
Principles & benefits of Effective Communication
Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills
Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills
Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya
Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Madhulika Jha, Echoes, Orient Long Man
2. Ramon & Prakash, Business Communication, Oxford.
3. Sydney Greenbaum Oxford English Grammar, Oxford.
4. Successful Communications, Malra Treece (Allyn and Bacon)
5. Effective Technical Communication, M. Ashraf Rizvi.

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Course Name	Course Code	LTP	Credit	Semester
UNDERSTANDING SELF FOR EFFECTIVENESS - II (PROBLEM SOLVING AND CREATIVE THINKING)	BSS 204	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognize the relation critical thinking with various mental processes.
CLO 2	Identify hinderance to problem solving processes.
CLO 3	Analyse the steps in problem-solving process.
CLO4	Createplan of action applying creative thinking.

B. SYLLABUS

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

Making Predictions and Reasoning

Memory and Critical Thinking

Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

Perception

Expression

Emotion

Intellect

Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

Convergent and Divergent thinking

Idea generation and evaluation (Brain Storming)

Image generation and evaluation

Debating

The six-phase model of Creative Thinking: ICEDIP model

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Michael S. (1999). How to be a Better Problem Solver, Kogan Page, New Delhi.
2. Geoff P. (1999). How to be a Better at creativity; by: Kogan Page, New Delhi, (1999)
3. Richard Y. C., & Keith P., (1998). Wheeler Publishing, New Delhi.
4. Phil Lowe Koge (1996). Page: Creativity and Problem Solving, New Delhi,
5. Pfeiffer, J. W., (1996). Theories and Models in Applied Understanding Self for Effectiveness, Management Pfeiffer & Company.
6. Bensley, A. D. (1998). Critical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole Publishing Company.

Course Name	Course Code	LTP	Credit	Semester
FRENCH - II	FLT 201/211	1:0:0	1	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: Unité 3: Organiser son temps

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler

ii) inviter/accepter/refuser

3. Faire un programme d'activités

imaginer une conversation téléphonique/un dialogue

Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5 : s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
2. Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
3. Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	LTP	Credit	Semester
Foreign Language German	FLG 201/211	1:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	• Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	• Students will be able to read and interpret small texts .
CLO 3	• Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	• Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns

Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READING

1. **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
2. **Tangram A1**by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
3. **Sprachtraining**A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013
4. Dictionaries for reference: **Studio D: Glossar** A1 - Deutsch –Englisch, Cornelsen, 2013http://www.duden.de/woerterbuch
5. Materials are given in form of photocopies if felt to be necessary

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Course Name	Course Code	LTP	Credit	Semester
SPANISH – II	FLS 201	1:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself…. descriptions of people, objects etc, computer/internet related vocabulary

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	Presentation/case study	EE
Weightage (%)	15	5	15	15	50

SUGGESTED READINGS

- Español, En Directo I A
- Español Sin Fronteras

Course Name	Course Code	LTP	Credit	Semester
CHINESE – II	FLC 201	1:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.

Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
– Going to the library issuing a book from the library
– Going to the cinema hall, buying tickets
– Going to the post office, buying stamps
– Going to the market to buy things.. etc
– Going to the buy clothes …. Etc.
Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	Presentation/case study	EE
Weightage (%)	15	5	15	15	50

SUGGESTED READINGS

- Elementary Chinese Reader Part I" Lesson 11-20

• Course Name	Course Code	LTP	Credit	Semester
AANANDAM-II	AND002	1:0:0	2	2

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy of giving and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus- Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact onsociety
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence andEfficiency

AANANDAM: COMMUNITY SERVICE

· Community service programs are very effective for students' personal and social, ethical, and academic development. These effects depend on the characteristics of the programs chosen

· Involvement of students in community work has an impact on development of student skills, creativity, critical thinking, and innovative powers. Passion and Positivity are basic requirements for Community service

· They would examine social challenges /problems, assess the needs of the community, evaluate previous implemented projects, and think of further solutions

· They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities. BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

· apply their knowledge and skills to solve specific community problem

· learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time

· make new friends, expand social network, and boost social skills and mental health.

· obtain employment

· be useful to society as it will protect them against stress, frustration, anddepression

ABOUT AANANDAM COURSE

Students are expected to engage in:

· An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)

· Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.

· It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules.

· Two credits for a project in each semester

· 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

· Do at least one individual act of goodness each day and Record this act in a dedicated diary/register

· Share this dedicated diary/register in a 30-minute Anandam period with the mentor and share your experience with the class

· Students in Semester scheme must take up one Group Community Service Project persemester

· Students in Annual scheme must take up two Group Community Service Projects per year

· Take one Group Community Service Project from August to November

· Take one Group Community Service Project from January to April

· The students must take photographs to document theirwork

· The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project

· The students may submit newspaper cuttings

· The students must participate in the Aanandam Day by displaying charts of their Group Community Service Project

· They can make power point presentations of their project which will help them get bettergrades

ROLE OF FACULTY MENTOR

· The mentor will maintain a register wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs

· Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The act will not be evaluated - just if it was recorded or not. (Be suggestive not judgemental)

· In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves

· The mentor will divide the class for the Group Community Service Project and record it in a register. 8 -12 students can form a group for project work.

· The students will opt the project of their choice.

· The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.

· The mentor will guide the students towrite the Group Community Service Project Report.

· Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spreadsheet

ROLE OF DIRECTOR/HOIS

· Allot one period of half an hour for Aanandam course

· Assign all faculty members as mentors for this period of half an hour for students

· Each faculty will have one class to mentor

· Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.

· To coordinate the Aanandam Day activities

· To organize Aanandam Day in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefit of students (to motivate and inspire them for community service)

· Photographs of the Aanandam Day should be displayed in department and these should be uploaded in the gallery of University web page on HTEportal

· A Project Assessment Committee (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

· Director/ HoIs

· One person fromcommunity

· Departmental Aanandam Coordinator

· Project Mentors (1 to 7 or moremembers)

The number of mentors can vary depending on the number of projects and students in each department.

· University level PAC to be formed for university colleges and departments

· State level PAC to be formed at Commissionerate level for Universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

Ø literacy programs, in today's digital age many organizations/individuals might also need help with email and websites Ø livelihood projects,

Ø time giving activities to adopted communities (awareness regarding Govt. programmes) sports like yoga, meditation, drills, and physical exercises in adopted areas

Ø activities on arts and culture such as restoration of traditional art and culture and monuments. Ø understand their responsibility in taking care of environment and appreciating cultural diversity

Ø While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers

Ø A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.

Ø Another group may be formed for attending to old people (who have money but need assistance for market and groceries) [Time Bank]

Ø Another group may be formed for civic activities, awareness programmes. Ø Local social problems to be taken up and solutions devised

Ø Innovations and Startups to be encouraged

Ø help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.

\ · Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)

· Location / community where the work was carried out

· Details of Activities performed are to be given with date

· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self - reliant)

· Photographs taken for documentation of work should be submitted

· Media coverage of the projects should be attached if any

· Students should also submit their certificates from the government bodies and or nongovernment bodies they collaborate with, if any

· Photographs of Display charts or ppt/video prepared while presentation on the group community service in the Aanandam Day must be submitted along with the report

· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.

· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page

· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.

· University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

· Project Assessment Committee will assess the Group Community Service Project Report

· submitted by the students, in the duly filled given format, based on:

· Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with thecommunity

· presentation of the project report

· impact on society and the course outcomeresults

Format for evaluation by Project Assessment Committee (Total max marks 50)

· Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)

· Report contains presentation /video (max.10 marks)

· Photographs of Students' participation and involvement of community (max.10 marks)

· Problem solving and challenging issues addressed/ innovation (max. 30 marks)

AWARD AND RECOGNI TION DEPARTMENT, UNIVERSITY AND STATE LEVEL

· Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.

· The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education forcontesting the state level award

· State Level Project Assessment Committee will evaluate projects received from all the universities (one each).

· A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects.

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs Grading Marks

C grade =32 hrs

B grade >32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

• Course Name	Course Code	LTP	Credit	Semester
PRINCIPLES OF FOOD PROCESSING	**BTD 301**	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Gives idea about how food process in industry
CLO 2	Learn the various equipment's used in food industry
CLO 3	Learn the various equipment's used in food industry.

B. SYLLABUS

Module I: Introduction

Definition of food technology; Branches of food technology, their definition and significance; Objectives of food technology and role of food technologists in food supply chain ;Brief history of development of food technology; Economic significance of food processing; Factors influencing growth of food processing industry. Major Indian and International bodies associated with food technology.

Module II: Application of Heat for Food Preservation

Definition of thermal processes; Thermal resistance of microorganisms; Factors affecting process requirements; General aspects of canning and bottling, process time evaluation; Thermal processing equipments; Processes for canning of selected foods

Module III: Removal of Heat for Food Preservation

Refrigeration and storage of fresh foods; Requirements of a refrigeration plant; Controlled atmosphere and hypobaric storage; Requirements for refrigerated storage of selected foods and food products; Basic principles of freezing preservation; Freezing point and freezing time: factors affecting them; Freezing processes for selected food products, their storage and thawing methods; Effects of freezing on food quality

Module IV: Food Preservation by Removal of Moisture

Basic principle of preservation, water activity; Concentration processes in food industry; Equipments for concentration food products; Drying characteristics of foods and factors affecting drying rate; Driers and their uses; Effect of drying on quality of food products; Intermediate moisture foods

Module V: Preservation by Fermentation and Chemical Preservatives

General principles of fermentation processes and their application to pickling, curing and other processes; Use of chemicals to preserve food products- classification, permitted levels and their effect on quality of food products and consumer health

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	Presentation/case study	EE
Weightage (%)	15	5	15	15	50

SUGGESTED READINGS

- Potter, NN Food Science (1999). AVI Publishing Co.
- Fellow PJ. (2004). Principles of Food Processing

• Course Name	Course Code	LTP	Credit	Semester
GENERAL BIOCHEMISTRY	**BTD 302**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	such as the structure/function of biomolecules, metabolic pathways, and the regulation of chemical and molecular processes that occur in and between cells.
CLO 2	Biochemistry majors will gain proficiency in basic laboratory techniques in both chemistry and biology, and be able to create the scientific method to the processes of experimentation and hypothesis testing.
CLO 3	Students in the Biochemistry major will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums.
CLO 4	Develop your research skills in preparation for a career in the biosciences industry or academic research

B. SYLLABUS

Module I

Introduction; Chemical components of cell, Subcelllar organelles, Nucleus, Endoplasmic reticulum, Galgi apparatus, Lysosomes, Peroxisomes, Mitochondria cellular organization and biological functions of cellular organelles. Chemical foundations of Biology -Properties of water, acids, bases and buffers, covalent bonds, Non-covalent interactions in biological systems.

Module II

Carbohydrates – classification, nomenclature, stereochemistry and properties of mono-, di-, oligo- and polysaccharides. Structure of glycoproteins and protein polysaccharides. Lipids – definition, classification and structure; Biological functions of lipids – lipoproteins, lipopolysaccharides.

Module III

Nucleic acids structure, minor bases, unusual bases, nucleosides, nucleotides, NAD, FAD, cAMP, rRNA, primary, secondary and tertiary structure, DNA, tRNA, mRNA, super molecular assemblies

Enzymes – introduction to kinetic and catalytic mechanisms of enzymes, regulation of enzymic activity; effects of physical parameters on enzymic activity

Module IV

Proteins – classification, amino acids – names and abbreviations, structure and properties; Protein structure– primary, secondary, tertiary and quaternary, chemical classification of proteins; peptides of biological importance; Structure and biological activities of Vitamins, hormones

Module V

Metabolic pathways: Glycolysis pathway and reactions, Citric acid cycle - Overview, Metabolic sources of Acetyl Co-A, enzymes and regulation and Electron Transport chain, Lipid digestion, absorption and transport, fatty acid oxidation, ketone bodies, fatty acid biosynthesis, regulation of fatty acid metabolism.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	Presentation/case study	EE
Weightage (%)	15	5	15	15	50

SUGGESTED READINGS

- Conn, EE, Stumpf PK, Bruening G and Ray HD. Outlines of Biochemistry. John Wiley &Sons, N. York
- Lehninger AL, Nelson DL and Cox MM. Principles of Biochemistry. Worth Publishing
- Powar, C.B. and Chatwal, G.R. , Biochemistry Handbook, Himalaya publishing House.
- Christopher Matky, Biochemistry, Scientific Publishers.
- Segel JH. Biochemical Calculations. John Wiley & Sons Inc.
- Stryer L. Biochemistry. WH Freeman and Company

• Course Name	Course Code	LTP	Credit	Semester
GENERAL & APPLIED MICROBIOLOGY	**BTD 303**	4:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	At the successful completion of this course the student should be able to:
CLO 2	Explain general principals and scope of microbiology and diversity of microorganisms
CLO 3	Illustrate clear concepts on bacterial cell structure, function, genetics, growth and pathogenesis
CLO 4	Demonstrate critical analytical and lab skills in microbiology

B. SYLLABUS

Module I
Introduction to microorganisms, their distribution and historical developments; Methods in microbiology – microbial nutrition, culture media, sterilization, pure culture techniques, enrichment culture techniques

Module II
Nature of microbial world: eukaryotes, eubacteria, archaebacteria, mollicutes and protists; Classification and phylogeny of bacteria; Relation between structure and function of prokaryotic cells. Morphology of microbial cells

Module III
Nutritional requirements and growth; Microbial metabolism: Fuelling reactions, biosynthesis and regulation

Module IV
Microbial genetics; mutation and gene function, genetic exchange and recombination

Module V
Parasitism and antimicrobial chemicals; Bio-Geochemical cycles and symbiosis; Microbial pathogenesis; The immune system; Exploitation of microbes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	Presentation/case study	EE
Weightage (%)	15	5	15	15	50

SUGGESTED READINGS

- Atlas RM. Principles of Microbiology, WMC Brown Publishers
- Pelczer, MJ, Chan ECS and Kreig NR. Microbiology. Tata McGraw Hill Book Co.
- Dubey, R.C. and Maheshwari . A Textbook of Microbiology, S. Chand & Co.
- Tortor, G.J., Funke, B.R. and Klac, C.L. Microbiology: An Introduction. Benjamin Cumming Publishers
- Prescott and Dunn. Industrial Microbiology. CBS Publishers
- Stanier RY, Ingraham JL, Weelis ML and Painter PR. General Microbiology. Macmillan
- Tauro, P, Kapoor KK and Yadav KS. An Introduction to Microbiology. Wiley Publishers, New Delhi
- Vanden Mark PV and Batzing BL. The Microbes – An Introduction to their Nature and Importance Benjamin Cummings

• Course Name	Course Code	LTP	Credit	Semester
GENERAL BIOCHEMISTRY- LAB	**BTD 322**	0:0:2	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge particularly in biochemistry, and its regulation.
CLO 2	Isolate of the different macromolecules from the prokaryotic cell system.
CLO 3	Critically and quantitatively analyze scientific data, either their own original data or the published data of others.
CLO 4	Define a specific hypothesis and design an experiment to test it.

B. SYLLABUS

1. Preparation of standard solutions, buffer solutions and colloidal solutions
2. Qualitative tests on carbohydrates, lipids, amino acids and proteins
3. Identification of amino acids/sugars by chromatographic technique
4. Isolation and purity determination of DNA
5. Quantification of DNA
6. Quantification of sugars
7. Quantification of proteins

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva/Presentation/performance**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	30	05	25	10	5	10

SUGGESTED READINGS

- Rameshwar A. Practical Biochemistry. A Basic Course. Kalyani Publication, New Delhi
- Shawhney, S.K. Introductory Practical Biochemistry. Narosa publishers

• Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	**BTD 330**	3:0:0	3	3

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

13. Choosing a subject
14. Finding sources of materials
15. Collecting the notes
16. Outlining the paper
17. Writing the first draft
18. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

Begin by making a list of subject-headings under which you might expect the subject to be listed.

The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

Get facts, not just opinions. Compare the facts with author's conclusion. In research studies, notice the methods and procedures, results & conclusions.

Check cross references.

4. Outlining the paper

e) Review notes to find main sub-divisions of the subject.

f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

d) statement of purpose
e) main body of the paper
f) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

m) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
n) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
o) Check for proper spelling, phrasing and sentence construction.
p) Check for proper form on footnotes, quotes, and punctuation.
q) Check to see that quotations serve one of the following purposes:
    (vii) Show evidence of what an author has said.
    (viii) Avoid misrepresentation through restatement.
    (ix) Save unnecessary writing when ideas have been well expressed by the original author.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

15) Title page
16) Table of contents
17) Introduction
18) Review
19) Discussion & Conclusion
20) References
21) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be

disregarded. There are a number of key components which should not be omitted. These include:

i) summary of question posed
j) summary of findings
k) summary of main limitations of the study at hand

details of possibilities for related future research

SUGGESTED READINGS

- Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press
- Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language.
- Berlin/ NY: Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan.

• Course Name	Course Code	LTP	Credit	Semester
FOOD RHEOLOGY & TEXTURE	BTD3 31	3:0:0	3	3

B. SYLLABUS

Module I: Introduction to Rheology

Rheology: definitions; importance in the food field. Rheological tests. Fundamental rheological tests. Fundamental rheology.

Module II Rheology of food

Rheology of suspensions of macromolecules. Rheology of the Newtonian and non-Newtonian flow. The importance of glassy state in food quality and texture preservation.

Module III Application of Rheology

Application of rheology concepts (non-Newtonian fluid behaviour) in plant layout development. The texture viscosity determination in food products.

Module IV Food Microstructure and Quality:

Measurement of Texture, Structural Aspects of Food Texture, Quality and Structure

Module V Food Texture:

Various types of texture; instruments used for texture measurements; importance of texture in food.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- M. Anandha Rao (2007). Rheology of fluid and semisolid foods principles and applications. Springer US.
- Moskowitz (1990). Food Texture. CRC Press.
- JM Steffe (1992). Rheological methods in food process engineering. Freeman press

Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL CROPS	**BTD 332**	3:0:0	3	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will familiar with agricultural crops practices.
CLO 2	Acquaint with botanical characters of crop plants, nutritional values and importance of crop plants

B. SYLLABUS

Module I: Introduction

Importance of plants and plants products; history of food plants countries and centers of origin

Module II: Food Crops-A

Botanical description, origin and food and nutritional values of different cereals including wheat; barley; corn; rice

Module III: Food Crops-B

Botanical description, origin and food and nutritional values of different coarse cereals including millets; sorghum; Legumes and pulses: nutritional profile, origin and legumes based various processed products.

Module IV: Nuts and oil seeds, Tubers and Root crops

Botanical description, origin and food and nutritional values of different Cashew nuts; almonds: pistachio; ground nuts; sun flowers. Underground vegetable tuber crops and their origin, nutritional value and importance in food processing including Potato; sweet potato; carrot; tapioca

Module V: Fruits, spices and beverages

Origin of various fruits, spices and beverages crops and their nutritional value and importance in food processing sector

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Handbook of Industrial Crops – CRC Press Book
- Industrial Crops and Uses (9781845936167): Bharat P. Singh

Course Name	Course Code	LTP	Credit	Semester
NANOTECHNOLOGY AND ITS APPLICATION IN FOOD	BTD 333	3:0:0	3	3

B. SYLLABUS

Module I:

Nano-material: Definitions, types, manufacturing of nano-material.

Module II:

Nanosensors:

Manufacturing of nanosensors; Application of nanosensors in food processing, packaging.

Module III:

Nano Bioactive compounds:

Manufacturing of bioactive nanomaterials; Bioactive compounds including phytochemicals and vitamins

Modules IV:

Food Quality Monitoring:

Monitoring of food quality using various nanomaterials during processing and storage.

Module V: Nanotechnology-Encapsulation and Delivery of nutrients:

Encapsulation and delivery of various nutrients using nanomaterials; Safety issues related with nanomaterials in foods.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- M.H. Fulekar (2010) Nanotechnology Importance and Application. I. K. International Pvt Ltd
- Q Huang (2012). Nanotechnology in the Food, Beverage and Nutraceutical Industries. Woodhead Publishing
- M. Bagchi, H. Moriyama, F.Shahidi (2013) Wiley-Blackwell

Course Name	Course Code	LTP	Credit	Semester
ENVIRONMENTAL SCIENCES	EVS001	3:1:0	4	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the importance, need and scope of the subject.
CLO 2	Evaluate local, regional and global environmental topics related to resource use and management.
CLO 3	Measure environmental variables and interpret results.
CLO 4	Interpret the results of scientific studies of environmental problems and propose solutions to these.
CLO 5	Implement "Sustainable development", in day to day activities.

B. SYLLABUS

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem

Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition
Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)

- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS - I	BCS301	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Inculcating creative thinking skills
CLO 2	Construct and showcase their communication skills in a creative manner.
CLO 3	Comprehending and demonstrating ways of self-introduction
CLO 4	Outlining and illustrating presentation Skills

B. SYLLABUS

Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments
Self-Actualization (Baseline, Self-Image Building, SWOT, Goal Setting)

Module II: Letter Writing
Types
Formats

Module III
Memo
Agenda and Minutes
Notice and Circulars

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge

- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
Behavioral Science III (Interpersonnel Communication)	BSS304	1:0:0	1	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrate knowledge of strategies for developing a healthy interpersonal communication.
CLO 2	Recognize the importance of transactional analysis, script analysis.
CLO 3	Identify the difference between healthy and unhealthy expression of emotions and develop emotional competence necessary for conflict resolution and impression management.
CLO 4	Enhance personal effectiveness and performance through effective interpersonal communication

B. SYLLABUS

Module I: Interpersonal Communication: An Introduction
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Behavioural Communication
Meaning and Nature of behavioiural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

Module IV: Conflict Management
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

Module V: Negotiation Skills
Meaning and Negotiation approaches (Traditional and Contemporary)

Process and strategies of negotiations

Negotiation and interpersonal communication

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Casse Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell

Course Name	Course Code	LTP	Credit	Semester
FRENCH - III	FLT301	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical: **Unité 6: se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restauran
3. 3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je

sais que

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- le livre à suivre : Campus: Tome 1

Course Name	Course Code	LTP	Credit	Semester
GERMAN - III	**FLG 301**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

Module VII: Directions
Names of the directions

Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions
To assimilate the knowledge of the conjunctions learnt indirectly so far

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2

Course Name	Course Code	LTP	Credit	Semester
SPANISH – III	**FLS 301**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. SYLLABUS

Module I

Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener, Poner, Ir….*
Weather

Module II

Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III

Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV

Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V

Reflexives

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

Course Name	Course Code	LTP	Credit	Semester
CHINESE – III	**FLC 301**	2:0:0	2	3

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

B. SYLLABUS

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II

Measure words; Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian; Our school and its different building locations.
What game do you like?; Difference between "hii" and "neng", "keyi".

Module III

Changing affirmative sentences to negative ones and vice versa; Human body parts.
Not feeling well words e.g. ; fever, cold, stomach ache, head ache.; Use of the modal particle "le"; Making a telephone call; Use of "jiu" and "cal" (Grammar portion); Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV

The ordinal number "di"; "Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.; use of to enter to exit
Structural particle "de" (Compliment of degree).; Going to the Park.; Description about class schedule during a week in school.; Grammar use of "li" and "cong".; Comprehension reading followed by questions.

Module V

Persuasion-Please don't smoke.; Please speak slowly; Praise – This pictorial is very beautiful

Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn't matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

Elementary Chinese Reader Part I, Part-2" Lesson 21-30

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-III	AND003	2:0:0	2	3

. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy of giving and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus- Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact onsociety
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence andEfficiency

AANANDAM: COMMUNITY SERVICE

- Community service programs are very effective for students' personal and social, ethical, and academic development. These effects depend on the characteristics of the programs chosen

· Involvement of students in community work has an impact on development of student skills, creativity, critical thinking, and innovative powers. Passion and Positivity are basic requirements for Community service

· They would examine social challenges /problems, assess the needs of the community, evaluate previous implemented projects, and think of further solutions

· They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities. BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

· apply their knowledge and skills to solve specific community problem

· learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time

· make new friends, expand social network, and boost social skills and mental health.

· obtain employment

· be useful to society as it will protect them against stress, frustration, anddepression

ABOUT AANANDAM COURSE

Students are expected to engage in:

· An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)

· Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.

· It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules.

· Two credits for a project in each semester

· 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

· Do at least one individual act of goodness each day and Record this act in a dedicated diary/register

· Share this dedicated diary/register in a 30-minute Anandam period with the mentor and share your experience with the class

· Students in Semester scheme must take up one Group Community Service Project persemester

· Students in Annual scheme must take up two Group Community Service Projects per year

- Take one Group Community Service Project from August to November
- Take one Group Community Service Project from January to April
- The students must take photographs to document theirwork
- The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
- The students may submit newspaper cuttings
- The students must participate in the Aanandam Day by displaying charts of their Group Community Service Project
- They can make power point presentations of their project which will help them get bettergrades

ROLE OF FACULTY MENTOR

- The mentor will maintain a register wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
- Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The act will not be evaluated - just if it was recorded or not. (Be suggestive not judgemental)
- In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
- The mentor will divide the class for the Group Community Service Project and record it in a register. 8 -12 students can form a group for project work.
- The students will opt the project of their choice.
- The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
- The mentor will guide the students towrite the Group Community Service Project Report.
- Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spreadsheet

ROLE OF DIRECTOR/HOIS

- Allot one period of half an hour for Aanandam course
- Assign all faculty members as mentors for this period of half an hour for students
- Each faculty will have one class to mentor
- Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.

· To coordinate the Aanandam Day activities

· To organize Aanandam Day in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefit of students (to motivate and inspire them for community service)

· Photographs of the Aanandam Day should be displayed in department and these should be uploaded in the gallery of University web page on HTEportal

· A Project Assessment Committee (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

· Director/ HoIs

· One person fromcommunity

· Departmental Aanandam Coordinator

· Project Mentors (1 to 7 or moremembers)

The number of mentors can vary depending on the number of projects and students in each department.

· University level PAC to be formed for university colleges and departments

· State level PAC to be formed at Commissionerate level for Universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

Ø literacy programs, in today's digital age many organizations/individuals might also need help with email and websites Ø livelihood projects,

Ø time giving activities to adopted communities (awareness regarding Govt. programmes) sports like yoga, meditation, drills, and physical exercises in adopted areas

Ø activities on arts and culture such as restoration of traditional art and culture and monuments. Ø understand their responsibility in taking care of environment and appreciating cultural diversity

Ø While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers

Ø A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.

Ø Another group may be formed for attending to old people (who have money but need assistance for market and groceries) [Time Bank]

Ø Another group may be formed for civic activities, awareness programmes. Ø Local social problems to be taken up and solutions devised

Ø Innovations and Startups to be encouraged

Ø help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.

\ · Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)

· Location / community where the work was carried out

· Details of Activities performed are to be given with date

· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self - reliant)

· Photographs taken for documentation of work should be submitted

· Media coverage of the projects should be attached if any

· Students should also submit their certificates from the government bodies and or nongovernment bodies they collaborate with, if any

· Photographs of Display charts or ppt/video prepared while presentation on the group community service in the Aanandam Day must be submitted along with the report

· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.

· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page

· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.

· University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

· Project Assessment Committee will assess the Group Community Service Project Report

· submitted by the students, in the duly filled given format, based on:

· Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with thecommunity

· presentation of the project report

· impact on society and the course outcomeresults

Format for evaluation by Project Assessment Committee (Total max marks 50)

· Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)

· Report contains presentation /video (max.10 marks)

· Photographs of Students' participation and involvement of community (max.10 marks)

· Problem solving and challenging issues addressed/ innovation (max. 30 marks)

AWARD AND RECOGNI TION DEPARTMENT, UNIVERSITY AND STATE LEVEL

· Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.

· The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education forcontesting the state level award

· State Level Project Assessment Committee will evaluate projects received from all the universities (one each).

· A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects.

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs Grading Marks

C grade =32 hrs

B grade >32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	LTP	Credit	Semester
FOOD CHEMISTRY	BTD 401	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To integrate the principles of chemistry and biochemistry into real-world food science and nutritional issues.
CLO 2	To identify the chemical structure of food components including fats, proteins, amino acids, carbohydrates and vitamins to understand how structure determines functional behavior of these food components with respect to food quality, nutrition and safety.
CLO 3	To reproduce chemical interactions and reactions with food components; differentiate their effects on the sensory, nutritional and functional properties of foods.

