B.Tech + M.Tech Biotechnology

Programme Code: UMT

Duration – 5 Years Full Time

Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2017-22 Batch

AMITY UNIVERSITY
RAJASTHAN

Credit Summary Sheet

B.Tech + M.Tech Biotechnology					
Semester	**CC**	**DE**	**VA**	**OE**	**Total**
1	16	3	4	3	26
2	17	3	4	3	27
3	16	3	8	3	30
4	18	3	4	3	28
5	20	3	4	3	30
6	20	3	4	3	30
7	27	3	4	3	37
8	20	3	4	3	30
9	25	3	4	-	32
10	30	-	-	-	30
Total	209	27	**40**	**24**	**300**

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

Program Structure

B.Tech + 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**
UMT101	Applied Mathematics - I	CC	3	1	-	4
UMT102	Applied Physics - I	CC	2	-	-	2
UMT103	Applied Chemistry - I	CC	2	-	-	2
UMT104	Introduction to Computers	CC	2	-	-	2
UMT105	Life Sciences	CC	2	-	-	2
UMT122	Applied Physics - I -Lab	CC	-	-	2	1
UMT123	Applied Chemistry - I-Lab	CC	-	-	2	1
UMT124	Introduction to Computers-Lab	CC	-	-	2	1
UMT125	Engineering Graphics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT130	Term Paper	DE	3	-	-	3
UMT131	Chemical Biology	DE				
UMT132	**Food Science**	DE				
UMT133	Basic and Applied Biotechnology	DE				
OE1	Open Elective-I	OE	3	-	-	3
BCS 101	English	VA	1	-	-	1
BSS 105	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					**26**

B.Tech + 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**
UMT201	Applied Mathematics - II	CC	3	1	-	4
UMT202	Applied Physics - II	CC	2	-	-	2
UMT203	Applied Chemistry - II	CC	2	-	-	2
UMT204	Object Oriented Programming in C++	CC	2	-	-	2
UMT205	Data Structure & Algorithms	CC	2	1	-	3
UMT222	Applied Physics - II -Lab	CC	-	-	2	1
UMT223	Applied Chemistry - II-Lab	CC	-	-	2	1
UMT224	Object Oriented Programming in C++-Lab	CC	-	-	2	1
UMT225	Data Structure & Algorithms-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT230	Term Paper	DE	3	-	-	3
UMT231	Plant Science	DE				
UMT232	Biodiversity	DE				
UMT233	Food Microbiology	DE				
OE	Open Elective-II	OE	3	-	-	3
BCS 201	English	VA	1	-	-	1
BSS205	Understanding Self for Effectiveness – II	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

B.Tech + 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**
UMT301	Cell Biology	CC	3	-	-	3
UMT302	Biochemistry - I	CC	2	1	-	3
UMT303	Microbiology	CC	3	1	-	4
UMT304	Basic Bioanalytical Techniques	CC	2	-	-	2
UMT321	Cell Biology-Lab	CC	-	-	2	1
UMT322	Biochemistry - I-Lab	CC	-	-	2	1
UMT323	Microbiology -Lab	CC	-	-	2	1
UMT324	Basic Bioanalytical Techniques-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT330	Term Paper	DE	3	-	-	3
UMT331	Biopesticides & Biofertilizers	DE				
UMT332	Industrial Waste Management	DE				
UMT333	Animal Science	DE				
OE	Open Elective-III	OE	3	-	-	3
EVS001	Environmental Sciences	VA	4	-	-	4
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS305	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					**30**

B.Tech + 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**
UMT401	Biochemistry - II	CC	3	-	-	3
UMT402	Genetics	CC	3	-	-	3
UMT403	Methods & Instrumentation in Biotechnology	CC	2	1	-	3
UMT404	Database Management Systems	CC	2	-	-	2
UMT405	Statistics for Biology	CC	3	-	-	3
UMT421	Biochemistry – II -Lab	CC	-	-	2	1
UMT422	Genetics-Lab	CC	-	-	2	1
UMT423	Methods & Instrumentation in Biotechnology-Lab	CC	-	-	2	1
UMT424	Database Management Systems-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT430	Term Paper	DE	3	-	-	3
UMT431	Developmental Biology	DE				
UMT432	Industrial Biotechnology	DE				
UMT433	Food and Nutrition	DE				
OE	Open Elective-IV	OE	3			3
BCS 401	Communication Skills – II	VA	1	-	-	1
BSS405	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					**28**

B.Tech + M.Tech Biotechnology: V- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
UMT501	Molecular Biology	CC	3	-	-	3
UMT502	Java - I	CC	2	-	-	2
UMT503	Plant Biotechnology	CC	3	1	-	4
UMT504	Animal Biotechnology	CC	3	1	-	4
UMT505	Fundamentals of Biochemical Engineering	CC	3	-	-	3
UMT521	Molecular Biology -Lab	CC	-	-	2	1
UMT522	Java - I-Lab	CC	-	-	2	1
UMT523	Plant Biotechnology-Lab	CC	-	-	2	1
UMT524	Animal Biotechnology-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT530	Term Paper	DE	3	-	-	3
UMT531	Tissue engineering	DE				
UMT532	**Cancer Biology**	DE				
UMT533	**Clinical Microbiology**	DE				
OE	Open Elective-V	OE	3			3
BCS 501	Communication Skills – III	VA	1	-	-	1
BSS505	Understanding Self for Effectiveness – V	VA	1	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language - V French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

B.Tech + M.Tech Biotechnology: VI- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
UMT601	Recombinant DNA Technology	CC	3	1	-	4
UMT602	Enzymology & Enzyme Technology	CC	3	-	-	3
UMT603	Structural Biology	CC	2	1	-	3
UMT604	Immunology & Immunotechnology	CC	3	-	-	3
UMT605	Bioresource Technology	CC	3	-	-	3
UMT621	Recombinant DNA Technology-Lab	CC	-	-	2	1
UMT622	Enzymology & Enzyme Technology-Lab	CC	-	-	2	1
UMT623	Structural Biology-Lab	CC	-	-	2	1
UMT624	Immunology & Immunotechnology-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT630	Term Paper & Industry Visit	DE	3	-	-	3
UMT631	Virology	DE				
UMT632	Nanoscience and Nanotechnology	DE				
UMT633	IPR & Drug Regulatory Affairs	DE				
OE	Open Elective-V	OE	3			3
BCS 601	Communication Skills – IV	VA	1	-	-	1
BSS605	Understanding Self for Effectiveness –V I	VA	1	-	-	1
FLT 601 FLG 601 FLS 601 FLC 601	Foreign Language - VI French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

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

For domain elective: UMT630- 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)

B.Tech + M.Tech Biotechnology: VII- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
UMT701	Bioprocess Technology	CC	3	1	-	4
UMT702	Downstream Processing	CC	3	1	-	4
UMT703	Java – II	CC	2	-	-	2
UMT704	Genomic & Proteomics	CC	3	1	-	4
UMT705	Pharmaceutical Technology & Biotechnology	CC	3	-	-	3
UMT750	Industrial Training Evaluation	CC	-	-	-	6
UMT721	Bioprocess Technology -Lab	CC	-	-	2	1
UMT722	Downstream Processing-Lab	CC	-	-	2	1
UMT723	Java - II-Lab	CC	-	-	2	1
UMT724	Genomic & Proteomics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT730	Term Paper	DE	3	-	-	3
UMT731	Bioethics & Biosafety	DE				
UMT732	Protein Engineering	DE				
UMT733	Nanotoxicology	DE				
OE	Open Elective-VI	OE	3			3
BCS 701	Communication Skills – V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT 701 FLG 701 FLS 701 FLC 701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**37**

B.Tech + M.Tech Biotechnology: VIII- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Total Credits**
UMT 801	Plant biochemistry and metabolism	CC	3	-	-	3
UMT802	Industrial microbiology	CC	3	1	-	4
UMT 803	Bioseperation technology	CC	3	1	-	4
UMT 804	Bioinformatics	CC	3	-	-	3
UMT 805	Project Management	CC	3	-	-	3
UMT822	Industrial microbiology -Lab	CC	-	-	2	1
UMT 823	Bioseperation technology-Lab	CC	-	-	2	1
UMT 824	Bioinformatics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT830	Term Paper	DE	3	-	-	3
UMT831	Environmental Biotechnology	DE				
UMT832	**Advanced Plant Breeding**	DE				
UMT833	Industrial Safety & Management	DE				
OE	Open Elective-VII	OE	3	-	-	3
BCS 801	Communication Skills – VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT 801 FLG 801 FLS 801 FLC 801	Foreign Language – VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**30**

B.Tech + M.Tech Biotechnology: IX- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Total Credits**
UMT 901	Nanobiotechnology	CC	3	1	-	4
UMT902	Biopharmaceutics and pharmacokinetics	CC	3	1	-	4
UMT903	Medical Biotechnology	CC	3	-	-	3
UMT904	Bioprocess Plant Design	CC	3	1	-	4
UMT905	Research Methodology	CC	2	-	-	2
UMT960	Minor Project	CC	-	-	-	6
UMT 921	Nanobiotechnology-Lab	CC	-	-	2	1
UMT923	Medical Biotechnology -Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
UMT930	Term Paper	DE	3	-	-	3
UMT931	Stem cell engineering	DE				
UMT932	**Analytical Methods in Microbiology**	DE				
UMT933	Genetic Modifications	DE				
BCS 111	Communication Skills – VII	VA	1	-	-	1
BSS 905	Understanding Self for Effectiveness – IX	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language – IX French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**35**

B.Tech + M.Tech Biotechnology: X- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
UMT060	Major Project /Dissertation	CC	-	-	-	30
	TOTAL					**30**

APPLIED MATHEMATICS – I

Course Code: UMT101 **Credit Unit: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

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 1^{st} 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	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text & References:

Text:
- Narayan, S. (2005). Differential Calculus. S. Chand, 30th Revised edition.
- Narayan, S. (2005). Integral Calculus, S. Chand, New Delhi.

References:
- Forsyth, A. R. (2013). A Treatise on Differential Equations, BoD–Books on Demand.
- Dass, H. K. (2008). Advanced Engineering Mathematics , S. Chand, New Delhi.

APPLIED PHYSICS - I
(FIELDS AND WAVES)

Course Code: UMT102 **Credit Unit: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

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

Text & References:

- French, A. P. (1971). Vibrations and Waves, CRC press.
- William, C., William, C., Elmore., & Mark, A. (1969). Physics of Waves. Courier Corporation Elmore, Heald.
- 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..

APPLIED CHEMISTRY- I

Course Code: UMT103 **Credit Unit: 03**

Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials.

Course Contents:

Module I: Chemical Bonding

Types of bond: 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; Law's of Absorbance; IR: Principle 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	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Jain, P. C., & Jain M. (1998). Engineering Chemistry.
- Chawla S. (2002). A Text book of Engineering Chemistry, Dhanpat Rai and Co.(Pvt.) Ltd., Educational and Technical Publishers, Delhi.

References:

- Morrison, R. T., & Boyd, R. N. (1992). Organic Chemistry, 6th.
- Puri, B. R., Sharma, L. R., & Pathania S. M. (1993). Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., New Delhi.
- Finar, I. L. (1973). Organic Chemistry, Vol. 1.

INTRODUCTION TO COMPUTERS

Course Code: UMT: 104 **Credit Unit: 02**

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

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

Text & References:

Text:

- Kanetkar, Y. (2001). Let us C, BPB Publications, 2nd Edition.
- Balagurusamy, E. (2004). Programming in ANSI C, Tata McGraw-Hill Education.
- Herbert, S. (2002). The Complete Reference, Osbourne Mcgraw Hill, 4th Edition.
- Raja Raman V. (1995). Computer Programming in C , Prentice Hall of India.