B. SYLLABUS

Module I: Carbohydrates

Classifications, structure and properties of carbohydrates; Role of carbohydrates (sugars, starch, cellulose, glucans, hemicelluloses, gums, pectic substances, polysaccharides) in food processing industry

Module II: Proteins

Physical and chemical properties of proteins; Protein denaturation and factors affecting it; Functional properties of proteins; Effect of processing and storage on food proteins

Module III: Lipids

Classifications and physico-chemical properties of food lipids; Hydrolytic and oxidative changes in lipids and their effect on food quality; Effect of frying and irradiation on food lipids; Modification of oils and fats

Module IV: Enzymes

Nature, classification and properties of food enzymes; Enzyme activity in different food systems; Use of enzymes in food processing with reference to hydrolyases, pectinases, invertase, isomerase, protease.

Module V: Vitamins, Minerals, Natural Pigments and Flavour Compounds and Water activity

Role of vitamins in food industry and effect of processing on them; Role of minerals in processed foods and effect of processing and storage on their bioavailability in products; Natural pigments of foods, their retention in food products during processing and storage; Flavour constituents of food, effect of processing on flavour retention; Bitter constituents and tannins in food. Water activity and its role in processing and storage of food products

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Fennema, OR. Principles of Food Science – Part I Food Chemistry. Mercel Dekker, New York, USA
- Harris, RS and Loeseke HV. Nutritional Evaluation of Food Processing, The AVI Publication Co. Inc., Westport, USA
- Meyer, LH. Food Chemistry
- Weiss, L. Food Oils and their Uses
- Richardson, T and Finley JW. Chemical Changes in Foods during Processing. The AVI Pub. Co. Inc., Westport USA

Course Name	Course Code	LTP	Credit	Semester
FOOD MICROBIOLOGY	**BTD 402**	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To introduce to students groups of microorganisms important for food industry
CLO 2	To acquaint with role of microbes in manufacture, preservation, spoilage of foods and in food poisoning
CLO 3	To develop theoretical and practical skills in Microbiological techniques

B. SYLLABUS

Module I: Microorganisms Important to Food Industry
The scope of Food Microbiology, Classification and identification of microorganisms important for food industry; Sources of microbial contamination at pre– and post– processing stages; Microbial Growth, Factors which influence growth of microorganisms in foods

Module II: Preservations of Foods
General methods of food preservation; Microbiology of Food preservations, Classification of preservation methods on the basis of action on microorganisms and severity of treatment

Module III: Microorganisms in Food Manufacture
Microbiology of fermented food products- Tempeh, Soy sauce, Sauerkraut, Yoghurt, Kefir, Kumis, Acidophilus milk, Bulgaricus milk, Baker's yeast, Beer, Cider Vinegar, Indigenous food products; Nutritional and therapeutic values of fermented foods

Module IV: Food Spoilage
Microbial spoilage of fruit and vegetable products; Microbial spoilage of cereals based products; Microbial spoilage of milk and milk products; Microbial spoilage of meat, fish and poultry products

Module V: Food Borne Illnesses and Food Poisoning
Growth of pathogens in foods and food borne diseases: Botulism, Salmonellosis, Shigellosis, Enteritis, Gastroenteritis, Listeriosis, Mycotoxins; Prevention of food-borne diseases; Food Hazards.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Adams M R and Moss M O. Food Microbiology
- Banwart, GJ. Basic Food Microbiology. Indian ed. CRAVI Publ. Co. Inc CBS Publ. & Distr., Delhi

- Jay, MJ. Modern Food Microbiology. CBS Publishers & Distributors, Delhi
- Frazier W.C. Food Microbiology. Tata McGraw Hill Publishing Co. Ltd., New Delhi

Course Name	Course Code	LTP	Credit	Semester
PRINCIPLES OF HEAT AND MASS TRANSFER	**BTD403**	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To integrate the principles of chemistry and biochemistry into real-world food science and nutritional issues.
CLO 2	To identify the chemical structure of food components including fats, proteins, amino acids, carbohydrates and vitamins to understand how structure determines functional behavior of these food components with respect to food quality, nutrition and safety.
CLO 3	To reproduce chemical interactions and reactions with food components; differentiate their effects on the sensory, nutritional and functional properties of foods

B. SYLLABUS

Module I
One dimensional steady state conduction through homogeneous and composite plane walls, Cylinders and spheres, Critical thickness of insulation

Module II
Concept of hydrodynamic and thermal boundary layers, Momentum and energy equation for boundary layers on a flat plate, Concept of free and forced heat convection, Application of dimensional analysis to free and force convection, Important dimensionless numbers

Module III
Thermal radiation, Kirchoff's law, Planck's distribution law, Wien's displacement law; Stefan-Boltzmann's relation, Configuration Factors, Radiant interchange between black and grey surfaces

Module IV:
Mass TransferSteady state molecular diffusion in fluids;

Module V:
Mass heat momentum transfer analysis; unsteady state diffusion; Diffusion in solids, Inter phase mass transfer

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Holman, J.P. (1997) Heat Transfer, 9th edition, McGraw-Hill
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International
- Cenegel. Heat Transfer. Tata-Mac Graw Hill Book Co. New Delhi
- Incropera, F.P. (1998) Fundamentals of Heat and Mass Transfer. John Weley
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Sons
- Dr D.S. Kumar, Heat and mass transfer, S.K. Kataria Publications
- Nag, P.K. (2002). Heat and Mass Transfer, TMH
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.

Course Name	Course Code	LTP	Credit	Semester
MECHANICS OF FLUIDS	**BTD 404**	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Define the different types of fluid and its properties.
CLO 2	Understand and analyze the different types of flow
CLO 3	Solve simple problems relating to fluid
CLO 4	Define, analyze boundary layer
CLO 5	Solve simple problems relating to the above concepts

B. SYLLABUS

Module I: Fluid Properties and Fluid Statics

Newtonian and Non-Newtonian Fluids;, Characteristics of non-Newtonian fluids Kinematics and Dynamic Viscosity; Incompressible and Compressible fluids, compressibility. Forces on plane surfaces, stability of floating bodies, metacentre and metacentre height.

Module II: Kinematics of Fluid Motion

Steady and unsteady flow; uniform and non-uniform flow; Laminar and Turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, vortex lines, vortex tubes, free and forced vortex.

Module III: Dynamics of Fluid Flow

Euler's equation of motion and its integration to yield Bernoulli's equation, graphical representation of Bernoulli's equation and its practical applications – Pitot tube, Venturi meter; steady flow momentum equation, force exerted by jet against plane surface

Module IV: Dimensional Analysis and Principles of Similarity

Buckingham p-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates, measurement of viscosity. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – William's formula.

Module V: Analysis of Pipe Flow

Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel. Flow rate and pressure drop relationships for Newtonian fluids flowing through pipe.

Measurement of flow using Venturi meter, orifice meter, Pitot tube, Flow nozzle, measurement of flow in open channels- rectangular, triangular, trapezoidal weir, Cipoeletti weir. Basic thermodynamic relations and thermodynamic processes for Compressible flow. Pumps and pumping systems

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- R K Basal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002
- D S Kumar, "Fluid Mechanics and Fluid Power Engineering", S K Kataria & Sons, 2000
- I H Shames, "Mechanics of Fluids", Tata McGraw Hill\
- V L Streeter and E B Wylie, "Fluid Mechanics", Tata McGraw Hill.

Course Name	Course Code	LTP	Credit	Semester
FOOD CHEMISTRY LAB	**BTD 421**	0:0:2	1	4

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A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To integrate the principles of chemistry and biochemistry into real-world food science and nutritional issues.
CLO 2	To identify the chemical structure of food components including fats, proteins, amino acids, carbohydrates and vitamins to understand how structure determines functional behavior of these food components with respect to food quality, nutrition and safety.
CLO 3	To reproduce chemical interactions and reactions with food components; differentiate their effects on the sensory, nutritional and functional properties of foods.
CLO 4	To explain how temperature, pH, ionic strength, type of bonds, aw affect chemical changes in food systems and how to adjust these conditions
	To integrate the principles of chemistry and biochemistry into real-world food science and nutritional issues.

B. SYLLABUS

1. Determination of moisture content
2. Determination of ash content
3. Determination of protein content
4. Determination of fat content
5. Determination of minerals (Ca, P, Fe)
6. Estimations of reducing and total sugars
7. Estimations of starch content
8. Estimation of crude fiber

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Food Chemistry by L H Meyor (CBS Publisher, Delhi)
- Food Facts and Principal by N. Shakuntala Manay & M. Shadaksharaswamy (New Age International (P) Ltd. Publishers, New Delhi)

Course Name	Course Code	LTP	Credit	Semester
FOOD MICROBIOLOGY LAB	**BTD 422**	0:0:2	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the nature and role of microorganisms in Food, Beverages, Dairy Industries.
CLO 2	Develop theoretical and technical microbiological skills required for the ways to Isolate and identify bacteria and control microbial growth by physical and chemical means

B. SYLLABUS

1. Total plate count of selected foods.
2. Microbiological examination of Canned / Bottled food products.
3. Microbiological examination of Fruits and vegetables.
4. Microbiological examination of Egg / Egg products
5. Microbiological examination of Cereal products
6. Microbiological examination of Milk and Milk products
7. Microbiological examination of Meat/ Meat products
8. Determination of a milk sample by Methylene Blue Reduction Test.
9. Coliform testing in portable water
10. Examination of microbial count in Production line study.
11. Determination of BOD and COD of food plant effluents.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Collins, CH, Lyrie PM and Crang J. M. Microbiological Methods. Academic Press, New York
- Aneja,K.R. Experiments in microbiology, Plant pathology and Biotechnology. New Age international publishers.

Course Name	Course Code	LTP	Credit	Semester
PRINCIPLES OF HEAT & MASS TRANSFER LAB	**BTD 423**	0:0:2	1	4

B. SYLLABUS

1. Conduction - Composite wall experiment
2. Conduction - Composite cylinder experiment
3. Convection - Experiment on heat transfer from tube-natural convection.
4. Convection - Heat Pipe experiment.
5. Heat exchanger - Parallel flow experiment
6. Heat exchanger - Counter flow experiment
7. Experiment on critical insulation thickness.
8. Conduction - Determination of thermal conductivity of fluids.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Cenegel. Heat Transfer. Tata-Mac Graw Hill Book Co. New Delhi
- Incropera, F.P. (1998) Fundamentals of Heat and Mass Transfer. John Weley
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Sons
- Dr D.S. Kumar, Heat and mass transfer, S.K. Kataria Publications

Course Name	Course Code	LTP	Credit	Semester
MECHANICS OF FLUIDS	BTD 424	0:0:2	1	4

B. SYLLABUS

1. Study of pressure measuring devices
2. Verification of Bernoulli's theorem
3. Studies on rotameter/ orifice meter/venturimeter/V-notch
4. To find major head loss in pipe line (sudden expansion/contraction/bend)
5. Study of friction factor for turbulent flow in smooth and rough pipe
6. Experiment on Reynold's apparatus.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- I H Shames, "Mechanics of Fluids", Tata McGraw Hill\
- V L Streeter and E B Wylie, "Fluid Mechanics", Tata McGraw Hill.

Course Name	Course Code	LTP	Credit	Semester
Term Paper	**BTD 430**	3:0:0	3	4

B. SYLLABUS

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

19. Choosing a subject
20. Finding sources of materials
21. Collecting the notes
22. Outlining the paper
23. Writing the first draft
24. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

h) Begin by making a list of subject-headings under which you might expect the subject to be listed.

i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author's conclusion.

h) In research studies, notice the methods and procedures, results & conclusions.

i) Check cross references.

4. Outlining the paper

g) Review notes to find main sub-divisions of the subject.

h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
u) Check for proper spelling, phrasing and sentence construction.
v) Check for proper form on footnotes, quotes, and punctuation.
w) Check to see that quotations serve one of the following purposes:
(x) Show evidence of what an author has said.
(xi) Avoid misrepresentation through restatement.
(xii) Save unnecessary writing when ideas have been well expressed by the original author.
x) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

22) Title page
23) Table of contents
24) Introduction
25) Review
26) Discussion & Conclusion
27) References
28) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be

disregarded. There are a number of key components which should not be omitted. These include:

l) summary of question posed
m) summary of findings
n) summary of main limitations of the study at hand
details of possibilities for related future research

SUGGESTED READINGS

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter. [(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

EditedArticles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	50%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	50%

Course Name	Course Code	LTP	Credit	Semester
COMPUTER SIMULATION & MODELING IN FOOD PROCESSING	**BTD431**	3:0:0	3	4

B. SYLLABUS

Module I: Modelling and simulations
Introduction to modelling and simulations. Classification of partial differential equations, numerical formulations, grids, Initial and boundary conditions, finite difference equations, finite element methods (FEM)

Module II: Modelling of unit operations-I
Moisture, gas and aroma/odour diffusion in food materials. Modelling of heat exchanges, modelling of aseptic processing of liquid and particulate foods.

Module III:
Modelling of ohmic heating, hydrostatic pressure processing and pulsed electric field.

Module IV: Modelling of unit operations-II
Modelling and computational study of UV processing, ozone processing, radio frequency heating, ultrasound processing. Stochastic finite element analysis of food process.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Soojin JunJoseph M. Irudayaraj. (2009). Foodprocessingoperationsmodeling. Design and Analysis. Second edition, CRC press, Boca Raton.
- Kai Knoerzer, Pablo Juliano, Peter Roupas, and Cornelis Versteeg. (2011) Innovative Food Processing Technologies: Advances in Multiphysics Simulation, First Edition. John Wiley & Sons, Ltd., West Sussex, UK.

Course Name	Course Code	LTP	Credit	Semester
ENZYMES IN FOOD PROCESSING	**BTD 432**	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the Characteristics of enzyme, classification and nomenclature of enzymes
CLO 2	Basic knowledge of Enzyme Biochemistry and enzyme kinetics.
CLO 3	Understand the basics of enzyme isolation and purification methods.
CLO 4	Identify the immobilization techniques and factors affecting it.
CLO 5	Know application of enzymes in food processing

B. SYLLABUS

Module I: Introduction-Definition-Historical highlights-classification of enzymes-nomenclature- structural features of enzyme-Methods of extraction and purification of enzymes.

Module II: Mechanism of enzyme action
Specificity-types of specificity-role of 3D structure -active site-substrate and enzyme concentration relationships-different effects –pH and temperature.

Module III: Enzyme kinetics
MM equation, Lineweaver Plot, - kinetics. Immobilization-need for immobilization-advantages –disadvantages-immobilization techniques- -effects of pH, temperature, substrate concentration, stability, kinetic properties-role of immobilized enzymes in food processing-commercial food application.

Module IV: Enzymes of food importance
Endogeneous enzymes in food quality- color- lipoxynase, chlorophyllase, polyphenol oxidase ,texture- Pectic enzymes, Amylases, cellulases, proteases, flavour and aroma-nutritional quality.

Module V: Application of enzymes in food industries
Mechanism and application of enzymes in food processing-enzymatic browning.Application of enzyme in meat industry, fruit and vegetable industry, dairy industry- bakery industry.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Price, N. L. and StevenL., “Fundamentals of Enzymology”, Oxford Scientific 2000.
- Godfrey T. West S (Eds), “Industrial Enzymology” 2nd Edition Mac Millan Press, London 1996.
- Robert J.Whitehurst and Barry A. Law. Enzymes in food technology Sheffield packaging technology.
- Asokan, P,“Enzymes”.Chinna publications,Tamil nadu 2003.
- Colowick,S.P.and Kalpan,N.O.(Eds), “Methods of enzymology” Academic press 1977.
- Tauber ph.D and Hentry,“Enzyme technology” 2000.

Course Name	Course Code	LTP	Credit	Semester
MARKETING MANAGEMENT FOR FOOD	**BTD433**	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the environment in which marketing works.
CLO 2	Observe how companies are utilizing their marketing mix in order to attract and retain customers.
CLO 3	Apply the concepts to improve their skills related to marketing and to improve decision making.
CLO 4	Visualize the advancements in Marketing.

B. SYLLABUS

Module I: Introduction

Introduction to marketing and management. Marketing concepts and marketing systems and its functions. Link between agriculture and food industry, Introduction to marketing boards, co-operatives and others. Market liberalization, its role, strategies, impact and economics.

Module II: Marketing management, strategies, planning and control

Introduction to Entrepreneurship, strategy, policy, planning and control. Marketing planning process, monitoring and evaluation. Need, objectives and process for new product development. Factors impact buyer behavior and market segmentation.

Module III: Commodity marketing and Product management

Commodity and its marketing, stages and challenges in commodity marketing, product and its definitions, product line, brand, product management models.

Module IV: Pricing management, channel management and physical distribution

Objectives, strategies, types and decisions of commodity, breakeven analysis, pricing, cost, revenue and supply relationship. Channel management, middleman and their role, distribution channels, concept and its technological advancements. Warehouse, inventory, logistics and transport management.

Module V: Marketing communication, research, cost and margins

Nature, objectives and factors of marketing communication. Advertisement, sales promotion, sales force, agents, promotions and budget for communication of commodity. Purpose and steps involved in market research. Objectives and structure of marketing cost and margins

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- David D. Van Fleet, Ella W. Van Fleet, and GeorgeJ. Seperich. (2014), Agribusiness: Principles of Management.Cengage Learning, New York.
- Freddie Barnard, Jay Akridge, Frank Dooley, John Foltz (2012). Agribusiness Management. Fourth edition, Routledge, New York.
- I.M. Crawford. (1997). Agricultural and food marketing management. Food and Agriculture Organization of the United Nations. Rome.ISBN 92-851-1003-7.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
COMMUNICATION SKILLS - II	**BCS 401**	1:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify steps to professional communication
CLO 2	Identify the key components of meeting, agendas and meeting minutes
CLO 3	Understand the key skills and behaviors required to facilitate a group discussion/presentation
CLO 4	Polish current affairs & rapport building

B. SYLLABUS

Module I: Social Communication Skills
Small Talk
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Professional Skills
Presentations
Negotiations
Meetings
Telephony Skills
GD-2 (Specifically: Social & Political)

EXAMINATION SCHEME:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

SUGGESTED READINGS

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

Course Name	Course Code	LTP	Credit	Semester
BEHAVIORAL SCIENCE-IV	**BSS 404**	1:0:0	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify the domains to develop as an individual society and nation level.
CLO 2	Recognize different ways to achieve personal excellence, professional power and professional success.
CLO 3	Analyse different techniques for career planning, setting goals to maintain focus, stress management for healthy living.
CLO 4	Apply different skills to achieve personal and professional success.

B. SYLLABUS

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management

Impression Management Techniques (Influencing Skills)

Impression Management Training-Self help and Formal approaches

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

SUGGESTED READINGS

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan, D. (2005). Information and Knowledge Management. Macmillan India Ltd. Delhi

Course Name	Course Code	LTP	Credit	Semester
FRENCH - IV	**FLT 401**	2:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts.
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.

Unité 1 Premiers pas en France. Page: 1-17 Leçons 0, 1, 2 & 3

Contenu Lexical:

1. Les mots transparent (en sciences)
2. Quelquesprénomsfrançais
3. La prise de contact
4. La politesse
5. Les salutations
6. La famille
7. Les présentations
8. Quelquesspécialitésscientifiques
9. Les Chiffres de 0 à 20
10. Les ordinaux
11. L'adressepostale
12. L'adresse mail
13. Le numéro de téléphone

Contenu Grammatical:

1. Les accents
2. Etre au présent
3. Les articles indéfinis
4. Les pronomspersonnels
5. Le feminin et le masculin
6. Les prépositions de lieu
7. Les articles définis
8. Avoir, étudier, habiter au présent, Les verbs du 1 er groupe au présent
9. Les adjectifspossessifs au singulier
10. Les pronomstoniques
11. L'interrogation

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	LTP	Credit	Semester
Introduction to Industrial Microbiology	MMC 101	4:0:0	4	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc.

B. SYLLABUS

Module I: Present perfect tense
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

Module II: Letter writing
To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

Module IV: Past tense
Introduction to simple past tense; Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale
Comprehension and narration
- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module VII: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

EXAMINATION SCHEMETotal: 100 marks

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- **: Lessonsfrom 11 onwardsfromDeutschalsFremdsprache -1B, INBH & Oxford, New Delhi, 1977**
- **Studio D A1** by Hermann Funk, Christina Kuhn and Silke Demme, Cornelsen, 2013
- **Tangram A1**by Rosa Maria Dallapiazza, Eduard von Jan & Till Schoenherr, Max Hueber, 2007
- **Sprachtraining**A1 by Rita Maria Niemann, Dong Ha Kim, Cornelsen, 2013

Course Name	Course Code	LTP	Credit	Semester
SPANISH - IV	**FLS 401/411**	2:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc

B. SYLLABUS

Module I
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

Module II
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, Doler

Module III
Imperatives (positive and negative commands of regular verbs)

Module IV
Commercial/ business vocabulary

Module V
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

Examination Scheme:

Continuous Evaluation (Total 50 Marks)	End Sem Evaluation (Total 50 Marks)

Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

- Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005
- Pasaporte Nivel (A1) byMatideCerraloza Aragón, oscarCerraloza Gilli, Begoña Llovet Barquero, EdelsaGroup didascalia, S.A. 2005

Course Name	Course Code	LTP	Credit	Semester
CHINESE – IV	**FLC 401**	2:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.

CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc.

B. SYLLABUS

Module I

Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

Module II

Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

Module III

Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV

Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

Module V

Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**

10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

1. Learn Chinese with me book-II. (Major Text Book)
2. Module on HSK-II. (suggested reading)
3. Practical Chinese Grammar for foreigners. (suggested reading)
4. Chinese Dictionaries: Chinese to English & English to Chinese. (reference books)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM-IV	AND004	2:0:0	2	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

INTRODUCTION

Aanandam is a credited subject that aims to instill the joy of giving and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the

habit of community service in students. The faculty will emphasize shift in focus- Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone.

The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:

- Awareness and empathy regarding community issues
- Interaction with the community and impact onsociety
- Interaction with mentor and development of Student teacher relationship
- Interaction among students, enlarge social network
- Cooperative and Communication skills and leadership qualities
- Critical thinking, Confidence andEfficiency

AANANDAM: COMMUNITY SERVICE

- Community service programs are very effective for students' personal and social, ethical, and academic development. These effects depend on the characteristics of the programs chosen
- Involvement of students in community work has an impact on development of student skills, creativity, critical thinking, and innovative powers. Passion and Positivity are basic requirements for Community service
- They would examine social challenges /problems, assess the needs of the community, evaluate previous implemented projects, and think of further solutions
- They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities. BENEFITS TO THE STUDENTS

Students should dedicate time as a volunteer as it helps them to:

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- obtain employment
- be useful to society as it will protect them against stress, frustration, anddepression

ABOUT AANANDAM COURSE

Students are expected to engage in:

- An individual act of goodness – caring, sharing and giving (time and energy) everyday group activity – a project in service of the local community (Group Community Service Project)
- Aanandam Day- will be celebrated once a month in the last week as decided by Director/HoIs.
- It is a credited subject. Marks/ Grades both will be entered in the marks sheet as per the university rules.
- Two credits for a project in each semester
- 50 marks for each project to be completed in 4 Months.

DIRECTIONS FOR STUDENTS

· Do at least one individual act of goodness each day and Record this act in a dedicated diary/register
· Share this dedicated diary/register in a 30-minute Anandam period with the mentor and share your experience with the class
· Students in Semester scheme must take up one Group Community Service Project persemester
· Students in Annual scheme must take up two Group Community Service Projects per year
· Take one Group Community Service Project from August to November
· Take one Group Community Service Project from January to April
· The students must take photographs to document theirwork
· The students can obtain certificate from the NGO/ Government Agency they are working with for Group Community Service Project
· The students may submit newspaper cuttings
· The students must participate in the Aanandam Day by displaying charts of their Group Community Service Project
· They can make power point presentations of their project which will help them get bettergrades

ROLE OF FACULTY MENTOR

· The mentor will maintain a register wherein the entry of act of goodness will be tick mark and be submitted every day to the Director/HoIs
· Review every student's dedicated register to see if they have recorded an act of goodness for that day and mark in register. The act will not be evaluated - just if it was recorded or not. (Be suggestive not judgemental)
· In half an hour class some students and faculty will deliberate on the pleasure of giving and acts of goodness. This should be done by rotation so that all students get a chance to speak and express themselves
· The mentor will divide the class for the Group Community Service Project and record it in a register. 8 -12 students can form a group for project work.
· The students will opt the project of their choice.
· The mentors can mobilize the required resources and support for the projects. They can coordinate and collaborate with Government bodies or NGOs.
· The mentor will guide the students towrite the Group Community Service Project Report.
· Mentors will review the project on monthly basis and submit the report to the nodal officer of the college to compile and share with higher authorities on Google spreadsheet

ROLE OF DIRECTOR/HOIS

· Allot one period of half an hour for Aanandam course
· Assign all faculty members as mentors for this period of half an hour for students
· Each faculty will have one class to mentor
· Appoint one faculty as department Aanandam Coordinator to monitor the program in their department and submit the monthly report to the University Nodal Officer which he/she will submit further to DCE – Govt. of Rajasthan.
· To coordinate the Aanandam Day activities
· To organize Aanandam Day in the last week of the month. A film or motivational lecture by some philanthropist (Bhamashah, Collector, Janpratinidhi) should be organized for the benefit of students (to motivate and inspire them for community service)

· Photographs of the Aanandam Day should be displayed in department and these should be uploaded in the gallery of University web page on HTEportal
· A Project Assessment Committee (PAC) to be constituted to assess the project report.

PROJECT ASSESSMENT COMMITTEE

Formation of Project Assessment Committee

· Director/ HoIs
· One person fromcommunity
· Departmental Aanandam Coordinator
· Project Mentors (1 to 7 or moremembers)

The number of mentors can vary depending on the number of projects and students in each department.

· University level PAC to be formed for university colleges and departments
· State level PAC to be formed at Commissionerate level for Universities

PROJECTS: SUGGESTIVE LIST

The students and mentor as per their interest would support activities of community service such as:

Ø literacy programs, in today's digital age many organizations/individuals might also need help with email and websites Ø livelihood projects,

Ø time giving activities to adopted communities (awareness regarding Govt. programmes) sports like yoga, meditation, drills, and physical exercises in adopted areas

Ø activities on arts and culture such as restoration of traditional art and culture and monuments. Ø understand their responsibility in taking care of environment and appreciating cultural diversity

Ø While some students would be interested in awareness about environment such as protecting and preserving natural resources and animal species (the flora and the fauna). Plantation and animal care centers

Ø A few would be concerned with healthcare like medical and dental missions, first-aid training, etc.

Ø Another group may be formed for attending to old people (who have money but need assistance for market and groceries) [Time Bank]

Ø Another group may be formed for civic activities, awareness programmes. Ø Local social problems to be taken up and solutions devised

Ø Innovations and Startups to be encouraged

Ø help plant a community garden, help out at a children's camp

THE PROJECT REPORT

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
\ · Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)
· Location / community where the work was carried out
· Details of Activities performed are to be given with date
· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self - reliant)
· Photographs taken for documentation of work should be submitted
· Media coverage of the projects should be attached if any

· Students should also submit their certificates from the government bodies and or nongovernment bodies they collaborate with, if any
· Photographs of Display charts or ppt/video prepared while presentation on the group community service in the Aanandam Day must be submitted along with the report
· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
· University will forward the report to the state level committee.

PROCEDURE FOR EVALUATION

· Project Assessment Committee will assess the Group Community Service Project Report
· submitted by the students, in the duly filled given format, based on:
· Submission of the student dedicated daily diary as per student attendance norms students' performance and interaction with thecommunity
· presentation of the project report
· impact on society and the course outcomeresults

Format for evaluation by Project Assessment Committee (Total max marks 50)

· Submission of register of everyday activity mandatory (if register is not submitted by the student, he/she will not be evaluated and considered for the award)
· Report contains presentation /video (max.10 marks)
· Photographs of Students' participation and involvement of community (max.10 marks)
· Problem solving and challenging issues addressed/ innovation (max. 30 marks)

AWARD AND RECOGNI TION DEPARTMENT, UNIVERSITY AND STATE LEVEL

· Based on the impact on society and Aanandam project outcome one Group Community Service Project will be selected by the Project Assessment Committee at department level for award of best project of the Department.
· The best project report of the University will be submitted to the Director, College Education/ Department of Higher and Technical Education forcontesting the state level award
· State Level Project Assessment Committee will evaluate projects received from all the universities (one each).
· A certificate/letter of appreciation to the winning teams (Nodal officer of the university, students, and mentor of the project) will be given

EVALUATION: GRADES EQUIVALENCE

Project Assessment Committee constituted will assess the projects.