LIFE SCIENCES

Course Code: UMT: 105 **Credit Unit: 02**

Course Objective:
The objective of the course is to provide students an understanding of the very basic molecules of life-DNA,RNA, proteins and how these molecules, when form further complex molecules like carbohydrates, vitamins and lipids, then functioning of body takes place. Since technology is advancing in every field, emphasis is also given on the understanding of application of some biotechnological concepts used in our daily life like biofuels, biofertilizers. An introduction to the origin of earth, the environment-air, water and land, origin of life on Earth, how life evolved from a single cell, some environmental problems and measures to be taken to combat them.

Course Contents:

Module I: 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	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Sodhi, G. S. (2005). Fundamental Concepts of Environmental Chemistry, Alpha Science Int'l Ltd.
- Sharma, B. K., & Kaur, H. (2001). An Introduction to Environmental Pollution, Krishna prakashan media (p) Ltd.
- Berg, J. M., Tymoczko, J. L., & Stryer L. (2011). Biochemistry, WH Freeman and Co., New York.
- Lodish, H. (2008). Molecular Cell Biology by. Macmillan, (2008).

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APPLIED PHYSICS – I-Lab

Course Code: UMT: 122 **Credit Unit: 01**

List of Experiments

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**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

APPLIED CHEMISTRY – I -Lab

Course Code: UMT: 123 **Credit Unit: 01**

List of Experiments

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.
   (B) Application of surface tension method in mixture analysis.
7. Application of distribution law in the determination of equilibrium constant.
8. Analysis of iron ore.
9. Plant pigments separation by paper chromatography.

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

INTRODUCTION TO COMPUTERS -Lab

Course Code: UMT: 124 **Credit Unit: 01**

Software Required: Turbo C

Course Contents:

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**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ENGINEERING GRAPHICS -Lab

Course Code: UMT: 125 **Credit Unit: 01**

Practicals

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

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**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Engineering drawing by Shah, Mahendrakumar Budhichand, and Bachubhai Chhibubhai Rana Pearson Education India, (2009).
- Geometric Dimensioning & Tolerancing by Gill, Pritam Singh. . Seagull Books Pvt Ltd, (2009).
- Engineering Drawing by Bhatt, N. D. Engineer 4 (1980).

TERM PAPER

Course Code: UMT 130 **Credit Units: 03**

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 consist 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 idea.

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. Bibliography
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:

1. summary of question posed
2. summary of findings
3. summary of main limitations of the study at hand
4. details of possibilities for related future research

Bibliography

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.
Bibliographical 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/.

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.)	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%

CHEMICAL BIOLOGY

Course Code: UMT: 131 **Credit Unit: 03**

Course Objective:

Chemical biology is that branch of life science, which deals with the study and manipulation of biological systems through the application of chemical techniques and tools. It differs from the more traditional disciplines of chemistry and biology in its emphasis on integrating a wider series of experimental techniques, ranging from synthetic organic chemistry, to biochemistry, to structural, molecular, and cellular biology. Chemical biology has historical and philosophical roots in medicinal chemistry, supramolecular chemistry (particularly host-guest chemistry), bioorganic chemistry, pharmacology, genetics, biochemistry and metabolic engineering.

Course Contents:

Module I: Principles of chemical biology

Classification & chemistry of carbohydrates, proteins and nucleic acids. Chemical method to synthesise peptides, polynucleotides,.Cellular Receptors for drug action, strategies for identifying the cellular target of physiologically active natural products (paclitaxel, vancomycin).

Module II: Chemical reactions in living systems

Classification of Enzymes, Introduction to enzyme chemistry: Redox reactions (1), Group transfer reactions, Isomerases, Carboxylation and decarboxylation, Types of chemical reactions important in organic synthesise: Eliminations, additions, condensation (Aldol condensation) and Substitutions, and Rearrangements (Claisen Reactions).

Module III: Structural chemical biology

Purine biosynthesis, thiamine biosynthesis, vitamin E biosynthesis, Steroids (Cholesterol), porphyrin biosynthesise.

Module IV: Chemical tools in enzymology

Specificity in DNA polymerase and the role of induced fit, Group I ribozyme: kinetics and mechanisms, RNA modifications and applications to catalysis, Unnatural amino acids

Examination Scheme:

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

Text & References:

Text:

- Waldmann H., Janning, P., (2005). Chemical Biology: A practical course, Wiley-VCH.
- Dobson, C.M., Gerrard, J.A., & Pratt A.J. (2002). Foundations of Chemical Biology, Oxford Chemistry Primers.

References:

- Chan, L.L., Pineda, M., Heeres, James T. (2008). A General Method for Discovering Inhibitors of Protein−DNA Interactions Using Photonic Crystal Biosensors *Chem. Biol.*, *3* (7), pp 437–448.

FOOD SCIENCE

Course Code: UMT: 132 **Credit Unit: 03**

Course Objective:
Food science is the branch of biotechnology which deals with properties and reactions of various food components. It explains the principles behind analytical techniques associated with food.

Course Contents:

Module I
Carbohydrates: Structure and functional properties of monooligo-polysaccharides including starch, cellulose, pectic substances and dietary fibre;
Proteins: Classification and structure of proteins in food;

Module II
Lipids: Classification and structure of lipids, Rancidity of fats, Polymerization and polymorphism;
Pigments: Carotenoids, chlorophylls, anthocyanins, tannins and myoglobin; Food flavours: Terpenes, esters, ketones and quinones;

Module III
Enzymes: Specificity, Kinetics and inhibition, Coenzymes, Enzymatic and non-enzymatic browning;
Nutrition: Balanced diet, Essential amino acids and fatty acids, PER, Water soluble and fat soluble vitamins, Role of minerals in nutrition, Antinutrients, Nutrition deficiency diseases.

Module IV
Chemistry of changes occurring during processing, storage and utilization, Principles, methods, and techniques of qualitative and quantitative physical, chemical, and biological analyses of food and food ingredients.

Text & References:

Text:

- Robert K., Murray, M.D., Granner, D.K., Mayes P.A., & Rodwell V.I. Harper's Biochemistry, McGraw-Hill/Appleton and Lange.
- Stryer, L. Biochemistry, W.H. Freeman and Company.
- Cooper T.G. Tools of Biochemistry, John Wiley and Sons Inc.