For 4 months Group Community Service Project the grade equivalence is as follows:

Total: 64 Hrs Grading Marks

C grade =32 hrs

B grade >32hrs to <=44hrs

A grade >44hrs to<=54hrs

O grade >54hrs to<=64hrs

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.

Course Name	Course Code	LTP	Credit	Semester
FOOD QUALITY – ANALYSIS, ASSURANCE AND Adulteration	**BTD 501**	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain the concept of food quality and importance of maintaining quality of prepared food products by applying fundamental knowledge, through in-class discussions, clicker questions, electronic simulations and exam questions
CLO 2	Appreciate the contributions of important advancement in food quality management systems and the historical development of the different organizations in order to understand contemporary safety and quality issues in a modern context, through clicker questions, class discussion and exam questions
CLO 3	Critically evaluate primary quality literature and interpret case studies in the context of quality management, in in-class discussions, clicker questions and exam questions

B. SYLLABUS

Module I: Introduction

Definition of food quality control, Quality assurance and safety, Factors affecting it; Quality attributes; Responsibilities and Role of quality control section. Food Adulteration and contamination, recent food safety issues

Module II: Quality Control Systems

Food safety Hazards, Hazard Analysis and Critical Control Points (HACCP), Risk management, Good Practices (GMP, GLP, GHP)

Module III: Food Laws and Food Standards

Food Safety Standards Act, FSSAI, FSSAI Initiatives, Pre- FSSAI acts and Orders (PFA, FPO, MMPO etc.), BIS, International Organization for Standardization (ISO) and ISO standards (ISO 9000, ISO 22000), Codex

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Amerine, MA Pangborn RM and Roseller EB. Principles of Sensory Analysis of Foods, Academic Press
- De Man JM. Rheology and Texture in Food Quality
- Ranganna, S. Handbook of Analysis and Quality Control for fruit and vegetable Products. Tata McGraw Hill Book Co. Pvt Ltd.
- Pomeranz, Y. Food Analysis: Theory and Practice.
- Kramer, A. and Twig BA. Quality Control for Food Industry
- BIS. Handbook of Food Analysis and other related Publications

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF FRUITS AND VEGETABLES	BTD 502	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To acquaint students with post- harvest handling operations.
CLO 2	Processing and preservation of fresh commodities.
CLO 3	Minimal processing, thermal processing, freezing and other methods of processing.
CLO 4	Processed fruit and vegetable products.

B. SYLLABUS

Module I: Post Harvest Technology of Fresh Fruits and Vegetables

Difference between fruits and vegetables; Status of Indian fruit and vegetable processing industry; Major fruits and vegetables of India. Fresh fruits and vegetables as living produce; Post harvest handling and transport of fresh commodities; Cold chain management; Storage and packaging of fresh fruits and vegetables.

Module II: Canning, Drying and Freezing of Fruits and Vegetables

Introduction; advantages and limitations of minimally processed products; Quality requirements for raw materials; Methods for minimal processing of fruits and vegetables, their packaging and storage; organic foods and their processing, Selection of raw materials; Methods of sun drying and dehydration for fruits and vegetables; Factors affecting drying rate; Osmotic drying; Intermediate moisture foods; Packaging and storage of dried products; Process for freezing; Effect of freezing process on quality of frozen products; Packaging and storage requirements for frozen products and their quality standards.

Module III: Sauces, Chutney, Pickles, Tomato and Tomato Products

Basic principles of preservation; Methods for preparation of sauces, chutneys and pickles; Common defects of products and their control; Quality standards; Vinegar as ingredient – types, methods of preparation, post-production processes, causes of spoilage

Selection of tomatoes for processing; Tomato pulp, juice and concentrated products; Methods for production of tomato soup, sauce, ketchup and other tomato products; Defects of tomato sauce / ketchup and their control.

Module IV Jams, Jellies and other High Sugar Products

Introduction, standards for high sugar products; Principles of jam, jelly and marmalade making, types of pectin required for them; Theories of gel formation; Jelly defects and their control; Preserves, candied fruits, glazed and crystallized fruits and peels – pretreatments of fruits and vegetables and methods for making these products.

Module V: Module II: Minimal Processing

Selection and preparation of raw materials; Syrups and brines; Canning and bottling processes with flow charts for fruits and vegetables and factors affecting processing; Effect of thermal processing on quality of canned product

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Srivastava R.P. and Kumar S. Fruit and vegetable preservation: principles and practices. CBS publishers.
- Morris, TN. Principles of Fruit Preservation. Biotech Books, Delhi.
- Pantastico, E. B. Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetables. AVI Publishing Co. Inc, Westport.
- Rydstm Heele, S, Post Harvest Physiology and Pathology of Vegetables. Marcel Dekker.
- Woodroof JG and Luh BS. Commercial Preservation of Fruits. The AVI Pub. Co. Westport, USA.

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF MILK AND MILK PRODUCTS	**BTD 503**	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the physical and chemical properties of milk and milk products
CLO 2	Describe the different treatments of milk such heating, homogenization, centrifugation, agitation filtration, concentration and fermentation
CLO 3	Prepare/manufacture different dairy products such as cream, butter, ghee, yoghurt, cultured milk, ice cream and cheese using simple and industrial techniques

B. SYLLABUS

Module I: Technology of Fluid Milk

Introduction – Definition, composition, physico-chemical and nutritional properties of milk; Collection, chilling and transportation of fluid milk, clean milk production; Standardization, homogenization and pasteurization of milk; Market milk, standards and quality tests for market milk; Sterilized milk and flavoured milk , CIP system and detergency.

Module II: Cream, Butter and Ghee

Types of cream, composition and production methods; Cream separator; Ripening of cream; Types of butter, composition and production methods; Factors affecting churn-ability of cream; Defects of butter; Production of butter, oil / ghee.

Module III: Fermented Milk Products

Methods for manufacture, packaging, storage and marketing of fermented milks, i.e., dahi, cultured butter milk, yoghourt, acidophilus milk, kumiss, kefir, etc, Cheese: classification, method for manufacture of cheddar cheese, defects and their control

Module IV: Evaporated, Condensed and Dried Milk

Definition, composition and standards; Manufacturing methods for evaporated and condensed milk; Milk powders, baby foods: methods for manufacture, packaging and storage; Defects and their control

Module V: Module III: Frozen and Indigenous Milk Products

Classification, composition, manufacture of ice cream; Packaging, storage and marketing of ice cream; Kulfi and other frozen milk products; Defects of frozen products and their control,

Principles and practices for manufacture, storage and marketing of khoa, rabri, channa, paneer, shrikhand, milk based sweets.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- De, Sukumar, Outlines of Dairy Technology. Oxford University Press, Oxford.
- Eckles, Combs and Macy. Milk and Milk Products.
- Jensen, RG. Handbook of Milk Composition. Academic Press. California.
- Warner IN. Principles of Dairy Processing.

Course Name	Course Code	LTP	Credit	Semester
FOOD ENGINEERING – I	**BTD 504**	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Gives idea about engineering process in industry
CLO 2	Learn the various equipments used in food industry.
CLO 3	Understand the concept of working equipments used in food industries

B. SYLLABUS

Module I: Introduction

General concepts and unit operations; Thermodynamics principles applied to food processing;

Module II Kinetics

Reaction kinetics for food processing; Mass and energy balance.

Module III: Size Reduction and Mixing

Principles involved in size reduction, energy requirements; Size-reduction equipments; Laws governing mixing operation; Mixing equipments; Measurement of mixing.

Module IV: Separation Processes-I

Basic principles, equipments and systems of Mechanical separation process- Screening; Filtrations; Sedimentation processes for low and high concentration suspensions; Centrifugation; Osmotic separation.

Module V: Separation Processes-II

Solvent extraction, leaching and distillation processes.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Earle, RT. Unit Operations in Food Engineering. Pergamon Press.
- Sahay, KM and Singh, KK. Unit Operations of Agricultural Processing. Vikas Publishing House.
- Singh, RP and Heldman, DR. Introduction to Food Engineering. AVI Publ., Westpott, USA.

- Valentas, K.I., Rostein, E and Singh, RP. Handbook of Food Engineering Practices. CRC Press.
- Watson, EL and Harper, JC. Elements of Food Engineering. AVI Publ. Co, Westport, USA.
- McCabe, W., Smith, Harriot,P. Unit Operations of Chemical Engineering, McGraw-Hill

Course Name	Course Code	LTP	Credit	Semester
STATISTICS FOR BIOLOGY	**BTD 505**	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on Microorganisms and their use in different industries
CLO 2	Acquire industrial skills of microbial culture, growth, and practices
CLO 3	Demonstrate the advanced application of Microbes in emerging industrial sectors

B. SYLLABUS

Module I: Measures of Dispersion

Significance of a good measure of variation, Properties of a good measure of variation, Interquartile range, Moments about mean ,Mean deviation, Standard deviation, Median, Mode, origin and any point, Skewness and Kurtois, Pearson's β and γ coefficients.

Module II: Correlation & Regression

Correlation: Introduction; Importance; Types; Karl Pearson's coefficient of linear correlation and Spearman's Rank correlation. Regression Analysis: Introduction; Two lines of Regression; Regression Coefficient in a bivariate frequency distribution; Standard error of the estimate.

Module III: Sampling and Test of Significance

Population, Sample, Parameter & Statistic, Sampling theory, Methods of sampling: Random sampling: Simple Random, stratified, Systematic and Multi Stage sampling, Non-Random Sampling: Purposive, Cluster, Quota, convenience and Sequential Sampling.

Null hypothesis, Alternative hypothesis, Critical region, Type I Error, Type II Error, Level of significance, Test of significance for large samples: Normal test for sample mean and population mean, normal test for two sample means, Test of significance for small samples: t-distribution, F-distribution, Chi-Square distribution, Test of goodness of fit, Test of independence and Analysis of Variance (ANOVA) – one way classification model.

Module IV: Statistical Quality Control

Control Charts, $\overline{x}$, R and C charts, Control chart for P(fraction defective), Acceptance sampling.

Module V Analysis of Time Series

Utility of Time series analysis, Components of time series, Measurement of Trend: Graphic method, Method of semi-averages, Method of moving averages, the method of least squares, Ratio to Trend Method, Ratio-to-Moving average method, Link relative method.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S. Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.
- Data Analysis and Classification for Bioinformatics, A Jagota, Bioinformatics by the Bay Press.
- Introduction to Probability Theory, PG Hoel, Houghton Mifflin College.
- Introduction to Statistical Theory, PG Hoel, SC Port, CJ Schiller, RA Srinivasan, A. Srivasan, McGraw-Hill Trade.
- Schaum's Outline of Probability, Random Variables and Random processes, hp Hsu, McGraw-Hill Trade.
- Statistical Methods in Bioinformatics: An Introduction, GR Grant, W J Ewens, Springer Verlag
- Fundamental of Biostatistics, Bernard Rosner, Oxford University Press.

Course Name	Course Code	LTP	Credit	Semester
FOOD QUALITY – ANALYSIS AND ASSURANCE LAB	BTD 521	0:0:1	1	5

B. SYLLABUS

1. HACCP plan for bakery industry
2. HACCP plan for the fruit and vegetable industry
3. HACCP plan for the dairy industry
4. Construting the decision chart for the HACCP implementation
5. Common tests for detection of food adulteration
6. Internal Audit of food premises
7. Implementation of clean street food hub
8. Food hygiene rating for food premises

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Clifton M & Pomeranz Y. 1988. Food Analysis - Laboratory Experiments. AVI Publ.
- Gruenwedel DW & Whitaker JR. 1984. Food Analysis Principles and Techniques. Vol. I. Physical Characterization. Marcel Dekker.
- Gruenwedel DW & Whitaker JR. 1984. Food Analysis Principles and Techniques. Vol. II. Physicochemical Techniques. Marcel Dekker.

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF FRUITS AND VEGETABLES LAB	**BTD 522**	0:0:1	1	5

B. SYLLABUS

1. Canning of fruits and cut-out test for canned fruits
2. Canning of vegetables and cut-out test for canned vegetables
3. Dehydration of fruits / vegetables and evaluation of dried products
4. Freezing of fruits / vegetables and evaluation of frozen products
5. Preparation of jam / jelly / marmalade / preserve and its evaluation
6. Preparation of fruit beverage and its evaluation
7. Preparation of fruit chutney / pickle and its evaluation
8. Preparation and evaluation of tomato sauce / ketchup
9. Testing of vinegar
10. Minimal processing of fruits / vegetables.
11. Visit to food processing industry

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Food Preservation and Processing, Manoranjan Kalia & Sangita Sood.
- Food Science, N. N. Potter, C B S Publishers & Distributors.

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF MILK AND MILK PRODUCTS LAB	**BTD 523**	0:0:1	1	5

B. SYLLABUS

1. Sampling of milk, platform tests
2. Determination of specific gravity, milk fat, SNF and TS percentage in milk
3. Cream separation and standardization of milk and cream
4. Preparation of toned/humanized/fortified/reconstituted/flavoured milk
5. Preparation and grading of butter
6. Preparation of cheese
7. Preparation of channa and paneer
8. Preparation of Khoa / ghee
9. Preparation of ice-cream .
10. Preparation of indigeneous milk product – shrikhand / kalakand / milk-cake
11. Visit to a dairy plant producing condensed milk / milk powder.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Sukumar De. Outlines of Dairy Technology. Oxford University Press
- Rangappa KS. Indian Dairy Products. Asia Publishing House
- Farrall AW. Engineering for Dairy and Food Products. John Wiley and Sons
- V. Cheke & A. Sheeprd. Cheese and Butter. Agrobios (India)

Course Name	Course Code	LTP	Credit	Semester
FOOD ENGINEERING LAB – I	**BTD 524**	0:0:1	1	5

B. SYLLABUS

1. Studies on sedimentation / filtration
2. Use of extraction columns
3. Studies on size reduction equipments.
4. Screen/sieve analysis
5. Experiment based on Stoke's law.
6. Calculation of power load for instrutments
7. Calculation of RCF using centrifuge.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Deman J.M. Rheology and Texture in Food Quality.
- Valents, KJ, Rostein, E and Singh, RP. Handbook of Food Engineering Practices. CRC Press

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	**BTD 530**	3:0:0	3	5

B. SYLLABUS

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

k) Begin by making a list of subject-headings under which you might expect the subject to be listed.

l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

j) Get facts, not just opinions. Compare the facts with author's conclusion.

k) In research studies, notice the methods and procedures, results & conclusions.

l) Check cross references.

4. Outlining the paper

i) Review notes to find main sub-divisions of the subject.

j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final Paper

y) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
z) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
aa) Check for proper spelling, phrasing and sentence construction.
bb) Check for proper form on footnotes, quotes, and punctuation.
cc) Check to see that quotations serve one of the following purposes:
    (xiii) Show evidence of what an author has said.
    (xiv) Avoid misrepresentation through restatement.
    (xv) Save unnecessary writing when ideas have been well expressed by the original author.
dd) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

29) Title page
30) Table of contents
31) Introduction
32) Review
33) Discussion & Conclusion
34) References
35) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

o) summary of question posed
p) summary of findings
q) summary of main limitations of the study at hand
r) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographicalconventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

EditedVolumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter. [(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

EditedArticles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

ElectronicJournalArticles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

OtherWebsites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

UnpublishedTheses/Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation,

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints.

Assessment Scheme:

Continuous Evaluation:
40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

Course Name	Course Code	LTP	Credit	Semester
REFRIGERATION AND AIR CONDITIONING	**BTD 531**	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Application of refrigeration systems.
CLO 2	Cycles related to various refrigeration systems
CLO 3	Various refrigeration system component and working of them.
CLO 4	Use of different refrigerants.
CLO 4	Analysis of COP for different refrigeration devices.
CLO 4	Working of refrigeration system with respect to different cycles.
CLO 4	Measurement of humidity in the surrounding

B. SYLLABUS

Module I: Refrigeration
Air refrigeration systems, various compression refrigeration cycles, basic components of the plant.

Module II
Properties and choice of refrigerants, Eco-friendly refrigerants, multiple compression and evaporation system, cascading.

Module III
Vapour absorption cycle, Electrolux system steam jet refrigeration, vortex tube, application of refrigeration systems cascading, vapour absorption cycle.

Module IV:
Psychometric processes, applied psychometric, comfort air-conditioning, ventilation requirements,

Module V:
Cooling and dehumidification sytem, estimation of cooling and heating loads, air handling, air distribution, duct design, industrial air conditioning

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- C.P. Arora. Refrigeration and Conditioning. Tata McGraw Hill.
- P. Manohar. Refrigeration and Conditioning. Wiley Eastern Limited.
- Jordan and Priester. Refrigeration and Conditioning. Prentice Hall of India.
- W.F. Stoecker. Refrigeration and Conditioning. McGraw Hill.

Course Name	Course Code	LTP	Credit	Semester
MALTING & BREWING TECHNOLOGY	**BTD 532**	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on brewing
CLO 2	Acquire industrial skills for malting process for production of beer
CLO 3	Demonstrate the Quality examination, Process measurement and analysis technology.

B. SYLLABUS

Module I Raw materials
Barley, Hops, Water, Yeast, Adjuncts etc.

Module II Malt Production
Intake, cleaning, grading, transfer; Drying and storage of barley; Barley steeping; Barley germination; Malt kilning; Treatment of malt after kilning; Malt evaluation; Special malts and malt from other cereals etc.

Module III Wort and Beer Production
Malt milling, Mashing, Lautering, Wort boiling, Brewhouse yield, Brewhouse equipment, Casting the wort, Removal of the coarse break, Cooling and clarifying the wort, Control and monitoring of wort production processes, Changes during fermentation and maturation, Pure yeast culture propagation, Conventional fermentation and maturation, Fermentation and maturation in cylindroconical tanks (CCVs), Beer filtration, Beer stabilization, Carbonisation of the beer, Special methods for beer production, packaging of the Beer.

Module IV Cleaning and disinfection
Cleaning agents, Disinfecting agents, Cleaning and disinfecting using a CIP system, Cleaning procedure, Mechanical cleaning,

Module V Finished beer
Beer composition, Components of beer, Beer and health, Beer types and their special features, Quality examination, Process measurement and analysis technology

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Wolfgang Kunze. Technology Brewing & Malting.

Course Name	Course Code	LTP	Credit	Semester
INFESTATION CONTROL AND GRAIN STORAGE	**BTD 533**	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on food grains storage, causes of deterioration during storage
CLO 2	Acquire industrial skills om control, storage structures used and storage of organic food grains.
CLO 3	Demonstrate the advanced application of requirements for safe storage, Pre-storage operations

B. SYLLABUS

Module I: Introduction
Post-harvest losses of food grains and its economic significance; Requirements for safe storage, Pre- storage operations

Module II: Storage Deterioration in Food Grains
Types of storage deterioration; Causes of spoilage; Detection and determination of the type and extent of damage

Module III: Infestation Control
Sources of infestation in stored food grains and their detection; Chemical, non-chemical and integrated methods of controlling insect infestation; Controlled atmosphere storage of food grains; Vertebrate pests and their control

Module IV: Toxic Contaminations
Toxic contamination in food grains and their ill effects; Permitted pesticides and their limits; Pesticide residues; Methods of safe handling of pesticides

Module V: Storage Structures
Traditional methods of bag storage; Methods for transit and bulk storage of food grains; Cleaning, aeration and drying of stored grains at farm and commercial levels; Role of moisture in storability of food grains; Categorization of grains for storage, loss measurement and disposal; Principles of godown sanitation and hygiene., Refrigerated vans for storage and transportation of raw and processed food materials.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- AACC. Insect Management for Food Storage and Processing
- AACC. Managing Stored Grains
- Atwal AS. Agricultural Pests of India and South-East Asia, Kalyani Publishers, New Delhi.
- Boumans, G. Grain Handling and Storage. Elseivier Science Publishers, Amsterdam
- Chakravarty. Post Harvest Technology of Cereals, Pulses and Oilseeds. Oxford and IBH Publishing Co Pvt Ltd, Delhi
- Kachru, Bright and Patil. Storage. CIAE, Bhopal
- Kent NL and Evers AD. Technology of Cereals. Woodhead Publishing Limited, Cambridge, UK Mollan. Pesticides and Pollution
- Pingale, S.V Handling and Storage of Food Grains. I CAR, New Delhi
- Sahay KM and Singh KK. Unit Operations in Agricultural Processing. Vikas Publishing House Pvt Ltd, New Delhi
- Sauer DB. Storage of Cereal Grains and their Products. American Association of Cereal Chemists Inc, St. Paul MN

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
SCIENTIFIC WRITING	BTD-534	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain the importance of integrity (honesty and ethics) in preparing research, reporting research results, and preparing scientific works.
CLO 2	Explain the conceptual background, theoretical framework/concept, literature review, experimental research methodology, survey, and qualitative aspects
CLO 3	Implement the preparation of experimental research proposals theoretically and practically in the laboratory and the field, survey and qualitative researc

B. SYLLABUS

Module I

Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial). Plagiarism: Introduction; Tools for the detection of plagiarism; Avoiding plagiarism

Module II

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature. Concept of impact factor

Module III: Computing skills for scientific research

Web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness. Graphic designing -Approach and Significance in research

Module IV

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V

Case studies of areas of current research. Formulating a research plan and its presentation

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Scientific journals and magazines

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF BIOTECHNOLOGY

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS501	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Create right selection of words and ideas while also choosing the appropriate channelof formalcommunication.
CLO 2	Demonstrate the ability to analyse a problem and devise a solution in a group.
CLO 3	Demonstrate proficiency in the use of written communication.
CLO 4	Recognize the mannerisms and methodology of Interview and GD to become more expressive in their body language and verbal performance.

Module I
Reading Comprehension

Summarising
Paraphrasing

Module II
Essay Writing
Dialogue Report

Module III
Writing Emails
Brochure
Leaflets

Module IV: Introduction to Phonetics
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

Corporate Dressing & Body Language (Verbal & Non-Verbal Cues & its role in Interview Selection)

Interview-1 (Briefing, Do's & Don'ts, Questions, Mock Sessions)

EXAMINATION SCHEME:

Components	Email Writing	GD	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- Krishnaswamy N,*Creative English for Communication*. Delhi: Macmillan Publishers India Ltd. Print. 2007.

Course Name	Course Code	LTP	Credit	Semester
UNDERSTANDING SELF FOR EFFECTIVENESS - V (GROUP DYNAMICS AND TEAM BUILDING)	BSS 504	1:0:0	1	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognize their personality and individual differences and identify its importance of diversity at workplace and ways to enhance it.
CLO 2	Recognize effective socialization strategies and importance of patriotism and taking accountability of integrity.
CLO 3	Recognize different types of human rights and its importance.
CLO 4	Identify Indian values taught by different religions.
CLO 5	Identify long term goals and recognize their talent, strengths and styles to achieve them

B. SYLLABUS

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization

Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC**- Flip class; **MA**- Movie Analysis; **CS**- Case study; **A**-Attendance

SUGGESTED READINGS

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Course Name	Course Code	LTP	Credit	Semester
French	**FLT 501**	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses.
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc

B. SYLLABUS

Module D: pp. 131 – 156 Unités 10, 11

Contenu lexical:

Unité 10: Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

Course Name	Course Code	LTP	Credit	Semester
GERMAN - V	**FLG 501**	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .

B. SYLLABUS

Module I: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module II: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

Module IV: Verbs with fixed prepositions
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

Module V: Texts
A poem 'Maxi'
A text Rocko

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

Course Name	Course Code	LTP	Credit	Semester
SPANISH - V	**FLS501**	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid-Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

- Español Sin Fronteras, Greenfield

Course Name	Course Code	LTP	Credit	Semester
CHINESE – V	**FLC501**	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

B. SYLLABUS

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II

Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc.
Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III

Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV

Use of "huozhe" and "haishi"; Is he/she married?; Going for a film with a friend.; Having a meal at the restaurant and ordering a meal.

Module V

Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?

Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?

Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

1. Learn Chinese with me book-I (Major Text book), People's Education Press

2. Chinese Reader (HSK Based) book-I (suggested reading)

3. Elementary Chinese Reader Book-I (suggested reading)

Course Name	Course Code	LTP	Credit	Semester
AANANDAM	AND005	2:0:0	2	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).

4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

Course Name	Course Code	LTP	Credit	Semester
FOOD ENGINEERING – II	**BTD 601**	3:1:0	4	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Gives idea about engineering process in industry
CLO 2	Learn the various equipments used in food industry.
CLO 3	Understand the concept of working equipments used in food industries

B. SYLLABUS

Module I: Heating Operations

Modes of heat transfer in food products; Heat exchangers and their selection for processing food products, Efficiency of heat exchangers.

Module II: Thermal Processing

Thermal death kinetics of microorganisms and enzymes; Thermal process time calculations and optimization techniques.

Module III: Psychometrics and Steam

Dry and wet bulb temperature and specific and adiabatic saturation; Psychometric chart and it's use; Enthalpy and latent heat; Steam generation systems; Boilers for food processing industry.

Module IV: Evaporation and concentration of Foods

Heat transfer during evaporation; Evaporation systems – characteristics, applications and selection; Evaporation efficiency

Module V: Food Dehydration, crystallization and Fluidization Processes in Food *Industry*

Basic principles, drying rate curves and equilibrium moisture content; drying time calculations; Dehydration systems including solar driers – characteristics, applications and selection

Crystallization – equilibrium yield, theories of crystallization; Crystallization and their application; Mechanism of fluidization and its application in food processing

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- R. L. Earle , Unit Operations in Food Processing
- Brennan, J.G., Butters, J.R., Cowell, ND and Lilly, AEV. Food Engineering Operations
- Sahay KM and Singh KK. Unit Operation of Agricultural Processing Vikas Publishing House
- Singh, RP and Heldman, DR. Introduction to Food Engineering
- Toledo R.T. Fundamentals of Food Engineering
- Watson, EL and Harper, JC. Elements of Food Engineering

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF CEREALS, PULSES AND OILSEEDS	**BTD 602**	3:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic composition and structural parts of food grains.
CLO 2	Aware the importance of physico-chemical properties of food grains.
CLO 3	Understand the basics of milling operations for food grains.
CLO 4	Identify the problems associated with milling of grains and their solution.
CLO 5	Know processing food grains into value added products

B. SYLLABUS

Module I: Introduction
Major food grains of India, their physical structure and chemical composition; Post harvest practices for safe storage of food grains

Module II: Technology of Wheat and Barley
Quality characteristics of wheat for milling, flour milling, turbo grinding and air classification, flour grades; Ingredients, technology and quality parameters for bakery products; Milling of Durum wheat, pasta products; Pearling and malting of barley

Module III: Rice Technology
Rice milling, its effect on nutritive value; Parboiling of paddy; Curling and ageing of rice, processed rice products

Module IV: Technology of Corn and Millets
Dry and wet milling of corn; Corn starches and its conversion products; Refining methods and milling of millets

Module V: Technology of Pulses
Nutritive value of legumes, anti-nutritional factors present in them; Milling of pulses, Processing of oilseeds for direct use; Extraction of oil and processing of extracted oil; Refining, utilization of de-oiled cake and preparation of peanut butter, margarine and spread

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- AACC. Rice Chemistry and Technology. AACC
- Chakravarty and De. Post Harvest Technology of Cereals and Pulses

- CFTRI, Manual of Rice and its Processing
- Hui, YH. Bakery Products Science and Technology
- Kent, NL. Principles of Cereal Technology
- Lawson H. Food oils and Fats
- Matz SA. Bakery Technology and Engineering
- Matz SA. Cereal Technology
- Pomeranz, Y. Wheat C Chemistry and Technology. Vol. II and I. AACC
- Rachie, K. The Millet: Importance, Utilization and Outlook. International Crop Research Institute for Semi-Arid Tropics, Hyderabad
- Siegel and Faweatt Food Legumes – Processing and Utilization

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF MEAT, FISH AND POULTRY PRODUCTS	**BTD 603**	3:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic concept meat processing
CLO 2	Explain role of livestock in Indian food industry
CLO 3	Explain the different techniques used in processing of meat products
CLO 4	Have theoretical knowledge of different analytical techniques used in food industry and laboratories for analytical purpose.
CLO5	Have knowledge of storage and transportation of meat products

B. SYLLABUS

Module I: Introduction
Overview of Meat, Fish and Poultry Industry in India; Structure, composition and nutritive value of meat, fish and poultry products

Module II: Meat Technology
Slaughter – house layout and management; Pre-slaughter practices for meat animals, pre-mortem and post-mortem examination; Scientific slaughter, handling and evaluation of carcass; Post-mortem changes and eating qualities of meat tissues, cutting and packaging meat; Refrigeration, freezing, canning and freeze drying of meat; curing and smoking of meat, changes during cooking of meat.

Module III: Fish Technology
Types of fish; post-mortem changes; Handling storage and transportation of fish; Curing, smoking, drying, freezing and canning of fish and marine products

Module IV: Poultry Products
Pre-slaughter care and handling of birds; ante- and post – mortem examination of birds; Scientific slaughter; Preparation of poultry products and their preservation;

Module V: Technology of Egg
Interior qualities of eggs- grading,, handling, packaging and transportation; Functional properties of eggs; Microbial spoilage; Preservation and maintenance of eggs; Freezing, dehydration and pickling of eggs

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Jhari Sahoo , Textbook on Meat, Poultry and Fish Technology
- NPCS Board of Consultants & Engineers, The Complete Technology Book on Meat, Poultry and Fish Processing.
- Gracy, JF. Thornton's Meat Hygiene. ELBS Publishers, London
- Lawrie, RA. Meat Science
- Levie A. Meat Hand Book. AVI Publishing Co.
- Mountney, GJ. Poultry Products Technology. AVI Publishing Co.
- Park Hurst, CR and Mountney GJ. Poultry Meat and Egg Production
- Price JF and Schweigest. Sciences of Meat and Meat Products. American Meat Institute Foundation
- Roman, JR and Zieglan, PT. The Meat We Eat
- Slansby, Industrial Fishery Technology
- Stadelman, WJ. Egg Science and Technology
- Zaitsev, V and associates. Fish Curing and Preserving

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Course Name	Course Code	LTP	Credit	Semester
FOOD ADDITIVES	**BTD 604**	2:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the Role of Food Additives in Food Processing.
CLO 2	Toxicology and Safety Evaluation of Food Additives.
CLO 3	Naturally occurring Food Additives.
CLO 4	Characteristics of different natural food additives.
CLO 4	Characteristics of different synthetic food additives.

B. SYLLABUS

Module I

Definitions; role of food additives in preservation and processing of food and food products, classification of food additives.

Module II

Enzymes, Vitamins and Amino Acids as food additives.

Module III

Anti-microbial food additives, preservatives, Antioxidants, emulsifying and stabilizing agents, surfactants, anticaking agents, thickeners, firming agents, flour improvers and bleaching agents.

Acidulants, sequestering agents, masticatory substances and low calorie and non-nutritive sweeteners.

Colourants, flavouring agents and related substances, clarifying agents, gases and propellants and other additives., Legal Considerations in food additives.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- BIS: Various ISI standards related to food additives
- Fennema OR, Food Chemistry. Marcel Dekker Inc
- Furia TE, Handbook of Food Additive- Vol I. CRC Press
- Furia TE. Handbook of Food Additive- Vol II. CRC Press
- Joint FAO / WHO Expert Committee. Food Additives
- Mannay, Food Acts and Principles
- Mohindra SN, Food Additives

Course Name	Course Code	LTP	Credit	Semester
FOOD PLANT SANITATION	**BTD 605**	2:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Gives idea about hygiene, hygienic handling of foods
CLO 2	Learn the various techniques used for hygiene in food industry.
CLO 3	Understand the sanitation equipments used in food industries.

B. SYLLABUS

Module I: Introduction
Significance of personal hygiene and plant sanitation in food industry; Definitions; Principles of personal hygiene, hygienic handling of foods and food plant sanitations

Module II: Food Plant Sanitation
Sanitary practices in food plants; sanitary evaluation of food plants; Sanitary aspects of equipments and buildings – plant layout and design, sanitary design considerations for food processing equipment; Safe and effective control of insects and pests; Control of microorganisms – microorganisms important in food sanitation; Factors affecting growth of these microorganisms.

Module III: Sanitary Aspects of Water Supply
Sources of water; Characteristics of water; Water supply to food processing industry; Water treatment for ensuring supply of potable water to industry, Effective detergents and cleaning practices and importance of cleaning technology; types of detergents and sanitizers and their formulation; CIP systems; Sanitary aspects of waste treatment and disposal.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Y. H. Hui, Food Plant Sanitation Food Science and Technology
- Atherton HV and Newlander JA. Chemistry and Testing of Dairy Products. CBS Publishers Delhi
- Forsythe SJ. Microbiology of Safe Foods. Blackwell Science Publications, London
- Longree K and Ambruster G. Quantity Food Sanitation. John Wiley & Sons, USA
- Marriot NG. Principles of Food Sanitation. AVI Publishing Co. Inc, Westport USA
- Roday S. Food Hygiene and Sanitation

Course Name	Course Code	LTP	Credit	Semester
FOOD ENGINEERING LAB – II	**BTD 621**	0:0:1	1	6

B. SYLLABUS

1. Estimation of thermal efficiency and capacity of heat exchangers.
2. Determination of thermal process time for canned products.
3. Establishment of freezing time
4. Studies on single effect / multiple effect evaporators
5. Determination of equilibrium moisture content and water activity
6. Establishing drying behavior of foods and calculation of drying rate
7. Studies on extrusion cooking characteristics of food products
8. Use of psychometric charts

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

1. Unit operations of chemical engineering by McCabe and Smith. McGraw-Hill
2. Chemical engineering handbook by Perry RH. McGraw-Hill
3. Dairy plant engineering and management by Tufail Ahmad, Kitab Mahal Publications
4. Engineering for dairy and food product by Farrall AW. John Wiley and Sons
5. Milk Pasteurization by Hall CW. The AVI Publication
6. Introduction to Chemical Engineering By Salil K Ghosal, Shyamal K Sanyal, Siddhartha Datta, Tata Mcgraw Hill

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF CEREALS, PULSES AND OILSEEDS LAB	**BTD 622**	0:0:1	1	6

B. SYLLABUS

1) Physico–chemical characteristics like test-weight, gluten content, etc
2) Milling of wheat
3) Milling characteristics of corn
4) Preparation of bread / test-baking
5) Preparation of buns / cakes / pizza, etc
6) Preparation of biscuits / cookies etc
7) Cooking quality of rice
8) Pre-treatment and milling of pulses
9) Extraction of oil from oilseeds
10) Preparation of breakfast cereals

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Altschul. Processed Plant Food Stuffs
- Matz, MA. Cookie and Cracker Technology
- Dubey, SC. Basic Baking: Science and Craft
- Pyler, EJ. Baking Science and Technology

Course Name	Course Code	LTP	Credit	Semester
PROCESSING OF MEAT, FISH AND POULTRY PRODUCTS LAB	**BTD 623**	0:0:1	1	6

SYLLABUS

1. Preparation of meat cuts, determination of yield of meat
2. Canning / curing of meat / freezing of meat / poultry / fish
3. Preparation of meat / poultry / fish product
4. Evaluation of external and internal quality of eggs
5. Grading, coating and thermos-stabilization of eggs
6. Visit to a slaughter house.

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Processed Meats; Pearson AM & Gillett TA; 1996, CBS Publishers. 2. Meat; Cole DJA & Lawrie RA; 1975, AVI Pub.
- Egg and poultry meat processing; Stadelman WJ, Olson VM, Shemwell GA & Pasch S; 1988, Elliswood Ltd.

Course Name	Course Code	LTP	Credit	Semester
FOOD ADDITIVES LAB	**BTD 624**	0:0:1	1	6

B. SYLLABUS

1. Detection of coal-tar dyes in food products
2. Determination of sulphur dioxide
3. Estimation of benzoic acid
4. Detection / estimation of a non-nutritive sweetener
5. Estimation of a vitamin used as food additive
6. Estimation of an amino acid used as food additive
7. Estimation of a mineral used as food additive
8. Estimation of antioxidant in food product

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

1. Food Science (5th Edn.) by Potter & Hotchkiss, CBS Publishers & Distributors.

2. Food process Technology by Fellows (Woodhead Publishing Ltd).

Course Name	Course Code	LTP	Credit	Semester
Term Paper & Industry Visit	**BFT 630**	3:0:0	3	6

B. SYLLABUS

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

7. Choosing a subject
8. Finding sources of materials
9. Collecting the notes
10. Outlining the paper
11. Writing the first draft
12. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

n) Begin by making a list of subject-headings under which you might expect the subject to be listed.

o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

m) Get facts, not just opinions. Compare the facts with author's conclusion.

n) In research studies, notice the methods and procedures, results & conclusions.

o) Check cross references.

4. Outlining the paper

k) Review notes to find main sub-divisions of the subject.

l) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

ee) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

ff) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

gg) Check for proper spelling, phrasing and sentence construction.

hh) Check for proper form on footnotes, quotes, and punctuation.

ii) Check to see that quotations serve one of the following purposes:

(xvi) Show evidence of what an author has said.

(xvii) Avoid misrepresentation through restatement.

(xviii) Save unnecessary writing when ideas have been well expressed by the original author.

jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

36) Title page
37) Table of contents
38) Introduction
39) Review
40) Discussion & Conclusion
41) References
42) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

s) summary of question posed
t) summary of findings
u) summary of main limitations of the study at hand
v) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographicalconventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

EditedVolumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter. [(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

EditedArticles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

JournalArticles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

ElectronicBook

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

ElectronicJournalArticles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

OtherWebsites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender

assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

UnpublishedPapers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

UnpublishedTheses/Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

BTD630- Term Paper & Industry Visit: In addition to term paper Students must compulsorily undergo Industrial Visit (Cluster of 5-6 Industries) for One week and they will be graded on their learning outcome of the visit for one third component of this Term Paper & Industry Visit.

Evaluation will be as follows;

Term Paper: 2 Credit (70 Marks)

Industry Visit: 1 Credit (30 Marks)

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Course Name	Course Code	LTP	Credit	Semester
ADVANCED FOOD TECHNOLOGY	**BTD 631**	3:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic concept of samples, sampling techniques and importance in food science.
CLO 2	Explain role of water activity in food preservation.
CLO 3	Explain the different techniques used in analysis of food samples.
CLO 4	Have theoretical knowledge of different analytical techniques used in food industry and laboratories for analytical purpose.
CLO 5	Have knowledge of sample extraction and sample preparation techniques

B. SYLLABUS

Principles and application of High pressure processing

Module II
Food irradiation - advantages and applications

Module III
Principles and application of Ohmic heating and pulsed electric field processing

Module IV
Microwave and infrared processing and application

Module V
Smart packaging and supercritical fluid extraction technologies.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

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- Da-Wen Sun. Emerging Technologies for Food Processing.
- Christopher J Doona. Case studies in novel food processing technologies.
- Jose L. Martinez. Supercritical Fluid Extraction of Nutraceuticals and Bioactive Compounds.
- Joseph Kerry. Smart Packaging Technologies for Fast Moving Consumer Goods

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Course Name	Course Code	LTP	Credit	Semester
ENGINEERING PROPERTIES OF FOOD MATERIALS	BTD 632	3:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on sphericity, frictional properties, thermal, electrical and optical properties of food materials
CLO 2	Acquire industrial skills of engineering properties of food materials, their rheological characteristics and flow behaviour
CLO 3	Demonstrate the advanced application of Elastic and Plastic behaviour of fresh and processed foods.

B. SYLLABUS

Module I: Physical Properties
Shape and size, bulk density, true density and specific gravity, aero- and hydro- dynamic properties, ultrasonic properties, Gas exchange properties of fresh fruits and vegetables

Module II: Frictional Properties
Static and kinetic friction; Rolling resistance; Angle of response

Module III: Rheological Properties
Elastic and Plastic behaviour of fresh and processed foods; Flow characteristics of liquid foods

Module IV: Electrical and Optical Properties
Electrical properties like electrical conductivity

Module V Optical Properties
Dielectric behaviour, resistivity, etc.; Colorimetric properties

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Baianu, IC and Pesson, H. Physical Chemistry of Food processes Vol I
- Baianu, IC and Pesson, H. Physical Chemistry of Food processes Vol II

- Lewis MJ. Physical Properties of Foods and Food Processing Systems
- Mohsenin NN. Physical Properties of Biological Materials. Gordon & Breach Science Publisher, New York
- Pomeranz Y. Food Analysis. Theory and Practice. Chapman and Hall, New York
- Sahay KM and Singh KK. Unit Operations in Agricultural Processing, Vikas Publishing House Pvt. Ltd., New Delhi

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Course Name	Course Code	LTP	Credit	Semester
FOOD PRODUCT DEVELOPMENT	**BTD 633**	3:0:0	3	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the basic components of new product development.
CLO 2	Awareness about testing their acceptability.
CLO 3	Understand the basics of production trail.
CLO 4	Identify the problems associated with product launching.
CLO 5	Knowledge about legal aspects and patenting process.

B. SYLLABUS

Module I

Concept of product development; Objectives, needs and importance of product development; Product life cycle and its role in product development; Role of creativity and strategy in product development

Module II

Product development process indulging opportunity analysis; Generation and evaluation of ideas; Testing of concept v/s product; Prototype product; Positioning of product and market research; Planning product development project using job progress bar chart and PERT technique

Module III

Planning production trails and test market and conducting them; Evaluation of test results; Various quality control techniques (viz. total quality assurance, HACCP & ISO – 9000) applicable to product development; Product launching; Advertisement and marketing plans

Module IV

Concept and types of Entrepreneurships, entrepreneurship opportunities in food sector, start-up ideas and their implementation, strategic planning, fund raising.

Module V

Feasibility report and estimation of break-even points, Licensing, and registration requirements for startups, recent start-ups in food sector

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

AMITY UNIVERSITY
RAJASTHAN

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SUGGESTED READINGS

- Arlington. Food Product Development
- Desrosier NW and Desrosier JN. Economics of New Product Development
- Graf, E and Israel SS. Food Product Development from Concept to Market Place
- Hilton P. New Product Development
- Holt K. Product Innovation
- Panek C. Problems of Product Design and Development

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Course Name	Course Code	LTP	Credit	Semester
BEHAVIOURAL SCIENCE - VI	**BCS 601**	1:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify stress and that an individual come across.
CLO 2	Recognize the causes of stress in their lives.
CLO 3	Analyze symptoms and how they are affecting lives.
CLO 4	Create ways to effectively cope with it.

B. SYLLABUS

Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interactional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies

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Peer group and social support
Happiness and well-being

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

SUGGESTED READINGS

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management

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Course Name	Course Code	LTP	Credit	Semester
FRENCH - VI	**FLT 601**	1:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	strengthen the language of the students both in oral and written so that they can:
CLO 2	i) express their sentiments, emotions and opinions, reacting to information, situations;
CLO 3	ii) narrate incidents, events ;

B. SYLLABUS

Module D: pp. 157 – 168 – Unité 12

Unité 12: s'évader

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" – pour caractériser
2. faire + verbe

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- le livre à suivre : Campus: Tome 1

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Course Name	Course Code	LTP	Credit	Semester
GERMAN - VI	**FLG601**	1:0:0	1	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc.

B. SYLLABUS

Module I: Adjective endings
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

Module II: Comparative adverbs
Comparative adverbs as and like

Module III: Compound words
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

Module IV: Infinitive sentence
Special usage of 'to' sentences called zu + infinitive sentences

Module V: Texts
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

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Module VII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

EXAMINATION SCHEME

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	Mid Term Test	Presentation	Viva Voce	Attendance	End-Term Exam
10	15	10	10	5	50

SUGGESTED READINGS

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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Course Name	Course Code	LTP	Credit	Semester
SPANISH – VI	**FLS601**	2:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses.
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc

B. SYLLABUS

Module I
Revision of the earlier modules

Module II
Present Perfect Tense

Module III
Commands of irregular verbs

Module IV
Expressions with **Tener que** and **Hay que**

Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

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Course Name	Course Code	LTP	Credit	Semester
CHINESE – VI	**FLC601**	2:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone intermediate language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of intermediate level.
CLO 3	Students will be able to communicate in small sentences in Simple Future and Past tenses .
CLO 4	Students will be able to communicate in oral in small sentences in Simple Future and Past tenses. etc.

B. SYLLABUS

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

Module II

Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like- spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. Etc

Module III

Temperature – how to say – What is the temperature in May here?
– How is the weather in summer in your area?
– Around 30 degrees
– Heating, air-conditioning
– Is winter is Shanghai very cold?
Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to

write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.

Tell the following in Chinese – My name is …. I was born in … (year). My birthday is …… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ……. (do what)? At week end, I ……. On Sundays I usually …… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ……. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

Continuous Evaluation (Total 50 Marks)					**End Sem Evaluation (Total 50 Marks)**
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

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Course Name	Course Code	LTP	Credit	Semester
AANANDAM-VI	AND006	2:0:0	2	6

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)
ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

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1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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PRINCIPLES OF FOOD BIOTECHNOLOGY	**BTD 701**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the role of bacteria and microbe in industrial and fermented food products.
CLO 2	Acquire the ability to use the microbes in research related to different field of Biotechnology.
CLO 3	Acquire the knowledge of the concepts in the field of agriculture, veterinary sciences, pharmaceutical industry and food industry etc.
CLO 4	Acquire skills of presentation and to use library and internet resources independently.

B. SYLLABUS

Module I
Historical development, scope and economic significance of food biotechnology

Module II
DNA replication, transcription, translation and post translation technology.

Module III
Fermentation biotechnology, biofermentors, basic design of a fermentor, fermentation processes for food ingredients like ethanol, enzymes, antibiotics, organic acids, flavours etc. using genetically superior microorganisms.

Module IV
Single cell proteins, yeasts and other new sources of foods, basic concepts of genetic engineering, genetically modified foods/ transgenetics; Immobilization of enzymes, and microorganisms .

Module V
Biosensors and their applications to food processing, Regulatory and safety aspects of food biotechnology, biotechnology and Intellectual Property Rights

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Byong HL. Fundamentals of Food Biotechnology. Wiley – VCH
- Joshi VK and Pandey A. Biotechnology: Food Fermentation, Microbiology, Biochemistry and Technology Vol I & II, Education Publishers and Distributors
- Maheshwari DK, Dubey RC and Kang SC. Biotechnological Application of Microorganisms. A Techno – Commerical Approach. J K Int. Publishers Hans Pvt. Ltd. New Delhi
- Mittal GS. Food Biotechnology- Techniques and Applications. Food Press
- Perry JG. Introduction to Food Biotechnology. CRC Press
- Roller S and Harlander S. Genetic Modification in the Food Industry-A Strategy for Food Quality Improvement. Aspen Press
- Thakur, IS. Industrial Biotechnology: Problems and Remedies. IK Int Publ. House Pvt Ltd, New Delhi

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PACKAGING OF FOOD PRODUCTS	**BTD 702**	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain various physical and chemical properties of packaging materials and their manufacturing process, through in-class discussions, electronic simulations and exam questions.
CLO 2	Communicate clearly about different type of packaging material and there functions, through independent written assignments and exam questions.
CLO 3	Appreciate the contributions of packaging material in increasing the shelf life of food products, through clicker questions, class discussion and exam questions.

B. SYLLABUS

Module I: Introduction
Introduction to Food Packaging –status of packaging industry in World and in India, Definition of Packaging - Package, Packaging, Packing, Functions of food packaging.

Module II: Packaging Materials
Properties of material required for packaging of food products, Chemistry, and technology of packaging materials for food products.

Module III: Packaging Forms
Concept of package designs for primary packaging of foods and food products and evaluation of its performance,
Forms of paper/wooden containers for fresh and processed foods; Characteristics of plastics, foil, polymeric and laminates containers; Glass and metal containers.

Module IV: Packaging Machinery and Packaging Operations
Important packaging machines used for food products and their operations; Aseptic packing – advantages, machinery and operation, Inert gas packaging; Smart packaging, edible films and other new developments, MAP & CAP.

Module V: Packaging Standards and Regulations
Safety aspects of packaging materials, Bar coding and legal requirements of packaging materials and product information, Recycling of packaging material.

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Crospy, MT, Food Packaging Materials
- Griffin, RC and Sacharow, S. Principles of Package Development. The AVI Publishing Co. Inc
- Heiss, R. Principles of Food Packaging. P. Keppler Verlag KG, Germany
- Institute of Packaging. Food Packaging and Health. Migration and Legislation. Institute of Packaging, London.
- Paine, FA and Paine HY. A Handbook of Packaging
- Mahadeviah, M and Gowramma RV. Food Packaging Materials
- Sacharow, S. Food Packaging

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Course Name	Course Code	LTP	Credit	Semester
PRINCIPLES OF HUMAN NUTRITION	**BTD 703**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding of nutritional requirements of human body.
CLO 2	Understanding of RDA, water balance and energy balance in human.
CLO 3	Understanding of balanced diets and meal planning.
CLO 4	Understanding the nutritional problems and causes.
CLO 5	Understanding the modification of food for fulfillment of nutrient requirement

B. SYLLABUS

Module I: Introduction

Definitions and Scope; Functions of foods; Important foods consumed in India (Food habits and their effect on regional imbalances) ; Classification of foods and their nutritional contribution.

Module II: Specific Nutrients

Water balance, energy balance; Digestion, absorption, metabolism and importance of major nutrients (Carbohydrates, Proteins, Fats) in body; Recommended daily allowances of nutrients for different groups of people

Module III: Balanced Diets and Meal Planning

Diet-structure and its possible modification / improvements (Normal Diet, Parental and Enteral Nutrition); Meal planning and planning of balanced diets for different groups of people.

Module IV: Nutritional Problems and Therapeutic Nutrition

Types of nutritional problems and causes; Common nutritional deficiencies.; Nutritional and non-nutritional considerations of the life cycle- infants, geriatric and others: Importance of therapeutic nutrition, planning diet for patients suffering from diseases like GIT diseases, CV diseases, liver disorder, renal disorders, Nutritional programmes in India; Toxicants naturally present in foods

Module V: Food Fortification

Food fortification , Food Supplementation and Food enrichment

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Gopal C, Ramasastri BV and Balsubramanian SC. Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad
- Howe PS. Basic Nutrition in Health
- Joshi, SA. Nutrition and Dietetics. Tata McGraw Hill Book Co. Ltd, New Delhi
- Mathew S. Practical Mannual of Introductory Foods
- Sharma, S and Wadhwa, A. Public Health Nutrition, Elite Publishers, New Delhi
- Srilakshmi, B. Dietetics. New Age International (P) Ltd, New Delhi.
- Swaminathan, M. Food Nutrition, Vol I
- Swaminathan, M. Food Nutrition, Vol II
- Krause and Mahan – Food and Nutrition
- Emma S., Weigley, D.H., Muller, Corinn, H. Robinson – Robinson's Basic Nutrition and Diet Therapy, Merill, Printice Hall.
- F.P. Anita and Phillip Abraham – Clinical Nutrition and Dietetics

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Course Name	Course Code	LTP	Credit	Semester
TECHNOLOGY OF SPICES, PLANTATION CROPS AND FLAVOURS	**BTD 704**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get knowledge about Indian spices and plantation crops.
CLO 2	Understand post-harvest technology of spices
CLO 3	Understand post-harvest technology of plantation crops

B. SYLLABUS

Module I: Introduction
Brief history and economic importance of spices and plantation crop products; Major Indian spices and plantation crops for food applications, general composition and importance constituents

Module II: Post Harvest Technology of Spices
Post harvest technology for major spices (black pepper, cardamom, coriander, cinnamon, ginger, onion and garlic, paprika, saffron, turmeric), their post harvest diseases and storage pests and their management; Packaging and storage of spices and spice powders

Module III: Post Harvest Technology of Plantation Crops
Post harvest technology of important plantation crops (Coconut, oil palm, cashew, cocoa, coffee, tea and vanilla), their post harvest diseases and storage pests and their management

Module IV: Value – Added Products
Value – added products like essential oils and oleoresins from spices, instant coffee etc.

Module V: Flavour Technology
Introduction to flavours; Major compounds of various food flavourings; Flavour encapsulation; Flavour application in food products

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Pruthy JS. Spices and Condiments. National Book Trust

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Course Name	Course Code	LTP	Credit	Semester
FOOD EQUIPMENT AND PLANT DESIGN	BTD 705	3:1:0	4	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Explain various types of plant layouts used when installing new food manufacturing plants and lines, through in-class discussions, electronic simulations and exam questions.
CLO 2	Communicate clearly about different methods for the optimization of various parameters in food processing operations by using different techniques through independent written assignments and exam questions.
CLO 3	Appreciate the contributions of various plant utilities like electricity, water, steam, air etc., through clicker questions, class discussion and exam questions

B. SYLLABUS

Module I: Materials for fabrication
Material selection in design of food processing equipments – their classification and properties; Creep phenomenon; Corrosion and its effect on material properties

Module II: Design of Food Handling and Processing Equipments
Application of design engineering to food processing equipments; Design parameters, codes and material selection., Design of equipments used in handling of foods;

Module III: Plant Design Concepts and Plant Location
Food plant design concepts and general design considerations; Plant location – location factors and their interaction with plant location, location theory models, computer aided selection of location.

Module IV: Feasibility Report and Process Flow Chart
Feasibility analysis and preparation of feasibility report; Factors affecting plant size and their interactions, estimation of break-even and economic plant size; Process design – process flow charts, computer – aided development of flow charts; Equipment selection including economic analysis of equipment alternatives.

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Module V: Food Plant Layout

Layout of food plants (including computer aided) and evaluation; Layout symbols; Planning and design of service facilities, human resources, product packaging and marketing systems; Hygienic design aspects and workers' safety; Functional design of plant building.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Chemical Engineers' Handbook. McGraw Hill Book Co. Inc, New York.
- O.P. Khanna, Production Engineering, and Industrial Management.
- Moore, Plant Layout and Design
- Peterse and Timmerhaus, Plant Design for Chemical Engineering.
- Rase and Barrow, Project Engineering, of Process Plant.
- Farrall, Engineering For Dairy and Food Products.

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Course Name	Course Code	LTP	Credit	Semester
INDUSTRIAL TRAINING EVALUATION	**BTD 750**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Perform various tasks in a food manufacturing plant.
CLO 2	Apply knowledge and academic skills in a food manufacturing plant
CLO 3	Develop communication/interpersonal skills and to work as a team with people from diverse background

B. SYLLABUS

1. To give students the opportunity to apply the knowledge and skills they have acquired on campus in a real-life work situation.
2. To provide students with opportunities for practical, hands-on learning from practitioners in the students' areas of specialization.
3. To expose students to a work environment, common practices, employment opportunities and work ethics in their relevant field.
4. To enhance the employability skills of the students.
5. To provide opportunities for students to be offered jobs in the organizations in which they undergo their Industrial Training.

STUDENT

The student is responsible to ensure that all matters relating to the Industrial Training Programme are conducted in an ethical, conscientious, trustworthy and committed manner.

A) Before Industrial Training

1. To apply for a suitable Industrial Training, submit an application form through the Officer (Training/ Training and placement) to the organization concerned one semester before the Industrial Training Programme commences.
2. Submit one copy of the offer letter for the Industrial Training to the Head of the department or Faculty coordinator (Industrial Training). Students are not allowed to change their Industrial Training after obtaining the approval and confirmation from the Industry.

3. To complete the Industrial Training placement process within the specified time based on the Industrial Training Programme schedule.
4. To ensure that the Industrial Training is not performed in a family-owned company so as to avoid conflict of interest.

B) During Industrial Training

1. Once the student has reached the training place, he / she must send a mail to the Faculty coordinator (Industrial Training / Department) / Head of the department or Officer (Training/ Training and placement) that he / she has joined the training from _____ in the industry (Name) _____ and forward his / her contact nos., E-mail ID and the contact nos. of the company representative.
2. During the training, students will be given 3-4 practical problems by the industry in which they are undergoing training. In case the industry do not give them the problems, the students will themselves formulate minimum three problems and maximum four problems and carry out detailed study on them and recommend the optimum solution based on their theory knowledge.
3. To maintain discipline and abide by all rules and regulations enforced by the organization and to ensure FULL attendance during the Industrial Training duration.
4. To carry out the Industrial Training in an ethical and professional manner and to uphold the reputation of Amity University, Rajasthan at all times.
5. To maintain confidentiality and to not disseminate / share any information related to the organization to third parties.
6. To be responsible for maintaining the security of properties belonging to the organization.

ASSESSMENT COMPONENTS

Assessment within the Industrial Training context aims to evaluate the student's work quality and appropriateness to the field of study with reference to the learning outcomes of the Industrial Training Programme. Students should be evaluated by Faculty coordinator (Industrial Training/ Department). Evaluation methods used may consist of the following:

- Industrial Training report
- Presentation by the student

DISCIPLINARY PROCEDURES DURING INDUSTRIAL TRAINING PROGRAMME

Within the training period, the student is wholly responsible to the organisation where he or she has been placed. This means that the student must observe specified office hours, and must adhere to all rules and regulations of the organisation, just like the other staff within the organisation, during the entire training period.