References:

- Thomas F. W. (1995). Cellular Biophysics I & II, MIT Press.
- Segal I.H. Biochemical Calculations, John Wiley and Sons.
- Mathews, C.K., Van Holde, K.E., & Ahern K.G. Biochemistry, Benjamin / Cummings.
- Devlin's Textbook of Biochemistry with Clinical correlations by John Wiley and Sons Inc.
- Lehninger, A.L., Nelson, D.L., Cox M.M. Principles of Biochemistry, Worth Publishing.

BASIC AND APPLIED BIOTECHNOLOGY

Course Code: UMT: 133 **Credit Unit: 03**

Course Objective

Understanding the fundamental principles of biotechnology and its application in agriculture, veterinary sciences, medical sciences, industry and environment.

Course Contents:

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.

Examination Scheme:

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

Text and Reference Books:

- 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.

ENGLISH

Course Code: BCS 101 **Credit Unit: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

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	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

UNDERSTANDING SELF FOR EFFECTIVENESS - I
(UNDERSTANDING SELF FOR EFFECTIVENESS)

Course Code: BSS 101 **Credit Unit: 01**

Course Objective:
This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

Course Contents:

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

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

Text & References:

- 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.

FRENCH - I

Course Code: FLT 101 **Credit Unit: 02**

Course Objective:
To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

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

GERMAN - I

Course Code: FLG 101 **Credit Unit: 02**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

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

SPANISH – I

Course Code: FLS 101 **Credit Unit: 02**

Course Objective:
To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

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

CHINESE – I

Course Code: FLC 101 **Credit Unit: 02**

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

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

APPLIED MATHEMATICS – II

Course Code: UMT: 201 **Credit Unit: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from athematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

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

Text & References:

- Dass, H.K. (2011). Higher Engineering Mathematics, S. Chand, Delhi.
- Mishra, S. (2013). Fundamentals of Mathematics Funcations a: Functions and Graphs. Pearson Education, First ed.

APPLIED PHYSICS - II

Course Code: UMT: 202 **Credit Unit: 02**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering.

Course Contents:

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

Text & References:

- Beiser, A. (2002). Concept of Modern Physics, McGraw-Hill Higher Education; 6th edition.
- Agarawal & Goel. (2011). Applied Physics II, Pragati Prakashan.
- Pallai, S. O. (2009). Solid State Physics, New Academic Science Ltd; 6 edition.
- Wehr & Richards. (1984). Physics of Atom, Addison-Wesley, 4 edition.

APPLIED CHEMISTRY - II

Course Code: UMT: 203 **Credit Unit: 02**

Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials.

Course Contents:

Module I: Water

Hardness of Water; Boiler Feed Water; Scale and Sludge; Softening of Water; External and Internal Treatment of Boiler Water; Domestic Water Treatment; Domestic Water Treatment; Desalination of Brackish Water; Chemical Analysis of Water; Dissolved O_2 (BOD, COD); Estimation of Free Chlorine; TDS.

Module II: Lubricants

Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication; Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point. Selection of Lubricants.

Module III: Fuel

Introduction; Characteristics of good Fuel ; Calorific value; Bomb Calorimeter; Proximate and Ultimate analysis of coal; Carbonization of coal; Gasification and Liquification of coal: Fischer Tropsch and Bergius Process; Water Gas and Producer Gas

Module IV: Polymers

Introduction; Polymerization: Addition and Condensation Polymerization; Thermosetting and Thermoplastic Polymers; Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation, Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers.

Module V: Corrosion

Introduction, Mechanism of Dry and Wet Corrosion, Types of Corrosion, Galvanic Corrosion, Concentration Cell Corrosion, Passivity, Underground Soil Corrosion, Pitting Corrosion, Intergranular Corrosion, Waterline Influencing Corrosion, Corrosion Control.

Examination Scheme:

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

Text & References:

Text:

- Jain & Jain. (2008). Engineering Chemistry, Dhanpat Roy & Sons eds.
- Chawla, S. (2009). Engineering Chemistry, Dhanpat Roy & Sons eds.

References:

- Dara, S.S. (2004). Engineering Chemistry, S Chand, New Delhi.
- Ratan, S. (2013). Engineering Chemistry, S.K. Kataria & Sons.

OBJECT ORIENTED PROGRAMMING IN C++

Course Code: UMT: 204 **Credit Unit: 02**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

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

Text & References:

Text:

- Venugopal, A.R., & Ravishanker, T. (1997). Mastering C++, TMH Publications.
- Lafore R. (2004). Object Oriented Programming using C++, BPB Publications.
- Balagurusamy E. (2013). Object Oriented Programming with C++, TMH; Sixth edition.

References:

- Parasons. (1999). Object Oriented Programming with C++, BPB Publication.
- Lawlor, S. C. (2002). The Art of Programming Computer Science with C++,Vikas Publication.

DATA STRUCTURE AND ALGORITHMS

Course Code: UMT: 205 **Credit Unit: 02**

Course Objective:
It helps the students to utilize the information acquired through electronic media to access biological information network and data bases in order to understand biological functions and then to evaluate genetic diseases, their causes and risks related to human kind.

Course Contents:

Module I: Introduction

Module II: Programming strategies
Objects and ADTs with example, Constructors and destructors, Data structure, methods, Pre and post conditions, C conventions, Error handling, Some programming language notes.

Module III: Data structures
Arrays; lists; stacks and stack frames; Recursion -Recursive functions with example of factorial, Queue, Degeue.

Module IV: Searching
Sequential and binary search, Trees, binary search tree, complexity.

Module V: Queues
Priority queues and heaps

Module VI: Sorting
Bubble, Heap, Quick, Bin, Radix

Module VII: Searching revisited
Red-Black trees, AVL trees, general n-ary trees, hash tables; Hashing and collision resolution

Module VIII: Dynamic algorithm
Fibonacci numbers, bionomial coefficients, optimal binary search trees, matrix chain multiplication, longest common subsequence, optimal triangulation.