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DEPARTMENTAL REPORT

When the training of the student in a particular department/ section/ shop of an industry is completed, he / she should write departmental report. Report should include description of the department/ Section/ Shop, the processes and procedures followed in it. Individual items of equipment, special attachment, indigenously adopted tools should be described. Personnel & any other human resource features should be highlighted. Drawings, sketches, specification of equipment, used, should be given wherever essential. The report should also contain entire studies & discussions carried out by the students in addition to what he/ she has observed during his / her day to day work. The departmental report should be signed by the student and also by his officer-in-charge of that department/ section/ shop.

The report must include the following:

(a) The basic history/introduction of the industry.
(b) The sequence of operations followed/ systems introduced for the production.
(c) The layout of various workshop/floors or the labs and admin section of the industry.
(d) The major equipment used for the production/ computer configuration required for the loading the used software's.
(e) The infrastructure available.
(f) The movement of material (raw, semi-finished and finished product), not applicable in case of software industry.
(g) The formulation of 3 to 4 practical problems.
(h) Data required to formulate the problems.
(i) Analysis of the data, steps required and commands used in case of software industry.
(j) Suggestions made based on the analysis of the data.
(k) Recommendations.
(l) Certificate from the industry for the period of training undergone.

The final report must be at-least 25 to 30 pages for the student undergoing 45 days training. In case no. of students undergoing training in the same industry are more than one, each student will prepare his/ her report separately.

The Layout Guidelines for the Project File & Project Report

A4 size Paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

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FORMAT OF INDUSTRIAL TRAINING REPORT

The following titles must be incorporated in the final industrial training report:

1. Preface/Acknowledgement
2. Certificate with Signatures and Seal of the Industry Person
3. Contents/Index
4. Introduction about the Industry
5. Training Schedule
6. Work Done / Observations
7. Specific Assignment / Project Handled
8. Learning after Training
9. Summary

EVALUATION THROUGH SEMINAR PRESENTATION

The students will present his report though seminar, which will be held by an expert committee constituted by the concerned department as per norms of the institute. The evaluation through seminar presentation will be based on the following criteria.

a) Quality of material presented.
b) Effectiveness of presentation.
c) Depth of knowledge and skills.

Upon completion of these programmes, students are expected to demonstrate the following graduates attributes:

- Engineering Knowledge
- Problem analysis
- Design/ development of solutions
- Conduct investigations of complex problems
- Modern tool usage, The engineer and society
- Individual and Team Work
- Communication and Project Management and Finance.

Text & References:

Industrial Microbiology by Brinton M miller & Warren Litsky. MGH.

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PACKAGING OF FOOD PRODUCTS - LAB	**BTD 722**	0:0:2	1	7

B. SYLLABUS

1. Strength properties of packaging materials
2. Operating can double seamers
3. Testing of can seams
4. Measurement of tin-coatings over tin plates
5. Sulphide-stain resistance porosity and crystal size of tin plates.
6. Global Migration of plastic films
7. Puncture-resistance of corrugated box
8. Shrink packaging of foods
9. Determination of water activity of dry food product

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Handbook of Packaging by Paine and Paine
- Manual of Analyzing for Fruits and Vegetables Products by S Ranganna

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PRINCIPLES OF HUMAN NUTRITION LAB	**BTD 723**	0:0:2	1	7

B. SYLLABUS

1) Determination of calorific value of foods
2) Determination of anti-nutritional factors (trypsin inhibitor)
3) Study of symptoms of nutritional deficiencies / disorders on human health
4) Case studies for diagnosis of nutritional deficiencies / disorders in human beings
5) Dietary survey of selected group of people, assessment of protein-calorie status of their
6) Planning and preparation of therapeutic diets for species group of people

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Raghuramulu N, Nair KM and Kalyanasundara S Am S. A Manual of Laboratory Techniques. NIN (ICMR), Hyderabad

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TECHNOLOGY OF SPICES, PLANTATION CROPS & FLAVORS LAB	**BTD 724**	0:0:2	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction and historical information on Microorganisms and their use in different industries
CLO 2	Acquire industrial skills of microbial culture, growth, and practices
CLO 3	Demonstrate the advanced application of Microbes in emerging industrial sectors

B. SYLLABUS

1. Identification and characterization of flavouring compounds of spices
2. Oil determination
3. Extraction of oil from clove, pepper, cardamom and chilli
4. Extraction of oleoresins-Turmeric, ginger, pepper, clove
5. Piperine estimation in pepper oleoresin
6. Steam distillation of spices
7. Determination of curcumin content in turmeric
8. Chemical analysis of spices : moisture, volatile oil, specific gravity, refractive index, acid value
9. Study of standard specification of spices
10. Packaging study of spices
11. Preparation of curry powder
12. Preparation of Indian Masala for different foods

EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

1. K. V. Peter. Handbook of herbs and spices. Second edition. Volume 1. 2012. Woodhead Publishing.

2. K. V. Peter. Handbook of herbs and spices. Second edition. Volume 2. 2012. Woodhead Publishing.
3. Handbook on Modern Packaging Industries (2nd Edition) By NIIR Board.
4. Kenji Hirasa, Mitsuo Takemasa. Spice Science and Technology. 1998, CRC Press, Boca Raton.
5. P.R. Ashurst. Food Flavourings. 1991. Blackie and Son Ltd.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
TERM PAPER	BTD730	3:0:0	3	7

Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

p) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

q) Begin by making a list of subject-headings under which you might expect the subject to be listed.

r) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

p) Get facts, not just opinions. Compare the facts with author's conclusion.

q) In research studies, notice the methods and procedures, results & conclusions.

r) Check cross references.

4. Outlining the paper

m) Review notes to find main sub-divisions of the subject.

n) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final Paper

kk) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

ll) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

mm) Check for proper spelling, phrasing and sentence construction.

nn) Check for proper form on footnotes, quotes, and punctuation.
oo) Check to see that quotations serve one of the following purposes:
(xix) Show evidence of what an author has said.
(xx) Avoid misrepresentation through restatement.
(xxi) Save unnecessary writing when ideas have been well expressed by the original author.
pp) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
43) Title page
44) Table of contents
45) Introduction
46) Review
47) Discussion & Conclusion
48) References
49) Appendix
Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
w) summary of question posed
x) summary of findings
y) summary of main limitations of the study at hand
z) details of possibilities for related future research

References
From the very beginning of a research project, you should be careful to note all details of articles gathered.

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The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographicalconventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

EditedVolumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter. [(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation,

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	
Final Evaluation:	60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FOOD ADULTERATION	**BTD 731**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Get basic knowledge onvarious foods and about adulteration
CLO 2	Understand the adulteration of common foods and their adverse impact on health
CLO 3	Be able to extend their knowledge to other kinds of adulteration, detection and remedies.

B. SYLLABUS

Module I: Introduction and ingredients used for food adulteration
Introduction to food adulteration. Definition according to various laws. Risk of adulteration, Preventive and corrective actions of adulteration.

Module II: Food Adulteration and Fraud in food chain
Food adulteration and fraud related to food chain, labelling, ingredients, components and the shelf life of food articles. Common adulterants used for preparation of adulterated and fraudulent food articles. Reasons and characteristics of adulterants behind their use.

Module III: Regulations and recommendations related to food adulteration
FSSA, EFSA, USFDA clauses related to food adulteration and fraud. Recommendation from various regulatory and federal agencies towards prevention and identification of food adulterants and fraudulent items.
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Module IV: **Resources regarding monitoring of food adulteration**
Library and information related to monitoring of food adulteration at the global level, Agencies monitoring the food adulteration such as FSSA, EFSA, RASFF, NSF etc.,

Module V: **Recent cases of adulteration**
Recent adulteration cases across the globe. Adulteration in spices, dairy, cereals, pulse and aminal based products. Adulteration in western countries such as German Ham and English Pickles. Basmati Rice and Baby Milk. Pink Margarine and Pure Ketchup and etc.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Darell. T Braden. Food Fraud and Adulterated, Ingredients, Background, Issues, and Federal Action (2014). Nova Science Publishers, Inc. New York.
- John M. Ryan. Food Fraud (2016). Academic Press. 125, London Wall, EC2Y 5AS.
- Bee Wilson. Swindled. The dark history of food fraud, from poisoned candy to counterfeit coffee (2008). Princeton university press, Princeton and Oxford.
- Food safety and standards act 2006. FSSAI website.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MANAGEMENT OF FOOD INDUSTRY WASTE	BTD 732	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Know and examine the basic characteristics of wastewater, their concentrations and significance.
CLO 2	Understand the design and working principle of conventional treatment processes and the kinetics of biological system
CLO 3	Select appropriate processes, depending on the nature of the impurities to be removed to be employed for effluent treatment
CLO 4	Knowledge about treatment of food industry waste and disposal
CLO 5	Develop understanding for cleaner production techniques.

B. SYLLABUS

Module I: Introduction

Definitions, sources and types of wastes and their special characteristics; Waste generation in India and its impact on environment, natural resources and human health

Module II: Waste from Food Processing Industries

Statutory standards for emissions of environmental pollutants from food processing industries; Necessity of efficient management of food industry wastes; Characterization of food industry effluents – physico – chemical parameters, oxygen demands and their inter-relationship; Unit concept of treatment of food-industry effluent

Module III: By products from Food Processing Industry Waste

Characterization of waste from food processing industry for by-products; Processes for important by-products from wastes of processing industries for fruits and vegetables, food grains, milk and milk products, and meat, fish and poultry products etc.

Module IV: Waste Treatment

Biological oxidations; Aeration devices systems; Physico-chemical, biological analysis of waste water, primary, secondary and tertiary treatments including anaerobic waste water treatments.

Module V: Advanced waste – water treatment systems

Microstrainers, filters, ultrafiltration and reverse osmosis etc; Handling and disposal of sludge of food industry.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- David A and Stapton NF. Principles and Practices for Safe Processing of Foods
- Green, JH. Food Processing Waste Management AFST (I) and CFTRI. Proceedings of Symposium on By-Products from Food Industries: Utilization and Disposal
- Kramer, G. Food Processing Waste Management
- Ockerman HW and Hansen CL. Animal By Product Processing. The AVI Publishing Co. Inc Westport USA
- Whitter EO and Webb BH. By-products from Milk. Reinhold Publishing Corp, New York

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FOOD BEVERAGES	**BTD 733**	3:0:0	3	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Emphasize problem solving tools with in food service careers
CLO 2	Focus on industry wide trends and work ethics
CLO 3	To guide in professional development and leadership skills

B. SYLLABUS

Module I: Introduction
History of growth; Economic importance; Classification; Dietary significance, Quality standards; Chemical, sensory and microbial evaluation; Product shelf – life

Module II: Ingredients for Food Beverages
Water, sugar, food additives and other ingredients required for production; Quality of water required and effect of dissolved constituents on beverage; Water treatment.

Module III: Fruit and Vegetable Juices and Beverages
Juice extraction equipments; Juice clarification, preservation and packing; Concentration and drying; Modified juice beverages; Fortified beverages

Module IV: Carbonated and Non-carbonated Beverages
Non-carbonated and carbonated beverages; Source of carbon dioxide and its physico – chemical properties; Carbonating process; Packaging of carbonated beverages, tea and coffe

Module V: Alcoholic Beverages
Method for manufacture of Alcoholic beverages, Classification of alcoholic beverages, Selection of ingredients for the production of whiskey, beer, wine, rum, brandy. Storage of alcoholic beverages

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

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SUGGESTED READINGS

- Green LR. Developments in Soft Drink Technology. Applied Science Publishers Ltd, London
- Wood roof JG and Phillips GF. Beverages: Carbonated and Non-Carbonated. The AVI Publishing Co. Inc, Westport

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS701	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate their personal strengths and insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while choosing the appropriate channel of formal communication
CLO 3	Apply acquired knowledge with the appropriate selection of channel of formal communication.

Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Speaking for Employment
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters, Video & Conference Call Etiquettes (Virtual Interviews)

Module IV: Basic Telephony Skills
Guidelines for Making a Call
Guidelines for Answering a Call, Formal SMS Drafting

Module V: Work Place Speaking
Negotiations
Participation in Meetings

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Keynote Speeches

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication*. The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BEHAVIOURAL SCIENCE - VII (INDIVIDUAL, SOCIETY AND NATION)	BSS704	1:0:0	1	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognize their personality and individual differences and identify its importance of diversity at workplace and ways to enhance it.
CLO 2	Recognize effective socialization strategies and importance of patriotism and taking accountability of integrity.
CLO 3	Recognize different types of human rights and its importance.
CLO 4	Identify Indian values taught by different religions.

B. SYLLABUS

Module I: Individual differences & Personality
Personality: Definition& Relevance

Importance of nature & nurture in Personality Development

Importance and Recognition of Individual differences in Personality

Accepting and Managing Individual differences (adjustment mechanisms)

Intuition, Judgment, Perception & Sensation (MBTI)

BIG5 Factors

Module II: Managing Diversity
Defining Diversity

Affirmation Action and Managing Diversity

Increasing Diversity in Work Force

Barriers and Challenges in Managing Diversity

Module III: Socialization
Nature of Socialization

Social Interaction

Interaction of Socialization Process

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Contributions to Society and Nation

Module IV: Patriotism and National Pride
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

Module V: Human Rights, Values and Ethics
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

Examination Scheme:

Components	SAP	JOS	FC/MA/CS/HA	P/V/Q	A
Weightage (%)	25	15	30	25	05

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

1. Davis, K. Organizational Behaviour,
2. Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
3. Dressler, David and Cans, Donald: The Study of Human Interaction
4. Lapiere, Richard. T – Social Change
5. Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
6. Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
7. Robbins O.B.Stephen;. Organizational Behaviour

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
FRENCH	**FLT 701**	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone advanced language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of advance level.
CLO 3	Students will be able to communicate with complex sentences

B. SYLLABUS

Module A: Unités 1 – 3: pp. 06 - 46

Contenu lexical:

Unité 1: Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

Unité 2: Imaginer **-** Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

Unité 3: Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

Contenu grammatical:

Le passé : passé composé/imparfait
Pronoms compléments directs/indirects, y/en (idées/choses)
Propositons relatives introduites par qui, que, où
Comparatif et superlatif
Le conditionnel présent
Situer dans le temps

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Féminin des adjectifs
La prise de paroles : expressions
Le subjonctif : volonté, obligation

EXAMINATION SCHEME:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Le Gargasson, I. Naik, S. Chaize, C. (2012) Tech French, Delhi : Goyal Publications
- Ray. A, Robert (2010) Le Petit Robert French Dicitionary, Paris: Le Robert
- Robert, Collins (2006) Collins Robert French Dictionary, Paris : Harper Collins

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Course Name	Course Code	LTP	Credit	Semester
GERMAN - VII	**FLG 701**	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone advanced language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of advance level.
CLO 3	Students will be able to communicate with complex sentences

B. SYLLABUS

Module I: Dass- Sätze
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

Module II: Indirekte Fragesätze
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

Module III: Wenn- Sätze
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

Module IV: Weil- Sätze
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

Module V: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VI: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

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EXAMINATION SCHEME:

ClassTest (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
Weightage (%)	30	15	05	15	15	10

SUGGESTED READINGS

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
SPANISH - VII	**FLS 701**	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone advanced language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of advance level.
CLO 3	Students will be able to communicate with complex sentences.

B. SYLLABUS

Module I
Revision of earlier semester modules

Module II
Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

Module III
Various expressions used on telephonic conversation (formal and informal)

Module IV
Being able to read newspaper headlines and extracts (Material to be provided by teacher)

Module V
Negative commands (AR ending verbs)

Module VI
Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

Examination Scheme:

Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**

10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Nuevo Español Sin Fronteras (ESF1) by Jesús sánchez Lobato, Concha Moreno Garcia, Concha Moreno Garcia, Isabel Santos Gargallo, Sociedad General Española De Librería, S.A 2005

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE – VII	**FLC 701**	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone advanced language skills such as reading, writing, speaking, listening & interactive) in the language
CLO 2	Students will be able to read and interpret small texts of advance level.
CLO 3	Students will be able to communicate with complex sentences.

B. SYLLABUS

Module I
Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1,2.

Module II
Pronunciation and intonation
Character Writing and stroke order.

Module III
Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

Module IV
Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

Module V
A brief summary of grammar.
The optative verb "yuanyi".
The pronoun "ziji".

Examination Scheme:

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Continuous Evaluation (Total 50 Marks)					End Sem Evaluation (Total 50 Marks)
Quiz	**Mid Term Test**	**Presentation**	**Viva Voce**	**Attendance**	**End-Term Exam**
10	**15**	**10**	**10**	**5**	**50**

SUGGESTED READINGS

- Kan tu shuo hua" Part-I Lesson 1-7

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Course Name	Course Code	LTP	Credit	Semester
AANANDAM-VII	AND007	2:0:0	2	7

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO4	Interaction among students, enlarge social network
CLO5	Cooperative and Communication skills and leadership qualities
CLO6	Critical thinking, Confidence and Efficiency

B. SYLLABUS

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

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GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.

Conclusion is clearly stated. The underlying logic is explicit

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Course Name	Course Code	LTP	Credit	Semester
MAJOR PROJECT/ DISSERTATION	**BTD 860**	20:0:0	20	8

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Demonstrated ability to identify solutions to problems related to the processing of food and to apply and expand upon the theoretical concepts presented in lectures
CLO 2	Demonstrated familiarity and competence with the practical skills and techniques used to process food. This will include planning a production run, preparation of raw materials, the use of processing equipment and appropriate methods of packaging and storing finished product
CLO 3	Ability to explain the benefits and limitations (scientific and ethical) of producing processed foods and be able to recommend, justify and critique commonly used methods of food processing

B. SYLLABUS

Methodology

Every student shall undertake major project. The major Project shall be undertaken in some food processing industry or laboratory of repute engaged in food analysis. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned industry unit or laboratory.

The faculty in consultation with the concerned scientist of the industry / laboratory shall select the topic of the project. At the conclusion of the project the students shall present a seminar and submit a dissertation. The dissertation shall be evaluated by the internal faculty / examiner. The students then shall have to appear for the Viva Voce.

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely

with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated objectives;

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

Title or Cover Page

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The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

Materials and Methods

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

Did the research project meet its aims (check back to introduction for stated aims)?

What are the main findings of the research?

Are there any recommendations?

Do you have any conclusion on the research process itself?

Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

Appendices

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

References

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples
For research article
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

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For book
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67
The Layout Guidelines for the Project File & Project Report

A4 size Paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5

Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis (Analyze Quantitative/ Qualitative information)

Quality Control

Conclusions

In case of industrial training, following format can be followed for preparation of training report:

- Title or Cover Page
- Copy of training certificate and institutional certificate
- Acknowledgement
- Table of contents
- Introduction
- Detailed section-wise report
- Bibliography(if required)

EXAMINATION SCHEME:

Components	Marks
Dissertation	**50**
Viva Voce	**50**

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Bachelor of Science (Honours) Biotechnology

Programme Code: BSB

Duration – 3 Years Full Time

Programme Structure

And

Curriculum & Scheme of Examination

With

Choice Based Credit System (CBCS)

2020 Batch

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JAIPUR

BSc Biotechnology

Credit Summary Sheet

Semester	Core (CC)	Domain Electives (DE)	VA	Open Electives(OE)	Total
1	16	3	4	-	25
2	16	3	4	3	28
3	13	3	4	3	25
4	15	3	4	3	27
5	22	3	4	3	34
6	25				25
Total	**107**	**15**	**20**	**12**	**164**

Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective

B. Sc. (Hon.) Biotechnology						
Semester I						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit Units**
BSB 101	Biochemistry	CC	3	-	-	3
BSB 102	Bioanalytical Techniques	CC	2	-	-	2
BSB103	Cell Biology	CC	3	-	-	3
BSB104	Plant science- I	CC	2	-	-	2
BSB 105	Chemistry – I	CC	2	-	-	2
BSB 121	Biochemistry -Lab	CC	-	-	2	1
BSB123	Cell Biology -Lab	CC	-	-	2	1
BSB124	Plant science- I-Lab	CC	-	-	2	1
BSB 125	Chemistry – I-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BSB130	Biochemical basis of disease	DE	3	-	-	3
BSB131	Biophysics	DE				
BSB132	Basics on Biotechnology	DE				
AND001	ANANDAM-I	VA	-	-	-	2
BCS 101	English	VA	1	-	-	1
BSS 103	Understanding Self for Effectiveness – I	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
Total						25

B. Sc. (Hon.) Biotechnology						
Semester II						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit Units**
BSB 201	Metabolic Regulation	CC	3	-	-	3
BSB 202	Plant science -II	CC	2	-	-	2
BSB 203	Microbiology	CC	3	-	-	3
BSB 204	Chemistry - II	CC	2	-	-	2
BSB 205	Genetics	CC	2	-	-	2
BSB 222	Plant science –II -Lab	CC	-	-	2	1
BSB 223	Microbiology-Lab	CC	-	-	2	1
BSB 224	Chemistry - II-Lab	CC	-	-	2	1
BSB 225	Genetics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BSB 230	Term Paper	DE	3	-	-	3
BSB 231	Bioinformatics	DE				
BSB 232	Enzyme technology	DE				
OE II	Open elective II	OE	3	-	-	3
AND002	ANANDAM-II	VA	-	-	-	2
BCS 201	English	VA	1	-	-	1
BSS 203	Behavioral Science – II	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
Total						**28**

B. Sc. (Hon.) Biotechnology						
Semester III						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit Units**
BSB 301	Molecular Biology	CC	2	-	-	2
BSB 302	Animal science	CC	3	-	-	3
BSB 303	Chemistry - III	CC	2	-	-	2
BSB 321	Molecular Biology -Lab	CC	-	-	2	1
BSB 323	Chemistry Lab	CC				2
DE Electives: Student has to select 1 course from the list of following DE electives						
BSB 330	Term Paper	DE	3	-	-	3
BSB 331	Protein engineering	DE				
BSB 332	Food Biotechnology	DE				
OE3	Open Elective III	OE	3	-	-	3
AND003	ANANDAM-III	VA	-	-	-	2
EVS001	Environmental Sciences	CC	4	-	-	4
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 303	Understanding Self for Effectiveness – III	VA	1	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
Total						**25**

B. Sc. (Hon.) Biotechnology						
Semester IV						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit Units**
BSB 401	Recombinant DNA Technology	CC	3	-	-	3
BSB 402	Structural Biology	CC	2	-	-	2
BSB 403	Immunology & Immunotechnology	CC	2	-	-	2
BSB 404	Scientific Writing	CC	3	-	-	3
BSB 405	Biomaterials and biomimetics	CC	2	-	-	2
BSB 421	Recombinant DNA Technology -Lab	CC	-	-	2	1
BSB 422	Structural Biology-Lab	CC	-	-	2	1
BSB 423	Immunology & Immunotechnology-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BSB 430	Term Paper & Industry Visit	DE	3	-	-	3
BSB 431	Downstream processing	DE				
BSB 432	Pharmaceutical Technology & Biotechnology	DE				
OE IV	Open elective IV	OE	3	-	-	3
AND004	ANANDAM-IV	VA	-	-	-	2
BCS 401	Communication Skills – II	VA	1	-	-	1
BSS 403	Understanding Self for Effectiveness – IV	VA	1	-	-	1
FLT 401 FLG 401 FLS 401 FLC 401	Foreign Language - IV French German Spanish Chinese	VA	2	-	-	2
Total						**27**

B. Sc. (Hon.) Biotechnology						
Semester V						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit Units**
BSB 501	Plant Biotechnology	CC	3	-	-	3
BSB 502	Animal Biotechnology	CC	3	-	-	3
BSB 503	Bioenterpreneurship	CC	3	-	-	3
BSB 504	Genomics & Proteomics	CC	3	1	-	4
BSB505	Clinical Research & Pharmacovigilance	CC	3	-		3
BSB550	Industrial Training Evaluation	CC	-	-	-	3
BSB 521	Plant Biotechnology -Lab	CC	-	-	2	1
BSB 522	Animal Biotechnology-Lab	CC	-	-	2	1
BSB 524	Genomics & Proteomics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BSB 530	Statistics for Biology	DE	3	-	-	3
BSB 531	Bioprocess technology	DE				
BSB 532	IPR & regulatory affairs	DE				
OE V	Open elective V	OE		-	-	3
AND005	ANANDAM-V	VA	-	-	-	2
BCS 501	Communication Skills – III	VA	1	-	-	1
BSS 503	Understanding Self for Effectiveness – V	VA	1	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language - V French German Spanish Chinese	VA VA VA VA VA VA	2	-	-	2
Total						**34**

B.Sc Biotechnology: 6th SEMESTER

Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
BSB660	Project /Dissertation	CC	-	-	-	25
	TOTAL					**25**

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Course Name	Course Code	LTP	Credit	Semester
Biochemistry	BSB101	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Apply their knowledge of structure of biomolecules to the functions that they carry out in the cell.
CLO 2	Appreciate the vast diversity of biochemicals that bring about all functions of life.
CLO 3	The associated lab work will enable them to see how reactions take place inside living cells

B. SYLLABUS

Module I: Introduction, Aims and Scope:

Chemical foundation of biology: Acid, Base, Buffer, pH, pK, Properties of water, oxidation-reduction properties, hydrophilic and hydrophobic groups in biomolecules

Module II: Nature and Perspective of Biological materials

Introduction to Biomolecules. Types of chemical bonds, Covalent and non covalent interactions in biology. Hormones and growth factors. High energy biomolecules ATP, GTP & Creatine phosphate.

Module III:

Carbohydrates and Lipids

Classification, nomenclature, types, structures, properties. Properties and structures of few biologically essential polysaccharides. Structure of glycoproteins and protein polysaccharides. Classification, nomenclature, types, structures, properties. Biological Membranes: Function and properties. Lipoproteins and lipopolysaccharides.

Module IV:

Proteins: Classification, structural organization of proteins, Types and properties of amino acids, name and abbreviations Characters of Peptide bonds

Module V

Nucleic acids: Structure and properties of nucleic acids (DNA & RNA), Types and structures of nitrogenous bases and nucleotides

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Conn, E., & Stumpf, P. (2009). Outlines of biochemistry, 7th Ed. John Wiley & Sons.
- Jain, J. L. (2004). Fundamentals of biochemistry, 6th Ed. S. chand.
- Berg, J. M., Tymoczko, J. L., & Stryer, L. (2002). Biochemistry, 7th Ed. WH Freeman and Co.
- Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008). Lehninger principles of biochemistry. 7th Ed. Macmillan.

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Course Name	Course Code	LTP	Credit	Semester
Bionalytical Techniques	BSB102	2:0:0	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To identify and use various instruments and tools for analysis of biological products.
CLO 2	To understand principles, applications and limitations of various bio analytical tools and techniques.
CLO 3	To compare various similar techniques and will be able to understand importance of one

B. SYLLABUS

Module I: Instruments, basic principles and usage

pH meter, absorption and emission spectroscopy, Principle and law of absorption, fluorimetry, colorimetry, spectrophotometry (visible, UV, infra-red), polarography, centrifugation, atomic absorption, NMR, X-ray crystallography , Radioisotope tracer techniques and autoradiography

Module II: Chromatography techniques

Paper chromatography, thin layer chromatography, column chromatography, gas chromatography, gel filtration and ion exchange chromatography,

Module III: Electrophoresis

SDS polyacrylamide electrophoresis, immunoelectrophoresis, Isoelectric focussing.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Wilson, K., & Walker, J. (2010). Principles and techniques of biochemistry and molecular biology, 7th Ed. Cambridge university press.
- Webster, J. G. (2004). Bioinstrumentation, 4th Ed. Wiley.
- Upadhyay, A & Nath, N. (2004). Biophysical chemistry, principle and techniques, 4th Ed. Himalaya Publishing House.
- Van Impe, J. F., Vanrolleghem, P. A., & Iserentant, D. M. (2013). Advanced instrumentation, data interpretation, and control of biotechnological processes. 4th Ed. Springer Science & Business Media.
- Hollas, J. M. (2004). Modern spectroscopy. 4th Ed. John Wiley & Sons.

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Course Name	Course Code	LTP	Credit	Semester
Cell Biology	BSB103	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify basic concepts and functional interrelationships of different cell structures and its components.
CLO 2	Generate ability to analyze and interpret the behavior of cells in their microenvironment with emphasis on phenomenon that regulates cell signaling, cell cycle and cancer
CLO 3	Understand the basic concepts of life and cell, which will act as a foundation for all further courses in Biotechnology

B. SYLLABUS

Module I: Cell as a basic unit of living systems

The cell theory, precellular evolution; broad classification of cell types: archaebacteria, PPLOs, bacteria, eukaryotic microbes, plant – and animal cells; cell, tissue, organ and organisms, different levels of organization.

Module II: Ultrastructure of the cell membrane and cell organelles

Ultrastructure of cell membrane and function, Structure of cell organelles; golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes; cytoskeletal structures (actin, microtubules.), mitochondria, chloroplast, lysosomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus).

Module III: Chromosomes

Structural organisation of chromosomes, chromatids, centromere, telomere, chromatin, nucleosome organisations; eu-and heterochromatin.

Module IV: Cell division and cell cycle

Cell cycle, interphase, mitosis and meiosis

Module V: Cell – Cell interaction and differentiation

Cell locomotion (amoeboid, flagellar and ciliar); cell senescence and death (apoptosis). Mechanism of cell differention (e.g., RBC); difference between normal and cancer cells.

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Alberts, B., Bray, A., Johnson, J., Lewis, M., Roff, K., Robert, P., Walter & K. Roberts, (2013). Essential Cell Biology: An Introduction to the Molecular Biology of the Cell. 4th Ed. D. Garland Publishing Company.
- Robertis, D. (1987). Cell and molecular biology. 8th Ed. Saunders college publishing.
- Lodish, H. (2008). Molecular cell biology. 7th Ed. Macmillan.

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Course Name	Course Code	LTP	Credit	Semester
Plant Science	BSB104	3:0:0	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify basic concepts and functional interrelationships of different cell structures and its components.
CLO 2	Generate ability to analyze and interpret the behavior of cells in their microenvironment with emphasis on phenomenon that regulates cell signaling, cell cycle and cancer
CLO 3	Understand the basic concepts of life and cell, which will act as a foundation for all further courses in Biotechnology

B. SYLLABUS

Module I: Algae and Lichen

General characters of algae, Various habitat, Cell structure in algae (special reference flagilla, stigma, Neuromotor apparatus and pigments), Classification of algae (F. E. Fritsch), Economic importance of algae, Life cycle of Polysiphonia General character, thallus structure and reproduction in Lichen. General character, taxonomy and economic importance of bryophytes, life cyce of Marchantia

Module II: Pteridophytes

General character and taxonomy of pteridophytes, heterospory and seed habit in pteridophytes, steler system in pteridophytes and life cycle of Marsilea.

Module III Gymnosperm and Angiosperm

General character and taxonomy of gymnosperms, life cycle of Pinus, economic importance of pteridophytes and gymnosperms. General character and taxonomy of angiosperms, Description of Lamiaceae, Malvaceae, Euphorbiaceae, Poaceae, Cucurbitaceae and Rutaceae. Economically important plants for cereals,fibre, oil, timber and medicinal value.

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Gangulee, H. C., & Kar, A. K. (1989). College Botany, Vol-II, 5th Ed. Books & Allied Pvt. Ltd., Calcutta.
- Singh, V. (2010). A text book of Botany. 4th Ed. Rastogi Publications.
- Chapman, V. J., & Chapman, D. J. (1973). The algae (Vol. 2, pp. XIV-XIV). 2nd Ed. London: Macmillan.
- Kumar, H. D. (1990). Introductory Phycology. 2nd Ed. Affiliated East West.
- Kumar, H. D., & Singh, H. N. (1995). A Textbook of Algae Ed. 4th. Ed. East–West Press Pvt. Ltd. New Delhi.
- Parihar, N. S. (1961). Bryophyta (Vol. 1). 4th Ed. Central Book Depot.
- Parihar, N. S. (1965). Pteridophytes. 4th Ed. Central Book Depot.

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Course Name	Course Code	LTP	Credit	Semester
Chemistry	BSB105	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

INORGANIC

Module I

Chemical bonds and molecules, Shapes of simple molecules, bond energy, bond length, resonance and Hydrogen bond. Radioactivity: Natural and artificial, group displacement law, half life period, binding energy, nuclear reaction equations, isotopes, tracers, radio dating, Application of radioactivity. Periodic table: Modern periodic table, periodicity in properties of elements, atomic radii, ionic and covalent radii, ionization energies, electron affinity, electro-negativity. Metallurgy of S block elements (Na, K, Be, Mg, Ca)

PHYSICAL

Module II

Gases: Kinetic theory of gases, Vander Waal's equation, critical constants, Liquefaction of gases.

Module III

Chemical-Kinetics: Velocity of a reaction, Law of mass action; determination of rate constants for first and second order reactions, collision theory of bimolecular reactions.

Catalysis: Promoters and Poisons, Enzyme catalysis.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Prakash, S. (2000). Advanced inorganic chemistry (Vol. 1). 19th Ed. S. Chand.
- Soni, P. L., & Katyal, M. (1977). A Text-Book of Inorganic Chemistry. 20th Ed. Sultan Chand & Sons.
- Puri, B. R., Sharma, L. R., & Madan, S. P. (1993). Principles of Physical Chemistry, 46th Ed. Shoban Lal Nagin Chand & Co.
- Puri, B. R., Sharma, L. R., & Madan, S. P. (1993). Principles of Physical Chemistry, 4th Ed. Shoban Lal Nagin Chand & Co.

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Course Name	Course Code	LTP	Credit	Semester
Cell Biology Lab	BSB123	0:0:2	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify basic concepts and functional interrelationships of different cell structures and its components.
CLO 2	Generate ability to analyze and interpret the behavior of cells in their microenvironment with emphasis on phenomenon that regulates cell signaling, cell cycle and cancer
CLO 3	Understand the basic concepts of life and cell, which will act as a foundation for all further courses in Biotechnology

B. SYLLABUS

Module I:
Cytological preparations, Fixation, dehydration and staining
Module II
Squash preparation of meiotic and mitotic cells.
Module III
Karyotyping, Embedding and sectioning.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
PLANT SCIENCE LAB – I	BSB124	0:0:2	2	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify basic concepts and functional interrelationships of different cell structures and its components.
CLO 2	Generate ability to analyze and interpret the behavior of cells in their microenvironment with emphasis on phenomenon that regulates cell signaling, cell cycle and cancer
CLO 3	Understand the basic concepts of life and cell, which will act as a foundation for all further courses in Biotechnology

A. SYLLABUS

Module I
Introduction to Algae and bryophyte
Polysiphonia and Marchantia.

Module II
Introduction to pteridophyte and gymnosperm
Various steles in pteridophytes, Marsilea. and Pinus.

Module III
Taxonomy of some selected families of flowering plants- Lamiaceae, Malvaceae, Euphorbiaceae, Poaceae, Cucurbitaceae and Rutaceae.

Module IV
Economic Botany; Economically important plants for food,fibre, oil, timber and medicinal value.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
CHEMISTRY LAB - I	BSB125	3:0:0	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

Module I
Volumetric analysis: Oxidation-reduction titration using $KMnO_4$ and $K_2Cr_2O_7$
Module II
Iodometry titrations: Estimation of sodium thiosulphate & potassium dichromate.
Module III
Preparation of the following inorganic compounds: Prussion blue from iron fillings, chrome alum, cuprous chloride and potassium trioxal atrochromate.

PHYSICAL CHEMISTRY

Module IV
Determination of surface tension and viscosity of liquids
Module V
Heat of neutralisation of a strong acid and a strong base.
Module VI
Solubility curve of KNO_3 or benzoic acid.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
Biophysics	BSB131	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

Unit I - Thermodynamics
Laws of thermodynamics, concept of free energy, unavailable energy and entropy, heat content of food, bomb calorimetry, chemical kinetics – rate, order, molecularity of reactions and energy of activation.

Unit II – Bioenergetics
Energy requirements in cell metabolism, role and structure of mitochondria, high energy phosphate bond, electron transfer phenomenon and biological transfer.

Unit III - Biophysical properties
Surface tension, adsorption, diffusion, osmosis, dialysis and colloids

Unit IV – Molecular alphabets of life
Amino acids, nucleic acid bases and lipids, classification and properties of amino acids, peptides and poly peptides. Nucleosides, nucleotides, polynucleotides, pentose and hexose poly saccharides.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Patrick F. Dillon, (2012). Biophysics 3rd Ed. Cambridge University Press.
- Bloomfield V A & Harrington R E, (2012) Biophysics: An Introduction 2nd Ed. Springer.
- Nolting, B, (2011), Methods in Modern Biophysics 3rd Ed. Springer.
- Cotterill, R. (2003). Biophysics: An introduction. 1st Ed. John Wiley & Sons.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Basics of Biotechnology	BSB132	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the role of different branches of Biotechnology.
CLO 2	summarize and inferring the field of their interest among the different papers of Biotechnology.
CLO 3	Execute the concepts in the field of agriculture, veterinary sciences, pharmaceutical industry and food industry etc.

B. SYLLABUS

UNIT I

History of biotechnology, scope of biotechnology, introduction of genetic engineering, plant and animal tissue culture.

UNIT II

Fermentation technology, immobilized enzymes, vaccines, antibodies and hybridoma technology, diagnostics, embryo transfer technology, sexing of embryo, transgenics.

UNIT III

Genome, genome mapping, physical maps, genetic maps, different types of DNA markers and their applications.

UNIT IV

Application of biotechnology in agriculture, veterinary sciences, pharmaceutical industry, food industry, chemical industry and environment.

UNIT V

Introduction and historical perspective: Discovery of microbial world, spontaneous generation, methods in microbiology: sterilization, culture media, pure culture techniques, antibiotics and mode of action.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

Course Becker, J. M. , Cold Well, G. A. & Zachgo, E. A. (2007). Biotechnology a Laboratory, Academic Press .
Brown, C. M., Campbell , I., & Priest, F. G. (2005). Introduction to Biotechnology, Panima.
Singh, B. D. (2006). Biotechnology Ey xpanding Horiozon, Kalyani.

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Course Name	Course Code	LTP	Credit	Semester
BIOCHEMICAL BASIS IN DISEASES	BSB130	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

Module 1: Nutritional and Inborn disorders
Alkaptonuria, Phenylketonuria, Glycogen and Lipid storage diseases, SCID, Clotting disorders.
Module 2: Nutritional deficiency based diseases
Kwashiorkar, Marasmus, Beri-beri, Scurvy, Pellagra, Anaemia, Night blindedness, Rickets, Osteomalacia, Osteoporosis, Wilson's disease.
Module 3: Life style diseases
Obesity, Cardiovascular diseases, Atherosclerosis, Diabetes mellitus-II. Inflammatory Bowel Disease (IBD).
Module 4: Hormonal Imbalances
Outline of hormone action and imbalances leading to disease - precocious puberty, hyper and hypopituitarism. Hyper and hypothyroidism.
Module 5: Infectious diseases
Viral infection (polio, measles, mumps, influenza, HIV); Bacterial infections (tetanus, diphtheria, tuberculosis, typhoid, cholera); Protozoan (Plasmodium and Trypanosoma) and parasitic infections.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN: 978-1-118-09242-2.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
English	BCS101	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Foundation of English Language.
CLO 2	Help students to inculcate creative & aesthetic sensitivity
CLO 3	Appreciation and analysis of the prescribed literary texts

B. SYLLABUS

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1) Madhulika Jha, Echoes, Orient Long Man
2) Ramon & Prakash, Business Communication, Oxford.
3) Sydney Greenbaum Oxford English Grammar, Oxford.
4) Successful Communications, Malra Treece (Allyn and Bacon)
5) Effective Technical Communication, M. Ashraf Rizvi.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness	BSS103	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding self & process of self exploration
CLO 2	Learning strategies for development of a healthy self esteem
CLO 3	Importance of attitudes and its effective on personality

B. SYLLABUS

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions

Healthy and Unhealthy expression of emotions

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Davis, K. Organizational Behaviour,
- Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
- Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
- Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G. (1985). Oxford Textbook of Public Health, Vol. 4.
- LaFasto & Larson. (2001). When Teams Work Best, Response Books (Sage), New Delhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
French	FLC001	2:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance
CLO 4	Narrate clearly ideas, themes in simple standard French

B. SYLLABUS

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2
Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1: Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps

1. dire la date et l'heure

Contenu grammatical:
1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German	FLC101	2:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice
Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS101	2:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact

that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

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Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC101	2:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.

Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC101	2:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.

· Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)

· Location / community where the work was carried out

· Details of Activities performed are to be given with date

· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)

· Photographs taken for documentation of work should be submitted

· Media coverage of the projects should be attached if any

· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.

· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page

· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.

· University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading "Group Community Service Project", and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:

a) Current scenario (Regional, national and international level as applicable)
b) Future predictions
c) Duty of the government
d) Government policies (related to the topic), if any
e) Duty of public
f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

· C grade =32 hrs (Below 20 marks)
· B grade >32 hrs to <=44hrs (20-30 marks)
· A grade >44 hrs to<=54hrs (30-40 marks)
· O grade >54 hrs to<=64hrs (40-50 marks)

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Metabolic Regulation	BSB201	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To provide basic knowledge for cell and body metabolism .
CLO 2	To provide knowledge about lipid , carbohydrateand nucleic acid metabolism.
CLO 3	To provide knowledge about application of biochemical pathways and diseases

B. SYLLABUS

Module I

Carbohydrate metabolism- Glycolysis pathway, Fates of pyruvate, Metabolic sources of Acetyl Co-A, Citric acid cycle, Amphibolic nature of the Citric acid cycle, Electron transport chain and oxidative phosphorylation, Glycogen breakdown and synthesis, Glycogen storage and its diseases, Gluconeogenesis, Glyoxylate pathway, Pentose phosphate pathway

Module II

Lipid metabolism - Beta oxidation of Fatty acids, Ketone bodies, Fatty acid biosynthesis, Regulation of fatty acid metabolism.

Module III

Amino acid metabolism -Amino acid deamination, Urea cycle, Amino acids as biosynthetic precursors, Biosynthesis of non essential amino acids, Nitrogen fixation.

Module IV

Nucleotide Metabolism –Biosynthesis and catabolic pathways of Purines and Pyrimidines, Metabolic disorders-SCID, GOUT.

Module V

Enzymes **-** Classification and nomenclature of enzymes, Regulation of enzyme activity, Kinetics of enzyme catalyzed reactions.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Granner, R. K. M. D. K., & Rodwell, P. A. M. V. W. (2006). Harper's Illustrated Biochemistry. 30th Ed. McGraw-Hill Medical.
- Berg, J. M., Tymoczko, J. L., & Stryer, L. (2002). Biochemistry. 7th Ed. WH Freeman and Co.
- U Satyanarayana, (2013) Biochemistry 4th Ed. Elsevier.
- Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008). Lehninger principles of biochemistry. 7th Ed. Macmillan.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Plant Science	BSB202	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the effects of tonicity on plant cell system
CLO 2	Create stress to see the effects on rate of photosynthesis in plants
CLO 3	Apply staining techniques for identification of various anatomical features of plants

B. SYLLABUS

Module I

Diffusion, osmosis, permeability, imbibition, plasmolysis, osmotic potential, water potential and matrix potential. Absorption of water: Passive and active absorption, Ascent of sap, Transpiration, guttation and significance of transpiration, factors affecting transpiration and Modern mechanism of stomatal closing and opening mechanism Minerals and their role in plant physiology, mechanism of absorption of mineral salts (Donnan's equilibrium, Ion exchange, diffusion, facilitated diffusion, active transport, symport, antiport) and hydroponics.

Module II

Importance of photosynthesis, role of pigments, Light reaction, Dark reaction-C3 cycle
Photo respiration, C4 Cycle, CAM cycle and factors affecting photosynthesis, Glycolysis
Kreb cycle, Factors affecting respiration and RQ.

Module III

Plant tissue and its classification, Structure of Xylem and Phloem, Leaf anatomy, Structure and function of cambium (normal), Anomalous behavior of cambium in *Achyranthes*, *Boerhaavia*, *Bignonia* and *Dracaena*, Root-stem transition Structure of anther and microsporogenesis, development of the male gametophyte and pollen dispersal, Structure of ovule, megasporogenesis and development of the female gametophyte with particular reference to *Polygonum* type, Endosperm and types, Fertilisation and development of embryo onagrad type.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Taiz, L., & Zeiger, E. (2006). Stress physiology. 5th Ed. Plant physiology.
- Singh, V., Pande, P.C. & Jain, D.K., (2013). A text book of botany (angiosperms-taxonomy, economic botany, anatomy, embryology and morphogenesis) 4th Ed. Rastogi Publications.
- Bhojwani, S.S & Bhatnagar S.P., (2014). The Embryology of Angiosperms by S.S. Bhojwani, S.P. Bhatnagar, 6th Ed. Vikas Publishing House Pvt. Ltd.
- Esau, K, (2011). Anatomy of Seed Plants 2nd Ed. Wiley Publications.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
MICROBIOLOGY	BSB203	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Acquire the ability to use the microbes in research related to different field of Biotechnology.
CLO 2	Acquire the knowledge of the concepts in the field of agriculture, veterinary sciences, pharmaceutical industry and food industry etc.
CLO 3	Acquire skills of presentation and to use *library and internet resources independently.*

B. SYLLABUS

Module I: History of Microbiology and Ultra Structure of Prokaryotic cell
Introduction, contribution of Scientists (Leeuwenhoek, Pasteur, Koch etc.), role of microorganisms in transformation of organic matter and in the causation of diseases. Pasteur's experiments, microscopy (optical, TEM and SEM), concept of microbial species and strains; general outline of various forms of micro-organisms. Nature of the microbial cell surface, Prokaryotic structure and function - cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions, gram positive and gram negative bacteria and endospores

Module II Microbial nutrition and growth
The definition of growth, mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, continuous culture, Diauxic growth, culture collection and maintenance of cultures.

Module III Microbial Taxonomy
Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, and characteristics of primary domains, taxonomy, nomenclature and Bergey's manual, Archaebacteria

Module IV: Control of microorganisms and Host-parasite relationship
Methods of sterilization & disinfection (Physical agents &chemical agents)Antibiotics with special reference to antibacterial & antifungal antibiotics, mode of actions,drug resistance .Host-parasite relationship (Normal micro flora of skin, oral cavity, gastrointestinal tract), types of toxins (Exo, endo, entero) and their structure and mode of actions,

Module V Industrial Microbiology

Introduction to industrially important microbes and microbial fermentative products (Production of antibiotics with special reference to penciliin & streptomycin, enzymes), food products from microbes (Dairy &SCP etc)

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Prescott, Herley, Klein (2002). Microbiology, 5th edn. C.B.S. Publishers.
2. Pelczar M.J., Chan E.C.S. and Kreig, N.R. Microbiology VI Edition, Tata McGraw Hill.
3. Jayaram Paniker C.K. (2009) Ananthnarayan and Paniker's Textbook of Microbiology, 8th edn. Orient BlackSwan.
4. Stanier, R. (2009). General Microbiology, 5th Edn, Macmillian.
5. Salisbury, Whitaker and Hall, Principles of Fermentation Technology, Aditya Books Pvt. Ltd.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chemistry	BSB204	2:0:0	2	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

Module I

Organic chemistry as chemistry of carbon compounds, Methods of purification, tests of purity: qualitative and quantitative elemental analysis, determination of molecular masses: calculation of Empirical and Molecular formula, Structural formula. Tetrahedral concept of carbon compounds; nomenclature of organic compounds; Isomerism; stereo-isomerism, geometrical and optical isomerism.

Module II

Grignard reagent; preparation and uses, Alcohol; ethanol, propanol, glycerol; Monocarboxylic acids and their simple derivatives, descriptive studies of dicarboxylic acids, viz. malic, oxalic, tartaric, maleic, General methods of preparation of aliphatic aldehydes and ketones, Keto-enol tautomerism; aceto-acetic ester and malonic ester.

Module III

Chemical equilibrium: Reversible reactions, equilibrium law, equilibrium constant, factors influencing equilibrium states.

Eletrochemistry: Electrolysis, laws of electrolysis, ionisation constant, specific, equivalent and molecular conductance, common ion effect; Hydrogen ion concentration, pH value, Theory of acid base indicators, buffer solutions, hydrolysis of salts and solubility product simple calculations based on these concepts.

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Bahl, B. S. (2006). Text Book of Organic Chemistry 18th Ed. S. Chand & Co. Ltd.
2. Puri, B. R., Sharma, L. R., & Madan, S. P. (2013). Principles of Physical Chemistry. 46th Ed. Vishal Publishing Co.
3. Bahl, A. (2010). Advanced organic chemistry. 3rd Ed. S Chand & Company Limited.
4. I.L. Finar & S, Pearsons (1973). Organic Chemistry Vol.I & II 6th Ed. Pearson India.
5. N, Haider. (2011), Fundamentals of Organic Chemistry 5th Ed. S. Chand & Co. Ltd.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Genetics	BSB105	2:0:0	2	1

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	aware of the genetics and its significance.
CLO 2	able to identify and solve problems related to Mendelian and Non Mendalian genetics.
CLO 3	Able to understand gene structure, mutation and sex linked inheritance.

B. SYLLABUS

Module I

Brief history, scope and significance of Genetics. Mendelian law of inheritance. Lethality and interaction of gene. Multiple allele and isoallele. Penetrance and Expressivity .Linkage and crossing over. Mapping of genes .interference and coincidence.

Basic microbial genetics, Conjugation, transformation, transduction and their use in genetic mapping.

Module II

Classical and modern concept of gene, pseudoallelism, position effect, intragenic crossing over and complementation test, Benzers work on rII locus in T4 Bacteriophage.

Mutation; spontaneous and induced, Mutagen; chemical and physical. Chromosomal aberrations; structural and numerical. Economic importance of mutation. Genetic disorders in human; Kleinefelter, Turner, Cri-du-Chat and Down syndrome.

Module III

Sex determination in plant and animal. Non disjunction as a proof of chromosomal theory of inheritance. Sex linked, sex influenced and sex limited inheritance.

Extra chromosomal inheritance; cytoplasmic inheritance, Mitochondrial and Chloroplast genetic system**.**

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Principles of Genetics, E. J. Gardner, John Wiley & Sons Inc.
- Genetics, P.K. Gupta, Rastogi Publication.
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education.
- Genetics, M.W. Strickberger, Prentice Hall College Division.
- Genetics, P.J. Russell, Benjamin/Cummings.
- Genetics, R. Goodenough, International Thomson Publishing.
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company.
- Principles of Genetics, D.P. Snustad & M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wiesley Publishing.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PLANT SCIENCE LAB - II	BSB222	0:0:1	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the effects of tonicity on plant cell system
CLO 2	Create stress to see the effects on rate of photosynthesis in plants
CLO 3	Apply staining techniques for identification of various anatomical features of plants

B. SYLLABUS

Module I
Plant physiology
Demonstration of osmosis.
Effect of wind on rate of transpiration (Ganon's potometer)
Comparison of stomatal frequency using $CoCl_2$.
Demonstration of hydroponic system.
Effect of light quality on photosynthesis and plant metabolites.
Determination of RQ for various plant materials.

Module II
Plant Histology
Leaf anatomy (monocot and dicot)
Primary and secondary structure of stem and root (monocot and dicot)
Anomalous behavior of cambium in *Achyranthes*, *Boerhaavia*, *Bignonia* and *Dracaena*
Module III
Embryology of angiosperms
Study of permanent slides of the: L.S. ovule types and L.S. caryopsis
Preparing glycerin mounted slides of T.S. anther, pollen, germinating pollen.
Separation of endosperm, ruminate endosperm
Isolation of embryo from seed.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
Microbiology-Lab	BSB223	0:0:1	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Acquire the ability to use the microbes in research related to different field of Biotechnology.
CLO 2	Acquire the knowledge of the concepts in the field of agriculture, veterinary sciences, pharmaceutical industry and food industry etc.
CLO 3	Acquire skills of presentation and to use *library and internet resources independently.*

D. SYLLABUS

Module I

Aseptic techniques:
Cleaning of glassware
Preparation of media, cotton plugging and sterilization.

Module II

Isolation of microorganisms from air, water and soil samples: dilution, pour plating and colony purification.
Enumeration of microorganisms: total vs. viable counts.

Module III

Microscopic examination of bacteria by gram staining.
Endospore staining.
Capsule staining.
Negative staining
Observe the microbes in living condition by hanging drop method.
Fungal slide preparation and study of characteristics of fungi.
Antibiotic sensitivity test.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chemistry-1	BSB124	0:0:2	2	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

C. SYLLABUS

Module I

Qualitative analysis of inorganic mixtures, containing not more than four ionic species (excluding insoluble substances) out of the following**:**

Pb^{2+}, Hg^{2+}, Hg_2^{2+}, Ag^{1+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, As^{3+}, Sn^{2+}, Sn^{4+}, Fe^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, NH_4^{1+}, K^{1+}, CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_2^{1-}, CH_3COO^{1-}, F^{1-}, Cl^{1-}, Br^{1-}, I^{1-}, NO_3^{1-}, SO_4^{2-}, $C_2O_4^{2-}$, PO_4^{3-}, BO_3^{3-}.

Module II

Purification of Organic compounds by crystallization (from water or alcohol) and distillation

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHEMISTRY LAB - I	BSB125	3:0:0	3	1

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

D. SYLLABUS

Module I
Volumetric analysis: Oxidation-reduction titration using $KMnO_4$ and $K_2Cr_2O_7$
Module II
Iodometry titrations: Estimation of sodium thiosulphate & potassium dichromate.
Module III
Preparation of the following inorganic compounds: Prussion blue from iron fillings, chrome alum, cuprous chloride and potassium trioxal atrochromate.

PHYSICAL CHEMISTRY

Module IV
Determination of surface tension and viscosity of liquids
Module V
Heat of neutralisation of a strong acid and a strong base.
Module VI
Solubility curve of KNO_3 or benzoic acid.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Genetics	BSB225	0:0:1	3	1

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	The students will have skills to analyze results of experiments related to Mendelian genetics
CLO 2	The students will have knowledge of problem solving related to above said experiments

E. SYLLABUS

- Introduction to microscopy and micrometery
- Study of chromosome structure & size
- Study of gene interaction
- Demonstration of law of independent assortment of alleles
- Demonstration of law of segregation of alleles
- Interaction of gene (lethal gene and linked genes)
- Study of Genetics disorder in human

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Bioinformatics	BSB131	3:0:0	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate about various publicly available biological datasets, their importance various databases and will go through its importance in biological prospect.
CLO 2	Create novel ideas to applying various tools for extracting biologically valuable information responsible for various functions by applying computational methods.
CLO 3	Apply these data sources and software for investigation of novel biological problems.

B. SYLLABUS

Module I: Computers

General introduction (characteristics, capabilities, generations), software, hardware : organization of hardware (input devices, memory, control unit arithmetic logic unit, output devices); software : (System software; application software, languages -low level, high level), interpreter, compiler, data processing; batch, on-line, real-time (examples from bioindustries; e.g. application of computers in co-ordination of solute concentration, ph, temperature, etc., of a fermenter in operation); internet application.

Module II: Basic Bioinformatics

Introduction to Internet, Search Engines (Google, Yahoo, Entrez etc)

Module III: Biological Databases

Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Structural databases (PDB)

Module IV: Phylogenetic Analysis

Trees-splits and metrices on trees, tree interpretation, Distance – additive, ultrameric and nonadditive distances,

tree building methods, phylogenetic analysis, parsimony, tree evaluation, maximum likelihood trees – continuous time markov chains, estimating the rate of change, likelihood and trees; analysis software.

Annotation, comparison of different methods; ESTs – databases, clustering, gene discovery and identification, and functional classification.

Module V: Genome analysis

Annotation, comparison of different methods; ESTs – databases, clustering, gene discovery and identification, and functional classification. Reconstruction of metabolic pathways; Genome analysis, genome anatomy, genome rearrangements with inversions, signed inversions, gene identification, gene expression, expression analysis, gene identification and functional classification.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- J.G. Brookshear (2014). Computer Science, 12th Ed. Pearson Education(singapore) Pte. Ltd.
- Attwood, T. K., & Parry-Smith, D. J. (2009). Introduction to Bioinformatics. 1st Ed. Benjamin Cummings press.
- Lacroix, Z. (2003). Bioinformatics: managing scientific data (Vol. 6, No. 2). 1st Ed. Academic Press.
- Higgins, D., & Taylor, W. (2000). Bioinformatics Sequence. Structure and Databanks. Oxford University Press. 2nd Ed. OUP Oxford press

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Enzyme Technology	BSB132	3:0:0	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To obtain basic knowledge about the relationship between properties and structure of the enzymes, their mechanism of action and kinetics of enzymatic reactions. They should understand the regulatory mechanisms of enzyme activity, enzyme inducers and repressors.
CLO 2	To understand the different methods of enzyme immobilization
CLO 3	To understand the functions of the different bioreactors and its designing parameters.