Module IX: Graphs
Minimum spanning tree and Djkstra's algorithm

Module X: Huffman encoding, FFT, Hard or intractable problems
Eulerian or Hamiltonian paths, Travelling salesman problem.

Examination Scheme:

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

Text & References:

Text:

- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:

- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

APPLIED PHYSICS – II -Lab

Course Code: UMT: 222 **Credit Unit: 01**
Practicals

List of Experiments

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**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

APPLIED CHEMISTRY – II -Lab

Course Code: UMT: 223 **Credit Unit: 01**
Practicals

Course Contents:

1. Determining the viscosity index of lubricating oil by using Redwood viscometer.
2. Determining the flash point and fire point of lubricating oil.
3. Determination of Hardness of Water.
4. Chemical Analysis of Water like Alkalinity, residual Chlorine.
5. Synthesis of Urea Formaldehyde resin.
6. Determination of Molecular weight of Polymer.
7. Determination of Ion exchange capacity of a region.
8. Determination of dissolved Oxygen in Water.
9. Determination of Iodine value in water.

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

OBJECT ORIENTED PROGRAMMING IN C++ -Lab

Course Code: UMT: 224 **Credit Unit: 01**
Practicals

Software Required: Turbo C++

- 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**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

DATA STRUCTURE AND ALGORITHMS -LAB

Course Code: UMT: 225 **Credit Unit: 01**

Course Contents:

Module I
Stack implementation through arrays, link list

Module II
Programs for recursion functions

Module III
Implementation of queues and leap structures

Module IV
Application of binary trees in pre-order, post-order and in-order evaluation

Module V
A VL tree implementation

Module VI
Optimal matrix multiplication

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

TERM PAPER

Course Code: UMT 230 **Credit Units: 03**

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 consist 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:

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 idea.

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:
   (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.
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. Bibliography
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:

5. summary of question posed
6. summary of findings
7. summary of main limitations of the study at hand
8. details of possibilities for related future research

Bibliography

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.
Bibliographical 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/.

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: 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.)

PLANT SCIENCE

Course Code: UMT: 231 **Credit Unit: 03**

Module I

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*

Module II

Outlines of classification of fungi, position, occurrence, structure and mode of reproduction in fungi, based on the following representatives: *Eurotium, Agaricus* and *Alternaria* Economic importance of fungi. General character and economic importance of bryophytes, life cyce of *Marchantia*

Module III

General character pteridophytes, heterospory and seed habit in pteridophytes, steler system in pteridophytes and life cycle of *Marsilea.*

Module IV

General character of gymnosperms, life cycle of *Pinus,* economic importance of pteridophytes and gymnosperms.

Module V

General character and taxonomy of angiosperms, Description of Lamiaceae, Malvaceae, Poaceae, Cucurbitaceae and Rutaceae. Economically important plants for cereals,fibre, oil, timber and medicinal value

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text Books:

- Singh, V., Pande, P.C., & Jain, D.K. (2010). A Text Book of Botany (Algae, Fungi, Bacteria, Virus, Microbiology, Plant Pathology, Bryophyte, Pteridophyta and Gymnosperms), Rastogi Publications, Meerut, 4th Ed.
- Singh, V., Pande, P.C., & Jain, D.K. (2013). A Text Book of Botany (Taxonomy, Economic Botany, Anatomy, Embryology and Morphogenesis), Rastogi Publications, Meerut, 4th Ed.

BIODIVERSITY

Course Code: UMT: 232 **Credit Unit: 03**

Module I: Introduction to Biodiversity

What is biodiversity, Scientific nomenclature and classification of biodiversity, Conservation and preservation of ecology, Measurement of species diversity, Ecosystem and community diversity, Distribution of biomes and global climate, Energy, nutrient cycling and ecosystem services, Natural and sexual selection, Genetic diversity, genetics, and conservation genetics. Global patterns of biodiversity and Desert biogeography.

Module II: Threats to Biodiversity

Overview of threats to biodiversity, Overexploitation of natural resources, Global climate change, Ecological impacts of climate change, Invasive species, Habitat destruction and fragmentation, cumulative impacts of human population growth.

Module III: Approaches to the conservation of biodiversities

Approaches to the conservation of biodiversity and historical perspectives, Legal protection at the species level: The Endangered Species Act, Applied population ecology: monitoring populations and assessing extinction risk, management and establishment of populations, Ex-situ conservation, Protecting and managing ecosystems, Restoring ecosystems, Conservation insights from paleoecology and historical ecology.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text

- Heywood, V.H., & Waston, R.T. (1995). Global Biodiversity Assessment, Cambridge Univ. Press.
- Cunningham, W.P., Cooper, T.H., Gorhani, E., & Hepworth, M.T. (2001). Environmental Encyclopedia, Jaico Publ. House, Mumabai.
- Gleick, H.P. (1993). Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute Oxford Univ. Press.

References:

- Jadhav, H., & Bhosale, V.M. (1995). Environmental Protection and Laws, Himalaya Pub. House, Delhi .

FOOD MICROBIOLOGY

Course Code: UMT: 233 **Credit Unit: 03**

Course Objective:
To introduce to students groups of microorganisms important for food industry with special emphasis on their role in manufacture, preservation, spoilage of foods and in food poisoning

Course Contents:

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	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Adams, M. R., & Moss, M. O., (2008) Food Microbiology, 3rd edition, RSC Publishing

Jay, James M., **Loessner**, Martin J., **Golden**, & David, A., (2005) Modern Food Microbiology, 7th edition, Springer .

Frazier, W.C., & Westhoff, D.C., (1987) Food Microbiology, 4th edition, Tata McGraw-Hill Education.

ENGLISH

Course Code: BCS 201 **Credit Unit: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

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	**A**	**CT**	**HA**	**EE**
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

UNDERSTANDING SELF FOR EFFECTIVENESS - II
(PROBLEM SOLVING AND CREATIVE THINKING)

Course Code: BSS205 **Credit Unit: 01**

Course Objective:
To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

Course Contents:

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

Text & References:

- Michael S. (1999). How to be a Better Problem Solver, Kogan Page, New Delhi.
- Geoff P. (1999). How to be a Better at creativity; by: Kogan Page, New Delhi, (1999)
- Richard Y. C., & Keith P., (1998). Wheeler Publishing, New Delhi.
- Phil Lowe Koge (1996). Page: Creativity and Problem Solving, New Delhi,
- Pfeiffer, J. W., (1996). Theories and Models in Applied Understanding Self for Effectiveness, Management Pfeiffer & Company.
- Bensley, A. D. (1998). Critical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole Publishing Company.

FRENCH - II

Course Code: FLT 201 **Credit Unit: 02**

Course Objective:
To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
To make them learn the basic rules of French Grammar.

Course Contents:

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

GERMAN – II

Course Code: FLG 201 **Credit Unit: 02**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

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

SPANISH – II

Course Code: FLS 201 **Credit Unit: 02**

Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

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

CHINESE – II

Course Code: FLC 201 **Credit Unit: 02**

Course Objective:
Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

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	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 11-20

CELL BIOLOGY

Course Code: UMT 301 **Credit Unit: 03**

Course Objective:

Cell biology plays a central role to connect the different fields of biotechnology which is highly interdisciplinary. It incorporates elements of Biology, Maths, Physics and Chemistry with combination of Computers and Electronics. The object of the present course is to understand the structure and function of the cellular and sub cellular components of cells and tissues with the help of recent techniques.

Course Contents:

Module I - Introduction to Cell Biology

Cell biology historical perspectives, The cell theory, pre cellular evolution, different classes of cell, prokaryotic and eukaryotic cells.

Module II - The Cell- Division Cycle

Overview of the cell cycle, cell cycle control system with phases, mitosis and meiosis.

Module III - Membrane Structure and Transport across Cell Membrane

Membrane structure-Lipid Bilayer, Fluidity of Membrane, Membrane Proteins.

Principles of Transmembrane transport, Types of Membrane Transport, Transport Proteins, Membrane channels in Transport process

Module IV - Cell Organelles and Cell Locomotion

Cellular organelles: structure and function of- cell wall, Mitochondria, Chloroplast, Nucleus, Endoplasmic reticulum, Lysosomes, peroxisomes and Golgi bodies.

Cell locomotion- Cytoskeleton, structure and function of cilia and flagella.

Module V - Cellular Signaling

General Principles of Cellular Signaling, Molecular tools involved in cell Signaling, Types of Cell Signaling, Signaling Pathway – cAMP Pathway, Notch Pathway.

Module VI - Cancer Biology

Cancer-Evolution of Cancer, Hallmarks of Cancer, Causes, Organ specific Cancer, Genes related to Cancer, Metastasis and Angiogenesis, Apoptosis, Prevention of Cancer, Diagnosis and Treatment of Cancer.

Module VII - Stem Cells

Properties of Stem cell, Types of Stem Cell.

Examination Scheme:

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

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, Garland Publishing Company, pp:864.
2) Cell Biology, T. Devasena, 1st Edition, Oxford Publishing House, pp:659.

References:

• Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
• Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
• Cell in Development and Inheritance, E.B. Wilson, Macmilian

• Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
• Molecular Cell Biology, H.Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.

BIOCHEMISTRY - I

Course Code: UMT 302 **Credit Units: 02**

Course Contents:

Module I: ***Introduction, aims and scope:***
Chemical foundations of Biology -Properties of water, acids, bases and buffers, covalent bonds, Non-covalent interactions in biological systems.

Introduction to biomolecules:- Carbohydrates:
Structure of monosaccharides, sterioisomerism and optical isomerism of sugars, reactions of aldehydes and ketone groups, ring structure and anomeric forms, mutarotation. Chemical reactions of sugars, important derivatives of monosaccharides, di- and tri-saccarides.

Module II: ***Lipids:***
Definition and classification. Fatty acids: introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols: nomenclature, physical properties, chemical properties and characterization of fats - hydrolysis, saponification value, acid value, rancidity of fats, Reichert-Meissel number and reaction of glycerol. Biological significance of fats.
Lipids and biological membranes, Lipid linked proteins and lipoproteins.

Module III: ***Carbohydrate metabolism:***
glycolysis pathway and reactions, Citric acid cycle - Overview, Metabolic sources of Acetyl Co-A, enzymes and regulation, The amphibolic nature of the Citric acid cycle, Electron transport chain and oxidative photophosphorylation. Glycogen breakdown and synthesis, glycogen storage and its diseases, Gluconeogenesis, The glyoxylate pathway, Pentose phosphate pathway

Module IV: ***Lipid metabolism:***
Lipid digestion, absorption and transport, fatty acid oxidation, ketone bodies, fatty acid biosynthesis, regulation of fatty acid metabolism.

Examination Scheme:

Components	Mid Term Test	Attendance	Class test/ Assignment/ Project/ Seminar/Quiz	End term Exam
Weightage (%)	15	5	10	70

Text & References:

Text:

- Lehninger Principles of Biochemistry by M.M. Cox and D.L. Nelson, 5th edition, 2008, W.H. Freeman and company, New York.
- Biochemistry by J.M. Berg, J.L. Tymoczko and L. Stryer, 5th edition, 2002, W.H. Freeman and Company, New York.
- Biochemistry by U.Satyanarayana, 3rd edition, 2006, New Central Book Agency (p) Lt.

References:

- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.

- Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
- Biochemistry, C.K. Mathews, K.E. Van Holde and K.G. Ahern, Benjamin / Cummings.
- Text book of Biochemistry, E.S. West, W.R. Todd, H.S. Mason, and J.T. Van Bruggen Oxford & IBH Publisher, Forth Edition.

MICROBIOLOGY

Course Code: UMT 303 **Credit Unit: 03**

Course Objective:

The course imparts the knowledge of different types of microorganisms that are invisible to our naked eyes. Discovery origin and evaluation of different forms of bacteria, fungi, protozoa and viruses constitute the basics of biotechnology.