B. SYLLABUS

Module I: Enzymes

Introduction and scope, Nomenclature, Mechanism of Catalysis.

Module II: Enzyme Kinetics

Single substrate steady state kinetics; Michaelis Menten equation, Linear plots, King-Altman's method; Inhibitors and activators; Multisubstrate systems; ping-pong mechanism, Alberty equation, Sigmoidal kinetics and Allosteric enzymes

Module III

Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module IV: Enzyme reactors

Reactors for batch/continuous enzymatic processing, choice of reactor type; idealized enzyme reactor systems, Mass transfer in enzyme reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reaction.

Module V: Bioprocess Design

Physical parameters, reactor operational stability, Immobilized cells.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

Text:

- R.C.B. Currell &V.D. Mieras (2012). Biotechnological Innovations in Chemical Synthesis 4th Ed. Biotol Partners Staff.
- Chaplin, M. F., & Bucke, C. (1990). Enzyme technology 1st Ed. Cambridge University Press.
- T, Palner (2001). Enzymes Biochemistry, Biotechnology, Clinical Chemistry 5th Ed. Horwood Publishing Ltd.
- Segal, I. H. (1993). Enzyme kinetics behaviour and analysis of rapid equilibrium and steady state enzyme systems 1st Ed. A Wiley-Interscience Publication.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Term Paper	BSB230	3:0:0	3	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
f) Show evidence of what an author has said.
g) Avoid misrepresentation through restatement.
h) Save unnecessary writing when ideas have been well expressed by the original author.
i) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN: 978-1-118-09242-2.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
English	BCS101	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Foundation of English Language.
CLO 2	Help students to inculcate creative & aesthetic sensitivity
CLO 3	Appreciation and analysis of the prescribed literary texts

B. SYLLABUS

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills

EXAMINATION SCHEME:

Components	Project	EE

Weightage (%)	50	50

Suggested Readings

6) Madhulika Jha, Echoes, Orient Long Man
7) Ramon & Prakash, Business Communication, Oxford.
8) Sydney Greenbaum Oxford English Grammar, Oxford.
9) Successful Communications, Malra Treece (Allyn and Bacon)
10) Effective Technical Communication, M. Ashraf Rizvi.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness	BSS103	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding self & process of self exploration
CLO 2	Learning strategies for development of a healthy self esteem
CLO 3	Importance of attitudes and its effective on personality

B. SYLLABUS

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

Making Predictions and Reasoning

Memory and Critical Thinking

Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Davis, K. Organizational Behaviour,
- Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
- Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
- Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G. (1985). Oxford Textbook of Public Health, Vol. 4.
- LaFasto & Larson. (2001). When Teams Work Best, Response Books (Sage), New Delhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

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Course Name	Course Code	LTP	Credit	Semester
French	FLF201	2:0:0	2	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. SYLLABUS

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5 : s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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Course Name	Course Code	LTP	Credit	Semester
German	FLG201	2:0:0	2	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS201	2:0:0	2	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Posessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC201	2:0:0	1	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use words, and expressions related to hobbies, abilities, gratitude and apology.
CLO 2	Exchange dialogues related to the above topics in Chinese.
CLO 3	Use grammar points used in lessons 6-9
CLO 4	Use words, and expressions related to hobbies, abilities, gratitude and apology.

SYLLABUS

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
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Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'
'At the Hotel'

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Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness	BSS203	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding self & process of self exploration
CLO 2	Learning strategies for development of a healthy self esteem
CLO 3	Importance of attitudes and its effective on personality

B. SYLLABUS

Module I: Interpersonal Communication

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Thinking skills

Critical Thinking and Learning:

Making Predictions and Reasoning

Memory and Critical Thinking

Emotions and Critical Thinking

Module II: Hindrances to Problem Solving

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving Process

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

Convergent and Divergent thinking

Idea generation and evaluation (Brain Storming)

Image generation and evaluation

Debating

The six-phase model of Creative Thinking: ICEDIP model

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Davis, K. Organizational Behaviour,
- Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
- Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
- Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G. (1985). Oxford Textbook of Public Health, Vol. 4.
- LaFasto & Larson. (2001). When Teams Work Best, Response Books (Sage), New Delhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND002	0:0:0	2	2

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

The student should develop:

· Awareness and empathy regarding community issues
· Interaction with the community and impact on society
· Interaction with mentor and development of Student teacher relationship
· Interaction among students, enlarge social network
· Cooperative and Communication skills and leadership qualities
· Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

· apply their knowledge and skills to solve specific community problem
· learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
· make new friends, expand social network, and boost social skills and mental health.
· be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.

· Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)
· Location / community where the work was carried out
· Details of Activities performed are to be given with date
· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
· Photographs taken for documentation of work should be submitted
· Media coverage of the projects should be attached if any
· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
· University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading “Group Community Service Project”, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:

a) Current scenario (Regional, national and international level as applicable)
b) Future predictions
c) Duty of the government
d) Government policies (related to the topic), if any
e) Duty of public
f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours
· C grade =32 hrs (Below 20 marks)
· B grade >32 hrs to <=44hrs (20-30 marks)
· A grade >44 hrs to<=54hrs (30-40 marks)
· O grade >54 hrs to<=64hrs (40-50 marks)

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.

2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.

3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Molecular BIology	BSB301	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge, particularly in molecular biology.
CLO 2	Isolation of the DNA from the prokaryotic and eukaryotic cell systems.
CLO 3	Critically and quantitatively analyze scientific data, either their own original data or the published data of others.

B. SYLLABUS

Module I

Introduction to molecular biology: Historical viewpoint of development of molecular biology, DNA: the chemical nature of gene, Watson and Crick's discovery, RNA, central dogma. DNA replication: Semiconservative manner of DNA replication, modes of replication, requirements of replication, bacterial DNA replication, eukaryotic DNA replication.

Module II

Prokaryotic and eukaryotic transcription: Structure and function of RNA polymerase, transcription initiation, elongation and termination (rho dependent and rho independent) processes in prokaryotes, transcription initiation, elongation and termination in eukaryotes, differences in prokaryotic and eukaryotic transcription.

Module III

Prokaryotic and eukaryotic translation: Overview of translation mechanisms in prokaryotes: translation initiation, elongation and termination in prokaryotes, Overview of translation mechanisms in eukaryotes: translation initiation, elongation and termination in eukaryotes, differences in prokaryotic and eukaryotic protein synthesis.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Genetics: A conceptual approach, Benjamin A. Pierce, W.H. Freeman and Company, New York, III edition, 2008.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press.
- Molecular Biology of the Cell, B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing, 2007.
- Genome 3, T.A. Brown, John Willey & Sons Inc., 2003.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis,Cold spring Harbor Laboratory Press.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Animal Science	BSB302	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the effects of tonicity on plant cell system
CLO 2	Create stress to see the effects on rate of photosynthesis in plants
CLO 3	Apply staining techniques for identification of various anatomical features of plants

B. SYLLABUS

General characteristics & classification of Amoeba & paramecium, Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*

Module II
Porifera: General characteristics and classification.
Cnidaria: General characteristics a nd classification; corals and coral reefs; polymorphism in Cnidaria. Ctenophora: General characteristics and Evolutionary significance

Module III
Platyhelminthes & Nemathelminthes: General characteristics and classification. Life cycle and pathogenicity of *Fasciola* and *Ascaris lumbricoides*
Annelida: General characteristics and classification up to orders. Excretion in Annelida

Module IV
General characteristics and classification of Arthropoda, Mollusca and Echinodermata

Module V
Introduction to Chordates: General Characteristics; outline classification, Protochordata: Hemichordata, Urochordata and Cephalochordata.
Model organisms used in scientific research.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Dhami, P.S. and Dhami, J.K. Invertebrate Zoology. 5th ed. New Delhi: R. Chand & Co.
- R.L. Kotpal.Modern Text Book of Zoology. Invertebrates. 11th Edition Rastogi Publications

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Chemistry III	BSB303	3:0:0	3	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

B. SYLLABUS

Module I: Inorganic chemistry

Acid and Bases: Elementary idea of Bronsted -Lowry and Lewis concept of acids and bases (Proton-donor acceptor and electrondonor acceptor systems), Relative strengths of Lewis acids bases and the effect of subsistent and the solvent on them. General properties of 3rd elements & Co-ordination Compounds: Molecular compounds, Werners coordination theory, IUPAC system of nomenclature of coordination compounds. Discussion of outer and inner orbit complexes.

Module II: Organic chemistry

General study of aromatic compounds, orientation of aromatic compounds, aromaticity. Study of preparation and properties of Toluene, Halogen substituted aromatic compounds; Chlorobenzene, benzene diazonium chloride, Phenols, nitrobenzene, aniline

Module II: Physical chemistry

Liquids: Vapor pressure, variation of vapour pressure of liquids with temperature (Clausious – Claperon Equation). Surface tension, viscosity, their experimental determination and applications. Osmosis and measurement of osmotic pressure. Effect of solutes on boiling points and freezing points of solutions Energy, Work, Heat capacity. Laws of thermodynamics, Free Energy (G), Galvanic cells, standard electrode potential, types of electrodes, measurement of pH. Lambert-Beer's Law: Law of photochemical equivalence; photoelectric cell. Phosphorescence and fluorescence.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Test book of Inorganic Chemistry, P.L. Soni, Sultan Chand & Sons
- Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.
- Advanced Inorganic Chemistry Vol-I & II, Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, S. Chand & Co. Ltd.
- Simplified Course in Inorganic Chemistry, Madan & Tuli, S. Chand & Co. Ltd.
- Concise Inorganic Chemistry, J.D. Lee, Black Well Sciences
- Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.
- Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.
- Atkin's Physical Chemistry, Atkin, Oxford Press.
- Physical Chemistry, Vemulapalli, Printice Hall of India

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Molecular Biology Lab	BSB321	0:0:1	3	3

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge, particularly in molecular biology.
CLO 2	Isolation of the DNA from the prokaryotic and eukaryotic cell systems.
CLO 3	Critically and quantitatively analyze scientific data, either their own original data or the published data of others.

B. SYLLABUS

Module I
Preparation of DNA: genomic, Plasmid

Module II
Isolation of RNA

Module III
RFLP analysis

Module IV
Preparation of Competent Cells

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHEMISTRY LAB - III	BSB323	0:0:1	1	3

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the structure and chemical transformations of inorganic molecules.
CLO 2	Understand the distinguish between natural and synthetic material
CLO 3	Basic idea about radioactive element,catalysis, chemical reaction etc

F. SYLLABUS

INORGANIC CHEMISTRY

Module I
Gravimetric estimation of barium and SO_4^{2+} as $BaSo_4$ ions, iron as F_2 O_3 and copper as CuCNS.

ORGANIC CHEMISTRY

Module II
Detection of functional groups in mono-functional Organic Compounds. (aldehyde, ester, phenol, amine, amides, alcohols).

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Term Paper	BSB330	3:0:0	3	3

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	provide students with an opportunity to develop in-depth expertise in any topic.
CLO 2	discuss and present your argument with evidence

B. SYLLABUS

The procedure for writing a term paper may consists of the following steps:

7. Choosing a subject
8. Finding sources of materials
9. Collecting the notes
10. Outlining the paper
11. Writing the first draft
12. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.
e) In research studies, notice the methods and procedures, results & conclusions.
f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.
d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
k) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
l) Check for proper spelling, phrasing and sentence construction.
m) Check for proper form on footnotes, quotes, and punctuation.
n) Check to see that quotations serve one of the following purposes:
o) Show evidence of what an author has said.
p) Avoid misrepresentation through restatement.
q) Save unnecessary writing when ideas have been well expressed by the original author.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

8) Title page
9) Table of contents
10) Introduction
11) Review
12) Discussion & Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN: 978-1-118-09242-2.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Protein Engineering	BSB331	3:0:0	3	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand various aspects of protein structure and engineering including rational design and directed evolution.
CLO 2	Identify key experimental processes required for engineering a protein, and knowledge of how to apply them to solve specific biochemical problems.
CLO 3	Investigate and explain heterologous expression of proteins and also techniques for protein design.

B. SYLLABUS

Module I

Protein structure: secondary structural elements, super-secondary structure, domains, mechanisms of protein folding, tertiary folds. Formation of oligomers. Protein solubility and interaction with solvents and solutes. The activity of proteins. Protein engineering principles.

Module II

Fundamental methods used in proteomics, Relationship between protein structure and function. Post translational protein modifications. Protein – protein interaction.

Module III

Use of computer simulations and knowledge-based methods in the design process. De-novo design; making use of databases of sequence and structure.

Module IV

Protein engineering of enzyme: Rational and directed evolution, Mutational effect on engineered proteins, Engineered proteins;

Module V

Structure function design for protein design.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- J.G. Brookshear (2014). Computer Science, 12th Ed. Pearson Education(singapore) Pte. Ltd.
- Attwood, T. K., & Parry-Smith, D. J. (2009). Introduction to Bioinformatics. 1st Ed. Benjamin Cummings press.
- Lacroix, Z. (2003). Bioinformatics: managing scientific data (Vol. 6, No. 2). 1st Ed. Academic Press.
- Higgins, D., & Taylor, W. (2000). Bioinformatics Sequence. Structure and Databanks. Oxford University Press. 2nd Ed. OUP Oxford press

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Food Biotechnology	BSB332	3:0:0	3	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To obtain basic knowledge about the relationship between properties and structure of the enzymes, their mechanism of action and kinetics of enzymatic reactions. They should understand the regulatory mechanisms of enzyme activity, enzyme inducers and repressors.
CLO 2	To understand the different methods of enzyme immobilization
CLO 3	To understand the functions of the different bioreactors and its designing parameters.

B. SYLLABUS

Module I: Introduction

Scope and importance of food industry; RDT and other technologies involved in development of food products; Concept of 'functional food'; Advances and trends, ethical issues, quality control, legislation, FDA & FPO (India), patenting processes and products, consumer acceptance scenario for GM food products and GM crops.

Module II: Techniques used in Food Industry

Sterilization, isolation, screening and strain improvement, cell harvesting and disruption, recovery and purification, production of organic acids – citric acid, lactic acid and acetic acid; Gene cloning, production of recombinant proteins e.g. chymosin

Module III: Dairy Biotechnology

Starter cultures, prebiotics, probiotics – their use as flavor enhancers and disease/ infection combats, applications in production of cheese, butter, ice-cream, yoghurt; applications in biomedical research, e.g. recombinant LABs as vaccines; Modified milk proteins.

Module IV: Microbial, Plant and Animal Biotechnology

Production of SCP (Single cell protein), production of baker's yeast, brewing industry,

Module V

Applications of transgenic plants in food production, transgenic fist, and transgenic poultry.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Food Biotechnology - 2. 1988. R.D. King and P.S.J. Cheetham (Eds.). Elsevier Applied Science, NY.
- Introduction to Food Biotechnology. Green, Perry Johnson. 2002. CRC Press, Boca Raton, Florida.
- Food Biotechnology-Techniques and Applications. Gauri S. Mittal. 1992. Technomic Publishing Co., Inc., Lancaster, PA.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Environmental science	EVS001	3:0:0	3	1

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To obtain basic knowledge about the relationship between properties and structure of the enzymes, their mechanism of action and kinetics of enzymatic reactions. They should understand the regulatory mechanisms of enzyme activity, enzyme inducers and repressors.
CLO 2	To understand the different methods of enzyme immobilization
CLO 3	To understand the functions of the different bioreactors and its designing parameters.

B. SYLLABUS

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance

Need for public awareness

Module II: Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem

Structure and function of an ecosystem

Producers, consumers and decomposers

Energy flow in the ecosystem

Ecological succession

Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution

Definition

Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development
Urban problems and related to energy
Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns.Case studies.
Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act
Air (Prevention and Control of Pollution) Act
Water (Prevention and control of Pollution) Act
Wildlife Protection Act
Forest Conservation Act
Issues involved in enforcement of environmental legislation
Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education

HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Communication skills-II	BCS301	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Foundation of English Language.
CLO 2	Help students to inculcate creative & aesthetic sensitivity
CLO 3	Appreciation and analysis of the prescribed literary texts

B. SYLLABUS

Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats

Module III
Memo
Agenda and Minutes
Notice and Circulars

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

EXAMINATION SCHEME:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

Suggested Readings

11) Madhulika Jha, Echoes, Orient Long Man
12) Ramon & Prakash, Business Communication, Oxford.
13) Sydney Greenbaum Oxford English Grammar, Oxford.
14) Successful Communications, Malra Treece (Allyn and Bacon)
15) Effective Technical Communication, M. Ashraf Rizvi.

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Course Name	Course Code	LTP	Credit	Semester
Understanding self for effectiveness	BSS103	1:0:0	1	1

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding self & process of self exploration
CLO 2	Learning strategies for development of a healthy self esteem
CLO 3	Importance of attitudes and its effective on personality

B. SYLLABUS

Module I: Interpersonal Communication
Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
RapportBuilding – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation
Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Davis, K. Organizational Behaviour,
- Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
- Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
- Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G. (1985). Oxford Textbook of Public Health, Vol. 4.
- LaFasto & Larson. (2001). When Teams Work Best, Response Books (Sage), New Delhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

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Course Name	Course Code	LTP	Credit	Semester
French	FLF201	2:0:0	2	2

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. SYLLABUS

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**

4. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
5. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
6. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

5. situer un lieu
6. s'orienter, s'informer sur un itinéraire.
7. Chercher, décrire un logement
8. connaître les rythmes de la vie

Unité 5 : s'informer

5. demander/donner des informations sur un emploi du temps passé.
6. donner une explication, exprimer le doute ou la certitude.
7. découvrir les relations entre les mots
8. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German	FLG201	2:0:0	2	2

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS201	2:0:0	2	2

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Posessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC201	2:0:0	1	2

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use words, and expressions related to hobbies, abilities, gratitude and apology.
CLO 2	Exchange dialogues related to the above topics in Chinese.
CLO 3	Use grammar points used in lessons 6-9
CLO 4	Use words, and expressions related to hobbies, abilities, gratitude and apology.

SYLLABUS

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'
'At the Hotel'

.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Anandam-II	AND002	0:0:0	2	2

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

The student should develop:

· Awareness and empathy regarding community issues

· Interaction with the community and impact on society

· Interaction with mentor and development of Student teacher relationship

· Interaction among students, enlarge social network

· Cooperative and Communication skills and leadership qualities

· Critical thinking, Confidence and Efficiency

Course Objectives:

After the completion of this course, students will be able to:

· apply their knowledge and skills to solve specific community problem

· learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time

· make new friends, expand social network, and boost social skills and mental health.

· be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

· Synopsis: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.

· Details of the Mentor and the Participants are to be given (name of mentor, name of participants, phone number/mobile no, email, and address)

· Location / community where the work was carried out

· Details of Activities performed are to be given with date
· Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
· Photographs taken for documentation of work should be submitted
· Media coverage of the projects should be attached if any
· The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
· The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
· The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
· University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading "Group Community Service Project", and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:

a) Current scenario (Regional, national and international level as applicable)
b) Future predictions
c) Duty of the government
d) Government policies (related to the topic), if any
e) Duty of public
f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours
· C grade =32 hrs (Below 20 marks)
· B grade >32 hrs to <=44hrs (20-30 marks)
· A grade >44 hrs to<=54hrs (30-40 marks)
· O grade >54 hrs to<=64hrs (40-50 marks)

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.

2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.

3. Conclusion is clearly stated. The underlying logic is explicit.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Recombinant DNA technology	BSB401	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop a broad and coherent body of knowledge tools and strategies used in particularly in recombinant DNA Technology
CLO 2	Gain a detailed understanding of the applications of recombinant DNA technology and genetic engineering. from an academic and industrial perspective
CLO 3	Students will become familiar with the tools and techniques of genetic engineering DNA manipulation enzymes, genome and transcriptome analysis and manipulation tools, gene expression regulation, production and characterization of recombinant proteins.
CLO 4	acquire knowledge of advances in biotechnology- healthcare, agriculture, and environment cleanup via recombinant DNA technology

B. SYLLABUS

Importance of Gene Cloning and DNA Analysis, Vectors for Gene Cloning: Plasmids and Bacteriophages, Purification of DNA from bacterial, plant and animal cells.

Module II: Basic Principles of Gene Cloning
Manipulation of purified DNA-enzymes used in RDT, Restriction Mapping, Introduction of DNA into living cells, How to obtain a clone of a specific gene.

Module III: Blotting techniques and hybridization
Southern, Northern and Western blotting techniques, Radioactive and non-radioactive probes, Dot blots and slot blots, RFLP, AFLP.

Module IV: Nucleic acid amplification and Sequencing
Principles of PCR, designing of primers, Sanger's and Automated DNA sequencing

Module V: Applications of gene cloning in biotechnology
Production of proteins from cloned genes, Gene cloning in medicine (Pharmaceutical agents such as insulin, growth hormones, recombinant vaccines), gene therapy for genetic diseases.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Brown, T.A. (2010). Gene cloning and DNA analysis, 6th Ed. Wiley- Blackwell, A John Wiley & Sons, Ltd. Publication.

References:

- Primrose, S. B. and Twyman, R.M. (2006). Principles of Gene Manipulation and Genomics, 7th Ed. Blackwell Publication.
- Glick, B.R. and Pasternak J.J. (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th Ed. ASM Press.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Structural biology	BSB402	3:0:0	3	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand aspects of protein structure and function including protein folding, degradation, development of new therapies, molecular interactions and recognition
CLO 2	Understand key experimental processes required to evaluate protein structure, function and gene expression, and knowledge of how to apply them to solve specific biochemical problems.
CLO 3	Students in the structural biology major will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums
CLO 4	Develop your research skills in preparation for a career in the biosciences industry or academic research.

B. SYLLABUS

Module I: Introduction to structural biology
Structural biology: Introduction and applications. Basic structural principles, Proteins and poly peptide chains.

Module II: Fundamentals of protein structure
Structre of amino acids, primary structure of proteins, Secondary structure of proteins-helices, sheets, loops and turns. Supersecondary structures, Tertiary structure of proteins: alpha domain structures beta domain structures, alpha-beta domain structures, homo and hetero-dimers, trimers and tetramers.

Module IV: Protein solubility and stabilization
Salting in and salting out, Native, partially denatured and denatured proteins; Protein denaturation, Physical and chemical denaturants; Refolding

Module V: Structure function and engineering
Rational structure based drug design. Protein-DNA interactions. Drug-DNA interactions. Protein engineering and design of Protein structures.

EXAMINATION SCHEME:

Components	CT/Mid-	Assignment	Project	Case	Attendance	EE

	term			Study		
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- Introduction to Protein Structure, C. Branden and J Tooze, Garland Publishing Company, New York. 2010.
- Textbook of Structural Biology, Anders Liljas, Lars Liljas and Poul, World Scientific Publishing Co Pte Ltd.

References:

- Protein Structure, M. Perutz, Oxford University Press.
- Structural Biology of Viruses, Wah Chiu, Roger M. Burnett and Robert Garce, Oxford University Press.
- Structure and Mechanism in Protein Science, Alan Fersht.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Immunology & Immunotechnology	BSB403	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Have a clear understanding of human body's defense mechanisms against various infections
CLO 2	Identify the importance of different organs and cells of immune system
CLO3	Understand the importance of interaction of all immunological components inside the body.

B. SYLLABUS

Module I

Immune system, immune response; Immunity: Innate and specific immunity, primary and secondary immune response, active and passive immune response, Humoral immunity and cell mediated immunity,Clonal selection theory Antibody structure, types and functions; concept of isotypes, allotypes, idiotypes. Antibody diversity, Monoclonal antibodies and their production

Module II

Immune system: The organs of the immune system: structure and function - Thymus, bone marrow, spleen, MALT.

Module III

Histocompatibility: structure of MHC class I, II & III antigens & their mode of antigen presentation, MHC restriction; Antigens & antigenicity Immunotechnology: ELISA, radioimmunoassay, Immunofluorescent assay. Precipitation an agglutination based assays.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

Owen J., Punt J., andStranfordSharon (2013): Immunology, 7thEdition, Macmillan higher education, New York. ISBN-13: 978-1-4292-1919-8.

Delves P., Martin S., Burton D. and Roitt I.(2006): Roitt's Essential Immunology, 11th Edition, Blackwell Publishers, Oxford.

Abbas AK, Lichtman AH, Pillai S (2010) Celllular and Molecular Immunology,6th Edition, Saunders Elsevier, ISBN:978-0-8089-2411-1

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Scientific Writing	BSB404	3:1:0	4	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhancement of understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of protein

B. SYLLABUS

Module I

Module 1

Introduction; Importance and basic rules of scientific writing; English in academic writing; Common error in Language; Structure of an original research article

Module 2

Writing an abstract; Literature review: Introduction, Source of literature; Process of literature review; Online literature databases; Literature management tools; Citing and Referencing; Different tools available, an Introduction to Mendeley and getting started with Mendeley, Add and managing references in Mendeley, Sharing, collaborating and other tools

Module 3

Ethics and Plagiarism Plagiarism: Introduction; Tools for the detection of plagiarism; Avoiding plagiarism

Module 4

Review Paper Writing, Research paper writing; Thesis Writing; Abstract/ Conference Paper/ Book/ Book Chapter writing;

Module 5

OERs: basic concept and licenses Open Educational Resources (OERs) for learning & Research; OERs development

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

6. Katz, Michael Jay. From research to manuscript: A guide to scientific writing. Springer Science & Business Media, 2009. Boland, Angela, Gemma Cherry, and Rumona Dickson, eds. "Doing a systematic review: A student's guide." (2017). 2nd edition SAGE publications

7. Wanderer, Nancy A. "Writing Better Opinions: Communicating with Candor, Clarity, and Style." Me. L. Rev. 54 (2002): 47.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Biomaterials and biomimetics	BSB405	2:0:0	2	4

F. COURSE LEARNING OUTCOMES (CLO)

CLO 1	biomaterials include nano-biomaterials, smart biomaterials, hybrid biomaterials, nano-biocomposites
CLO 2	hierarchically porous biomaterials and tissue scaffolds
CLO 3	summarises key research in this important field.

B. SYLLABUS

Module-I: Fundamentals

Definition of biomaterials, requirements & classification of biomaterials, Properties of biomaterials; Biocompatibility & toxicological screening of biomaterials

Module-II: Implant Materials

Stainless steel, Co-based alloys, Ti and Ti-based alloys.Importance of stress-corrosion cracking. Classification according to thermosets, thermoplastics and elastomers. Importance of molecular structure, hydrophilic and hydrophobic surface properties, Biodegradable polymers for medical purposes, Definition of bioceramics, common types of bioceramics, the importance of wear resistance and low fracture toughness

Module-III: Biomimetics

Hierarchical structure, mechanical properties and fabrication of biomimetic biomaterials; Biomimetic coatings for biomaterial surfaces, Inspiration from animals, self-healing materials, Biomimetic in photonics, Various applications of Biomimetic

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Methodology of Clinical Drug Trials, 2nd Edition. Spriet A., Dupin-Spriet T., Simon P. Publisher: Karger.
2. Design and Analysis of Clinical Trials: Concepts and Methodologies, 3rd Edition. SheinChung Chow, Jen-Pei Liu. Publisher: Wiley.
3. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.
4. Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
5. Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd.
6. A Textbook of Pharmacovigilance: Concept and Practice, by Guru Prasad Mohanta, Published by PharmaMed Press/BSP Books (2015).
7. An Introduction to Pharmacovigilance, by Patrick Waller, Published by October 2009, Wiley-Blackwell.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
RECOMBINANT DNA TECHNOLOGY LAB	BSB421	0:0:1	1	4

COURSE LEARNING OUTCOMES (CLO)

CLO 1	become familiar with the tools and techniques of genetic engineering DNA manipulation enzymes, genome and transcriptome analysis and manipulation tools, gene expression regulation, production and characterization of recombinant proteins.
CLO 2	Students will acquire knowledge of advances in biotechnology- healthcare, agriculture, and environment cleanup via recombinant DNA technology

B. SYLLABUS

Module I:
Isolation of Genomic DNA and plasmid DNA

Module II:
Polymerase Chain Reaction

Module III
Restriction digestion

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
Structural biology Lab	BSB422	0:0:1	1	4

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the evolution of protein structural motifs and domains and associate this with function
CLO 2	Use on-line structural databases and tools to predict the properties, structure and function of proteins.
CLO 3	Critically and quantitatively analyse scientific data, either their own original data or the published data of others
CLO 4	Define a specific hypothesis and design an experiment to test it.

B. SYLLABUS

Crystallization of Lysozyme -pH driven and salt driven crystallization.