Course Contents:

Module I: Historical perspective

Introduction and historical perspective - Discovery of the microbial world, controversy over spontaneous generation

Module II: Control of microorganismsand microbes

Theory and practice of sterilization; control of microorganisms by physical and chemical agents; antibiotics.

Module III: Methods in Microbiology,

Pure culture techniques; Media; Principles of microbial nutrition; Isolation of microorganisms, identification and characterization, Growth - The definition of growth, mathematical expression of growth, growth curve, measurement of growth, synchronous growth, continuous culture, culture collection and maintenance of cultures.

Module IV: Microbes: Structure, Function and Classification

Prokaryotic Cells: cell walls, cell membranes, Flagella and Pili, Capsules, ribosomes, Cell inclusions, endospores and genophore; Structure and classification of fungi, protozoa, viruses, algae; Archaea; Classification of Bacteria; Bergeys Manual: brief introduction; Ribotyping

Module V

Metabolic Diversity among microorganisms - photosynthesis in microorganisms; brief introduction ofanaerobic respiration and Fermentation; nitrogen fixation; methanogenesis

Module VI

Normal microbiota; Mechanism of microbial pathogenicity

Tutorial

One tutorial per week will be given to the students to solve their query and discuss the application of microbes in various fields.

Examination Scheme:

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

Text Books:

1. Prescott, Herley, Klein (2002). Microbiology, 5thedn.C.B.S. Publishers.
2. Pelczar M.J., Chan E.C.S. and Kreig, N.R.Microbiology VI Edition, Tata McGraw Hill.
3. JayaramPaniker C.K. (2009) Ananthnarayan and Paniker's Textbook of Microbiology, 8thedn. Orient BlackSwan.

Reference Books:

1. Stanier, R. (2009). General Microbiology, 5thEdn, Macmillian.
2. Salisbury, Whitaker and Hall, Principles of Fermentation Technology, Aditya Books Pvt. Ltd.

BASIC BIOANALYTICAL TECHNIQUES

Course Code: UMT 304 **Credit Unit: 02**

Course Objective:

The students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology. It will also develop practical skills among the students.

Course Contents:

Module I: Solution and Buffers

Preparation of solutions, concept of pH and buffer, types of buffers and their preparation, pH meter.

Module II: Centrifugation

Principle of centrifugation, rotors, different types of centrifuges, preparative and analytical centrifugation, ultra-centrifugation.

Module III: Microscopy

Optical microscopy, Bright field, Dark field, phase contrast and fluorescence microscopy. Electron microscopy: Transmission and scanning electron microscopy, Atomic force microscopy.

Module IV: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy, Nuclear Magnetic Resonance and Electron Spin Resonance spectroscopy,

Examination Scheme:

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

Text books

1. Wilson, K. and Walker, J. 2008. Principles and techniques of biochemistry and molecular biology. 6th Ed., Cambridge University press, New Delhi.
2. Sawhney, S. K. and Singh, R. 2011. Introductory practical biochemistry, 2nd Ed., Narosa publishing house New Delhi.
3. Upadhyay, A., Upadhyay, K. and Nath, N. 2010. *Biophysical Chemistry (Principles and Techniques).* Himalaya Publishing House Pvt. Ltd, Mumbai.

References:

- Advanced Instrumentation, Data Interprtation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.

CELL BIOLOGY LAB

Course Code: UMT 321 **Credit Units: 01**

Course Contents:

Module I Study of Microscopy

Parts and types of Microscope

Module II Study of Plant Cell and Animal Cell

Study of Onion Cells, Study of cheek cells, Study of RBC.

Module III Study of Plastids

Study of chromoplasts using Tomato, Study of chloroplastusing Chili, Study of Leucoplasts using Potato.

Module IV: Cell Division

Mitosisand Meiosis.Study of permanent slides of Mitosis and Meiosis.

Module V

Study of osmosis.

Module VI

Study of apoptosis using RBC

Examination Scheme:

Components	IA			EE			
	CT (Practical Based)	Viva	Attendance	Major Experiment	Minor Experiment/ Spotting	Viva	Practical Record
Weightage (%)	15	10	5	35	15	10	10

BIOCHEMISTRY-I LAB

Course Code: UMT 322 **Credit Units: 01**

Course Contents:

Module I

Colorimetric determination of pK.

Colour reactions of sugars. (Molischs test, iodine test, Saliwanoff test, Fehlings test, Benedicts test, Bials test).

Quantitative estimation of Sugars

Module III

Cholestrol estimation

Estimation of free fatty acids

Estimation of iodine number.

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

MICROBIOLOGY LAB

Course Code: UMT323 **Credit Units: 01**

Course Contents:

1. Preparation of solid and liquid media.
2. Isolation of microorganisms by plating, streaking and serial dilution.
3. Preparation of slant and stab cultures for bacteria and fungi
4. Enumeration of microbial population.
5. Microscopic examination of bacteria by gram staining.
6. Endospore staining.
7. Capsule staining.
8. Negative staining
9. Observe the microbes in living condition by hanging drop method.
10. Fungal slide preparation and study of characteristics of fungi.
11. Antibiotic sensitivity test.

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

BASIC BIOANALYTICAL TECHNIQUES LAB

Course Code : UMT 324 **Credit Units: 01**

Course Contents :

Module I
Preparations of solutions and buffers

Module II
Centrifugations technique (Centrifugation – low speed and high speed)

Module III
Microscopy

Module IV
UV-Vis Spectrophotometer

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

TERM PAPER

Course Code: UMT 330 **Credit Units: 03**

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

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

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.

Bibliographical 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/.

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: 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.)

BIOFERTILIZERS AND BIOPESTICIDES

Course Code: UMT331 **Credit Unit: 03**

Unit I Biofertilizers – Definition, kinds, microbes as biofertilizers, Symbiotic associates – Rhizobium taxonomy, Physiology, Host cell – Rhizobium interactions, mass cultivation, inoculants and serology.