2. Study of change in salt concentration on protein precipitation.
3. Study of protein finger printing
4. Study of change in pH on protein solubility.
5. Protein structure analysis.
6. Protein ligand interaction studies

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
Immunology and immunotechnology lab	BSB423	0:0:1	1	4

G. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Have a clear understanding of human body's defense mechanisms against various infections
CLO 2	Identify the importance of different organs and cells of immune system
CLO 3	Understand the importance of interaction of all immunological components inside the body.

H. SYLLABUS

Module I

Blood film preparation & identification of blood cells

Module II

Differential Leucocyte Count, Total Leucocyte Count

Module III

Agglutination Based Tests: Study of blood groups ,Widal test

Module IV

Study of ELISA.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Term Paper	BSB430	3:0:0	3	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Create right selection of words and ideas while also choosing the appropriate topic
CLO 2	Demonstrate proficiency in the use of written communication.
CLO 3	Demonstrate proficiency in justifying a scientific doubt

B. SYLLABUS

The procedure for writing a term paper may consists of the following steps:

13. Choosing a subject
14. Finding sources of materials
15. Collecting the notes
16. Outlining the paper
17. Writing the first draft
18. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author's conclusion.
h) In research studies, notice the methods and procedures, results & conclusions.
i) Check cross references.

4. Outlining the paper

e) Review notes to find main sub-divisions of the subject.
f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

u) Check for proper spelling, phrasing and sentence construction.

v) Check for proper form on footnotes, quotes, and punctuation.

w) Check to see that quotations serve one of the following purposes:

x) Show evidence of what an author has said.

y) Avoid misrepresentation through restatement.

z) Save unnecessary writing when ideas have been well expressed by the original author.

aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

15) Title page
16) Table of contents
17) Introduction
18) Review
19) Discussion & Conclusion
20) References
21) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

i) summary of question posed

j) summary of findings

k) summary of main limitations of the study at hand

l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S.,

Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN: 978-1-118-09242-2.

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Downstream processing	BSB431	3:0:0	3	4

F. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Describe the basic techniques of downstream processing.
CLO 2	Demonstrate awareness about Filtration, Dialysis, Electrophoresis, crystallization & drying
CLO 3	Express knowledge of Chromatographic techniques of bioseparations
CLO 4	Analyze and design the necessary steps for downstream processing of bioproducts

F. SYLLABUS

Module I
Characteristics of Bioproducts; Coagulation, Flocculation and conditioning of broth.

Module II
Mechanical separation; Cell disruption techniques, Protein precipitation and separation

Module III
Aqueous- two- phase extraction, Adsorption-desorption processes, Chromatographic methods of separation based on size, charge, hydrophobic interactions and biological affinity

Module IV
Membrane based separation; Dialysis, Electrodialysis; Micro filtration, Ultra filtration; Electrophoresis,
Module V
G. Crystallization; Drying
H.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Reading:

- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill.
- Bioseparatioins, P.A. Belter, E.L. Cussler and W.S. Hu, John Wiley and Sons Inc. Bioseparations: Downstream Processing for Biotechnology, P.A. Belter et al, John Wiley and Sons Inc.
- Biotreatment, Downstream Processing and Modelling (Advances in Biochemical Engineering / Biotechnology, Vol 56), T. Scheper et al, Springer Verlag.
- Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher.

- Downstream Processing, J.P. Hamel, J.B. Hunter and S.K. Sikdar, American Chemical Society.
- Protein Purification, M.R. Ladisch, R.C. Willson, C.C. Painton and S.E. Builder, American Chemical Society.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Pharmaceutical technology & biotechnology	BSB432	3:0:0	3	4

G. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Pharmaceutical technology and biotechnology in Pharmaceutical Industries.
CLO 2	Understanding of Pharmaceutical Dosage Forms & New Drug Delivery Systems.
CLO 3	Understanding of Biotechnology based Pharmaceutical products.

I. SYLLABUS

Module –I:
Pharmaceutical calculations: Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing recipes percentage solutions, allegation, alcohol dilution, proof spirit, isotonic solutions, displacement value etc.
Module-II
Pharmacopoeias & Formularies: IP,BP,USP, Drug & cosmetic act and rules, Good manufacturing practices, Good laboratories practices and requirements of premises, plant and equipment for pharmaceutical products including Master & Batch formula records. (Schedule-M).

Module III
Pharmaceutical Dosage Forms & Drug Delivery Systems:
Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. Various route of drug administration.

Module-IV
Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, dried human serum, human plasma protein fraction, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, fibrin foam, plasma substitutes: ideal requirements, PVP, dextran.

Module-V
Antibiotics: Historical development of antibiotics. Antimicrobial spectrum and methods used for their standardization. Classification of antimicrobial drugs based on mechanism of action. Problems arising with use of Antimicrobial drugs (Toxicity, Hypersensitivity reactions, Drug resistance, Super-infection, Nutritional deficiencies.
Antibiotics fermentation: General history, Raw materials, manufacturing process and quality control.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Books:

1. Pharmaceutical Biotechnology, by Daan J. A. Crommelin, Robert D. Sindelar. Informa Healthcare USA, Inc, 3rd edition.
2. Textbook of Pharmaceutical Biotechnology, By Chandrakant Kokate, Pramod H.J, SS Jalalpure , Publisher: Elsevier India Pvt Ltd.
3. Vyas SP, Dixit VK."Pharmaceutical Biotechnology", 1st edition ,2007, CBS Publishers & Distributors, New Delhi
4. Textbook Of Physical Pharmaceutics by C.V.S. Subrahmanyam, Vallabh Prakashan.
5. Text book of Pharmaceutical Engineering by C.V.S. Subrahmanyam, Vallabh Prakashan.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS401	1:0:0	1	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify steps to professional communication
CLO 2	Identify the key components of meeting, agendas and meeting minutes
CLO 3	Understand the key skills and behaviors required to facilitate a group discussion/presentation
CLO 4	Polish current affairs& rapport building

B. SYLLABUS

Module I: Vocabulary
Enhancing Speaking Skills (Public Speaking)
Module II:

Resume Building-1

Module III:

GD-2 (Specifically: Social & Political)v
Module IV:
Presentations

EXAMINATION SCHEME:

Components	Public Speaking	GD	Poster Presentation	Attendance
Weightage (%)	30	30	35	5

Suggested Readings

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons

- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print

- Krishnaswamy N,*Creative English for Communication***.** Delh**i:** Macmillan Publishers India Ltd. Print. 2007.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
BEHAVIOURAL SCIENCE -IV	BSS403	1:0:0	1	4

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Compare the difference between the groups and teams and their strength and weaknesses.Also, the internal and external factors that affect their functioning.
CLO 2	Access when there is a need of group formation and when it is needed to be transformed into team.
CLO 3	Identify the characteristics of leaders and the power practiced by them.

B. SYLLABUS

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and Internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
French	FLF401	2:0:0	2	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. SYLLABUS

Module C: pp. 104 – 139 : Unités 8,9

Contenu lexical : Unité 8: Découvrir le passé

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

Contenu grammatical:

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

Suggested reading

- le livre à suivre : Campus: Tome 1

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
German	FLG401	2:0:0	2	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language

B. SYLLABUS

Module I: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module II: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

Module IV: Verbs with fixed prepositions
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

Module V: Texts
A poem 'Maxi'
A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture; Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS401	2:0:0	2	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Suggested Reading

- Español Sin Fronteras, Greenfield

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC401	2:0:0	2	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use words, and expressions related to hobbies, abilities, gratitude and apology.
CLO 2	Exchange dialogues related to the above topics in Chinese.
CLO 3	Use grammar points used in lessons 6-9
CLO 4	Use words, and expressions related to hobbies, abilities, gratitude and apology.

SYLLABUS

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II

Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III

Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV

Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V

Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?

Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?

Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Is he/she married?

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Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Anandam-IV	AND004	0:0:0	2	4

D. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network

SYLLABUS

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

University will forward the report to the state level committee·

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

· C grade =32 hrs (Below 20 marks)

· B grade >32 hrs to <=44hrs (20-30 marks)

· A grade >44 hrs to<=54hrs (30-40 marks)

· O grade >54 hrs to<=64hrs (40-50 marks)

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Plant Biotechnology	BSB501	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the effects of growth hormones on plant cell culture system
CLO 2	Create awareness in commercialization of plants by culturing them under in vitro conditions
CLO 3	Application of protoplast engineering for production of disease free plants

B. SYLLABUS

Module I: Introduction to in vitro methods

Terms and definitions. Beginning of in vitro cultures in our country (ovary and ovule culture, in vitro pollination and fertilization. Embryo culture, embryo rescue after wide hybridization, and its applications. Endosperm culture and production of triploids.

Module II

Introduction to the processes of embryogenesis and organogenesis and their practical applications
Micropropagation, axillary bud, shoot-tip and meristem culture. Haploids and their applications. Somaclonal variations and applications (Treasure your exceptions).
Module III: Introduction to protoplast isolation
Principles of protoplast isolation and applications. Testing of viability of isolated protoplasts. Various steps in the regeneration of protoplasts. Introduction of somatic hybridization. Various methods for fusing protoplasts, chemical and electrical. Cybrids- definition and application.

Module IV

Use of plant cell, protoplasts and tissue culture for genetic manipulation of plants

Introduction to A. tumefaciens. Tumor formation on plants using A.tumefaciens (Monocots vs. Dicots). Practical application of genetic transformation

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

- M.K. Razdan. An Introduction to Plant Tissue Culture. Oxford and IBH Publishing
- J.H. Dodds and L.K. Roberts. Experiments in Plant Tissue Culture. Cambridge University Press
- K.M.O. Caldenty, W.H. Barz and H.L. Wills, Plant Biotechnology and Transgenic Plants. Marcel Dekker
- J. Hammond, P. McGarvy and V. Yusibov. Plant Biotechnology. Springer Verlag.
- T-J Fu, G. Singh and W.R. Curtis. Plant Cell & Tissue Culture for the production of Food Ingredients. Kluwer Academic/Plenum Press
- S.S. Bhojwani and M.K. Razdan. Plant Tissue Culture: Theory & Practice. Elsevier Health Sciences

AMITY UNIVERSITY
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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Animal BIotechnology	BSB202	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the effects of tonicity on plant cell system
CLO 2	Create stress to see the effects on rate of photosynthesis in plants
CLO 3	Apply staining techniques for identification of various anatomical features of plants

B. SYLLABUS

Module I
Introduction of animal cell culture substrate, culture media,
Module II
Preservation and maintenance of cell lines.
Module III
Vaccines: Design, production and administration
Module IV
Transgenic animals. In vitro fertilization and embryo transfer technology, cryopreservation of embryos
Module V
Pharmaceutical products: Human protein replacement. Gene therapy: types, vectors, methods, safety and advances

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- R.I Freshney. Culture of Animal Cells. Wiley-Leiss.
- J.R.W. Masters. Animal Cell Culture – A Practical approach. Oxford.

- M. Clynes. Animal Cell Culture Techniques. Springer Verlag.
- M. Butler and M. Dawson. Cell Culture Lab Fax. Bios scientific Publications Ltd.
- R. Basega. Cell Growth and Division – A Practical approach. IRL Press.
- Moo-Young, Alan T. Bullm Howard Dalton. Comprehensive Biotechnology. Panima Publication.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Bioenterpreneurship	BSB503	3:0:0	3	5

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	develop the understanding of management of entrepreneurship
CLO 2	acquaint the students with various aspects of entrepreneurship business.

B. SYLLABUS

Module I

Need, scope and types of entrepreneurship management of self and understanding human behaviour, business ethics, performance appraisal, and (SWOT) analysis.

Module II

Market survey techniques, Criteria for the principles of product selection and development, Elements of Marketing & Sales Management- (a) Nature of product and market strategy (b) Packaging and advertising (c) After Sales Service (d) Pricing techniques. financial incentives, books of accounts and financial statements.

Module III

Technical feasibility of the project, plant layout & process planning for the product, Quality Control, Critical Path Method (CPM) and Project Evaluation Review Techniques (PERT) as planning tools for establishing SSI

Module IV

Desirables in start-up, Setting up Small, Medium & Large scale industry, Quality control in Biotech industries, Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities

Module V

Funding Opportunities & Incentives, Government Initiatives for Startups; Success stories: Biocon, Sea6 Energy, MedGenome,Bharat Biotech, GANIT Labs, Forus Health

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Entrepreneurship: New Venture Creation, David H. Holt
2. Patterns of Entrepreneurship : Jack M. Kaplan

3. Entrepreneurship and Small Business Management: C.B. Gupta, S.S. Khanka, Sultan Chand & Sons.
4. Entrepreneurship, Robert D. Hisrich (Author), Michael P. Peters (Author), Dean A. Shepherd (Author), Sabyasachi Sinha, McGraw Hill; Eleventh edition (6 August 2020); McGraw Hill Education (India) Private Limited

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Genomics and proteomics	BSB504	3:1:0	4	5

G. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Enhancement of understanding of the molecular basis of gene structure, expression and regulation in prokaryotes and eukaryotes
CLO 2	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 3	Develop theoretical and technical skills required for industrial and scientific application of protein

B. SYLLABUS

Module I

The origin of genomes; Acquisition of new Genes; DNA sequencing-chemical and enzymatic methods; Restriction mapping.

Module II

DNA & RNA fingerprinting; The Human Genome; Phylogeny. SAGE, ESTs, AFLP & RFLP analysis.

Module III

Basic principles of protein structure. 2D – gel electrophoresis, mass spectroscopy.

Module IV

Modeling of three-dimensional structure of a protein; Modeling mutants

Module V

Clinical and biomedical applications of genomics and proteomics, Molecular diagnostics designs; Global market of gene and protein based diagnostics

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EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

8. A.D. Baxevanis and B.F.F. Ouellette. Bioinformatics: A practical guide to the analysis of genes and proteins. John Wiley and Sons Inc.
9. T. Palzkill. Proteomics. Kluwer Academic Publishers
10. Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
11. DNA Micro arrays: A Practical Approach, M. Schlena, Oxford University Press.
12. B. Liu. Statistical Genomics: Linkage, Mapping and QTL Analysis. CRC Press.
13. M. Schlena. DNA Micro arrays: A Practical Approach. Oxford University Press.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Clinical research & pharmacovigilance	BSB505	3:0:0	3	5

H. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understanding of Drug Discovery and Development Process
CLO 2	Understanding for Profile of Clinical research and pharmacovigilance organizations
CLO 3	Understanding of drug regulatory aspects behind the Clinical research and pharmacovigilance
CLO4	Understanding of Clinical trials designs and control

B. SYLLABUS

UNIT-I

Basics of general Pharmacology & Drug discovery process

Drug, Receptors, Dosage forms, routes of drug administration, drug receptor interactions, drug drug interactions, drug resistance, drug tolerance, drug dependence, Pharmacokinetic (ADME) and Pharmacodynamic of drugs, Adverse drug effects.

General introduction about Drug discovery and development process, Bioavailability /Bioequivalence Studies and Pharmacovigilance.

Repurposing of drugs

UNIT-II

Basics of Clinical trials - Basics of clinical trials, Introduction and history of clinical trials, Types of clinical trials, Inclusion and exclusion criteria, Primary and Secondary outcome/endpoint of clinical trials, Needs of Clinical trials and Phases of clinical trials.

UNIT-III

Various Key documents, application filling and Ethical regulation of Clinical trials:

- Investigator Brochure (IB), Protocol & Amendment in Protocol , Case Report Form (CRF),
- Informed Consent Form (ICF) , Essential Documents in Clinical Trial Good Clinical Practice: ICH guidelines, Indian GCP guidelines (CDCSO guidelines),
- Investigational new drug (IND) / clinical trial exception (CTX) / clinical trial authorization (CTA) application
- New drug application (NDA/ANDA) / marketing authorization application (MAA)
- ICMR Guideline - Ethical Guideline for Biomedical Research on Human Subjects & Schedule Y
- Ethical Codes – The Declaration of Helsinki.

UNIT-IV

Clinical trial design: Need of clinical trial design

Treatment studies- Randomized controlled trial, Adaptive clinical trial, Nonrandomized trial, Observational studies- Cohort study, Case control study, Cross sectional study, Ecological study

UNIT-V

Pharmacovigilance:

Introduction to adverse drug reactions: Definitions and classification of ADRs, Detection and eporting, Causality assessment, Severity and seriousness assessment , Predictability and preventability assessment, Management of adverse drug reactions.

Introduction to pharmacovigilance: History and development of pharmacovigilance, Importance of safety monitoring / Why pharmacovigilance

National and international scenario: Pharmacovigilance in India, Pharmacovigilance global perspective, WHO international drug monitoring programme

Adverse drug reaction reporting: Introduction to reporting systems, Spontaneous reporting system , Reporting to regulatory authorities , Guidelines for reporting ADRs in biomedical literature

Drug dictionaries and coding in pharmacovigilance: WHO adverse reaction terminologies, MedDRA and Standardised MedDRA queries.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

8. Methodology of Clinical Drug Trials, 2nd Edition. Spriet A., Dupin-Spriet T., Simon P. Publisher: Karger.
9. Design and Analysis of Clinical Trials: Concepts and Methodologies, 3rd Edition. SheinChung Chow, Jen-Pei Liu. Publisher: Wiley.
10. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.
11. Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
12. Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd.
13. A Textbook of Pharmacovigilance: Concept and Practice, by Guru Prasad Mohanta, Published by PharmaMed Press/BSP Books (2015).
14. An Introduction to Pharmacovigilance, by Patrick Waller, Published by October 2009, Wiley-Blackwell.

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
PLANT Biotechnology Lab	BSB521	0:0:1	1	5

COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate the basic features of plant cells
CLO 2	Create awareness about the economic importance of plants
CLO 3	Apply in vitro techniques improvement of quality and quantity of characters

B. SYLLABUS

Module I
Sterilization techniques of glass wares & equipments.
Preparation of cotton plugs & culture media .
Preparation and sterilization .of different explants.
Inoculation of explants on culture media.

Module II
Culture of plant embryos/seeds.
Callus culture.
Testing of seed viability.

Module III
Culture of plant embryos/seeds; callus culture; meristem; haploid culture; seed test viability.

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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Course Name	Course Code	LTP	Credit	Semester
Animal Biotechnology Lab	BSB522	0:0:1	1	5

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop the theoretical and empirical concepts of cell culture and investigate the newer applications of cell culture
CLO 2	Demonstrate the principles and applications of hybridoma technology, IVF-ET, animal cloning and vaccine development
CLO 3	Apply the concepts & techniques for the applications of transgenic animals with reference to animal models and discuss the public and ethical concerns and associated risks over the use of animal biotechnology.
CLO 4	Develop the research skills in preparation for a career in the biosciences industry or academic research

B. SYLLABUS

Module I
Culture of animal cell line
Module II
Preparation of competent cells by calcium chloride method
Module III
Study of toxicity on cell lines

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Genomics and proteomics Lab	BSB524	0:0:1	1	5

I. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Integrate skills in solving problems and analyzing data using a molecular and genetic approach
CLO 2	Develop theoretical and technical skills required for industrial and scientific application of proteins.

J. SYLLABUS

Module I

Electrophoretic separation of plasmid DNA.
Restriction, digestion & ligation of DNA.

Module II

Gene finding tools and genome annotation- Gen Scan, Net Gene, Hmm gene.

Module III

Comparison of two given genomes- Mummer.

Module IV

Homology modeling of 3-D structure from amino acid sequence: SWISS- MODELLER
Graphics tools: SWISS- PDB Viewer

EXAMINATION SCHEME:

Components	IE	Attendance	EE
Weightage (%)	45	5	50

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Bioprocess Technology	BSB531	3:0:0	3	5

H. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Introduction to various culture methods
CLO 2	Understanding of fermenter designs
CLO 3	Process operation and control and monitoring at industrial level
CLO 4	Students will be well trained to choose and design technologies for the industrial manufacture of food products, with due regard to raw materials, energy, economics and sustainability in the system of industrial food technology and nutrition.

J. SYLLABUS

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Media formulation, Cell culture techniques; Inoculum development and aseptic transfers. Different types of pumps, valves, and line materials, piping conventions etc. used in Biochemical Process

Module II

Process technology for the production of primary metabolites, eg. biomass, ethanol, acetone-butanol, citric acid, amino acids, polysaccharides and plastics.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains. Computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. Power alcohol – definition, uses, merits and demerits of various technologies for its production.

Amino Acid: Genetic Control of metabolic pathway.

Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L-lysine by inhibition and repression mechanism.

Module III

Biomass: Bakers and distillers yeast production using various raw materials, "bios" factors for growth, Crabtree effect, harvesting, different forms and uses.What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Biofertilizers, biocompost and biopesticides

Module IV

Production of secondary metabolites – penicillin, cephalosporins, streptomycin, tetracycline etc. Metabolites from plant and animal cell culture

Penicillin: Classification, various penicillin as precursor and 'R' – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery, uses of various forms etc.

Streptomycin: chemical structure, production, harvest and recovery, use by-product of streptomycin fermentation etc.

Tetracycline: chemical structure, production, harvest and recovery, use by-product of tetracycline fermentation etc. Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Reading:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Bioprocess Engineering Basic Concepts, M.L. Shuler and F. Kargi, Prentice Hall
- Bioprocess Engineering, B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D'Elia, John Wiley and Sons Inc.
- Bioprocess Engineering Principles, P Doran, Academic Press
- Biotechnology. A Textbook of Industrial Microbiology, W. Crueger and a. Crueger, Sinauer Associates.
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press
- Process Engineering in Biotechnolgy, A T Jackson , Prentice Hall

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
IPR and regulatory affairs	BSB532	3:0:0	3	5

I. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Understand the role of Intellectual Property Rights
CLO 2	Understanding of filing process of Patent for invention.
CLO 3	Understanding of the role WIPO & Indian Patent agency

K. SYLLABUS

Module-I

General Principles of Intellectual Property: Copyright, Trademark, Inventions-Patentable, Geographical Indications, Industrial Designs, Integrated Circuits, Trade Secrets. Patents: need of patents, major types of patents, International registration of patents, patent term and extension The Patents Act, 1970 – Salient features.

Organization: Intellectual Property Rights, World Trade Organization (WTO), World Intellectual Property Organization (WIPO), Paris Convention, Berne Convention, TRIPS Agreement, the Doha Declaration, Patent Cooperation Treaty (PCT), Madrid Protocol.

Module-II

New Drug Application: Steps involved in the development of new drug. New drug applications as per WHO guidelines and abbreviated NDA. Requirement and guidelines on clinical trials, Investigational New Drug Application(IND)

Module-III

Regulatory affairs and its importance.

Biosafety- definitions - DBT guidelines on biosafety in conducting research in biology/biotechnology - Regulations of Genetically modified Organisms in India- Biosafety regulation for transgenic plants and animals - labeling of GM foods.Role and responsibility ofDBT, BCIL, BRAI, DSIR, IBSC, RCGM, Animal Ethics Committee, Human Ethics Committee, FSSAI, CDSCO and USFDA

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Books:

1. Drug Regulatory Affairs by Dr. N.S. Vyawahare and SachinItkar, NiraliPrakashan.
2. Pharmaceutical Regulatory Affairs by C.V.S. Subrahmanyam& J. ThimmaSetty, VallabhPrakashan.
3. Quality Assurance of Pharmaceutics Vol I & II of WHO publications, 1999.
4. GMPs by Mehra
5. How to Practice GMP by P.P.Sharma.
6. GMP of Pharmaceuticals by Willing and Stoker

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Statistics for biology	BSB523	3:0:0	3	5

J. COURSE LEARNING OUTCOMES (CLO)

CLO 1	To understand elementary mathematical statistics including deriving simple results and solving problems.
CLO 2	To develop various concepts and techniques of statistics useful in business.
CLO 3	To develop the ability to analyze a problem, apply the appropriate statistical techniques for problem solving and interpret the results.
CLO 4	To solve simple data-analytic problems by hand and also use computers for analyzing problems involving large datasets with the help of statistical software

L. SYLLABUS

Module I

Statistics and Biostatistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Standard deviation, Variance

Module II

Probability: Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability.

Module III: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module IV: Correlation and Regression

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient.
Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples.

Module V: Introduction to the following Statistical terms
Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.
Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.

EXAMINATION SCHEME:

Components	CT/Mid-term	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Books:

Ronald N. Forthfer and Eun Sun Lee. Introduction to Biostatistics. Elsevier.
S.P. Gupta. Statistical Methodology. S. Chand & Co.
S.C. Gupta. Fundamentals of Statistics. S.Chand & Co.
K. Visweswara Rao. Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology. Jaypee Brothers

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Course Name	Course Code	LTP	Credit	Semester
Communication Skills	BCS501	1:0:0	1	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Create right selection of words and ideas while also choosing the appropriate channelofformalcommunication.
CLO 2	Demonstrate the ability to analyse a problem and devise a solution in a group.
CLO 3	Demonstrate proficiency in the use of written communication.
CLO 4	Recognize the mannerisms and methodology of Interview and GD to become more expressive in their body language and verbal performance.

B. SYLLABUS

Module I: Vocabulary
Email Writing (Briefing, Do's & Don'ts & Practice)
Module II:
Corporate Dressing &Body Language (Verbal & Non-Verbal Cues & its role in Interview Selection)

Module III: Interview-1 (Briefing, Do's & Don'ts, Questions, Mock Sessions)
Module IV:
GD-3(Practice Sessions)

EXAMINATION SCHEME:

Components	Email Writing	GD	Personal Interview	Attendance
Weightage (%)	30	30	35	5

Suggested Readings

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print

- Krishnaswamy N,*Creative English for Communication***.** Delh**i:** Macmillan Publishers India Ltd. Print. 2007.

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Course Name	Course Code	LTP	Credit	Semester
BEHAVIOURAL SCIENCE - V	BSS503	1:0:0	1	5

F. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Recognize their personality and individual differences and identify its importance of diversity at workplace and ways to enhance it.
CLO 2	Recognize effective socialization strategies and importance of patriotism and taking accountability of integrity.
CLO 3	Recognize different types of human rights and its importance.

B. SYLLABUS

Module I: Individual differences& Personality
Personality: Definition& Relevance

Importance of nature & nurture in Personality Development

Importance and Recognition of Individual differences in Personality

Accepting and Managing Individual differences (Adjustment Mechanisms)

Intuition, Judgment, Perception & Sensation (MBTI)

BIG5 Factors

Module II: Socialization

Nature of Socialization

Social Interaction

Interaction of Socialization Process

Contributions to Society & Nation

Module III: Patriotism and National Pride
Sense of Pride and Patriotism
Importance of Discipline and hard work
Integrity and accountability

Module IV: Human Rights, Values and Ethics
Meaning of Human Rights
Human Rights Awareness
Importance of human rights
Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc

Module V: Personal and Professional Excellence

- Personal excellence:
    - Identifying Long-term choices and goals
    - Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence
Resilience during challenge and loss
Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Suggested Readings

- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behavior

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Course Name	Course Code	LTP	Credit	Semester
French	FLF501	2:0:0	2	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. SYLLABUS

Module D: pp. 131 – 156 Unités 10,11

Contenu lexical : **Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

Suggested reading

- le livre à suivre : Campus: Tome 1

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Course Name	Course Code	LTP	Credit	Semester
German	FLG501	2:0:0	2	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 4	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language

B. SYLLABUS

Module I: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module II: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

Module IV: Verbs with fixed prepositions
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

Module V: Texts
A poem 'Maxi'
A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture; Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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Course Name	Course Code	LTP	Credit	Semester
Spanish	FLS501	2:0:0	2	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Students will be able to communicate in small sentences in writing, self introduction, family description etc.
CLO 2	Students will be able to read and interpret small texts .
CLO 3	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc.

SYLLABUS

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Suggested Reading

- Español Sin Fronteras, Greenfield

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Course Name	Course Code	LTP	Credit	Semester
CHINESE	FLC501	2:0:0	2	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Use words, and expressions related to hobbies, abilities, gratitude and apology.
CLO 2	Exchange dialogues related to the above topics in Chinese.
CLO 3	Use grammar points used in lessons 6-9
CLO 4	Use words, and expressions related to hobbies, abilities, gratitude and apology.

SYLLABUS

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

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Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

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AMITY INSTITUTE OF BIOTECHNOLOGY (AIB)

Course Name	Course Code	LTP	Credit	Semester
Anandam	AND005	0:0:0	2	5

E. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network

SYLLABUS

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants,phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.

University will forward the report to the state level committee·

Evaluation Scheme:
Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

· C grade =32 hrs (Below 20 marks)
· B grade >32 hrs to <=44hrs (20-30 marks)
· A grade >44 hrs to<=54hrs (30-40 marks)
· O grade >54 hrs to<=64hrs (40-50 marks)