Unit II Frankia woodland and Actinornizal nitrogen fixing plants and its host plants, characteristics, identification, cultural method and maintenance of Azospirillum, Azotobacter, Azolla and anabaena.

Unit III Mycorrhiza - VAM association, types, occurrence, Collection, isolation and inoculum production.

Unit IV Large scale production of biofertilizer, Organic farming Carrier materials, general outline of microbes as fertilizers, Rhizosphere effect microbial products influencing plant growth.

Unit V Biopesticides – Definition, kinds and commerce of biopesticide, Bacillus thuringiensis, insect viruses and entomopathogenic fungi – its characteristics, physiology, mechanism of action and application.

Reference:

1. Subba Rao, N.S. 2000 Soil Microbiology. Oxford and IBH Publishing Co. Ltd.

2. Verma A and Hock B. 1995. Mycorrhiza. ISBN

3. Yaacovokan, 1994 - Axospirillum, CBC press.

4. Wicklow, D.T. and B.E. Soderstrom. 1997, Environmental and microbial relationships.. Springer ISBN.

INDUSTRIAL WASTE MANAGEMENT

Course Code: UMT332 **Credit Unit: 03**

OBJECTIVE

This subject deals with the pollution from major industries and methods of controlling the same. The student is expected to know about the polluting potential of major industries in the country and the methods of controlling the same.

UNIT I INTRODUCTION

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II CLEANER PRODUCTION

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III POLLUTION FROM MAJOR INDUSTRIES

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV TREATMENT TECHNOLOGIES

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT V HAZARDOUS WASTE MANAGEMENT

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secure land fills

TEXT BOOKS**:**

1. M.N.Rao & A.K.Dutta, “Wastewater Treatment”, Oxford - IBH Publication, 1995.
2. W .W. Eckenfelder Jr., “Industrial Water Pollution Control”, McGraw-Hill Book Company, New Delhi, 2000.
3. T.T.Shen, “Industrial Pollution Prevention”, Springer, 1999.
4. R.L.Stephenson and J.B.Blackburn, Jr., “Industrial Wastewater Systems Hand book”, Lewis Publisher, New Yark, 1998
5. H.M.Freeman, “Industrial Pollution Prevention Hand Book”, McGraw-Hill Inc., New Delhi, 1995.
6. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw-Hill, 2000.

ANIMAL SCIENCE

Course Code: UMT 333 **Credit Unit: 03**

Course Objective:

To acquaint students with the general characters and classification of Acoelomates to chordates and the affinities between different groups.

Course Contents:

Module I

Protista, Parazoa and Metazoa: General characteristics. Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica. Porifera: General characteristics and classification. Canal system and spicules in sponges.

Module II

Cnidaria: General characteristics and classification; Metagenesis in Obelia; corals and coral reefs; polymorphism in Cnidaria. Platyhelminthes: General characteristics and classification. Life cycle and pathogenicity of Fasciola hepatica and Taenia solium

Module III

Nemathelminthes: General characteristics and classification; Life cycle, and pathogeniciy of Ascaris lumbricoides and Wuchereria bancrofti; Parasitic adaptations in helminthes

Introduction to Coelomates: Evolution of Coelom and Metamerism, Annelida: General characteristics and classification up to orders. Excretion in Annelida

Module IV

Arthropoda: General characteristics and classification up to orders; vision and respiration in Arthropoda; Metamorphosis in Insects; social life in bees.

Module V

Mollusca: General characteristics and classification up to orders; Respiration in Mollusca

Echinodermata: General characteristics and classification up to classes; water vascular system in Asteroidea; Larval forms in Echinodermata; Affinities with Chordates

Module VI

Introduction to Chordates: General Characteristics; outline classification, Protochordata: Hemichordata, Urochordata and Cephalochordata. General characteristics of Pisces, Amphibia, Reptilia, Aves and Mammals

Examination Scheme

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

Text books:

1. Dhami, P.S. and Dhami, J.K. Invertebrate Zoology. 5th ed. New Delhi: R. Chand & Co.,
2. Hyman L.H. The Invertebrates. Vol. I, II, III, IV and V. McGraw Hill Book Company. Inc., , 1959.

Reference books

1. Kotpal, R.L. Minor phyla. 5th ed. Meerut: Rastogi Publishers, 2006.
2. Kotpal, R.L. Modern Text Book of Zoology Invertebrates. 10th ed., Rastogi Publishers, Meerut, 2012.

ENVIRONMENTAL SCIENCES

Course Code: EVS001 **Credit Units: 04**

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

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	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text & References:

- 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)
- 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
- Survey of the Environment, The Hindu (M)
- 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

COMMUNICATION SKILLS - I

Course Code: BCS 301 **Credit Units: 01**

Course Objective:
To form written communication strategies necessary in the workplace.

Course Contents:

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

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- 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

UNDERSTANDING SELF FOR EFFECTIVENESS - III
(INTERPERSONAL COMMUNICATION)

Course Code: BSS305 **Credit Units: 01**

Course Objective:

This course provides practical guidance on:
Enhancing personal effectiveness and performance through effective interpersonal communication
Enhancing their conflict management and negotiation skills

Course Contents:

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

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

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 Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - III

Course Code: FLT 301 **Credit Units: 02**

Course Objective:

- To provide the students with the know-how
- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

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 restaurant
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	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

GERMAN - III

Course Code: FLG 301 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

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 tlelphone 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	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

SPANISH – III

Course Code: FLS 301 **Credit Units: 02**

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

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	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 -Nivel Elemental

CHINESE – III

Course Code: FLC 301 **Credit Units: 02**

Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

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	**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, Part-2" Lesson 21-30

BIOCHEMISTRY - II

Course Code: **UMT 401** **Credit Units: 03**

Course Contents:

Module I : ***Proteins and amino acids:***

Amino acids and peptides- classification, chemical reactions and physical properties.
Introduction to protein structure and function.
Glycoproteins -structure and function,
Vitamins and Coenzymes: structure and function of water soluble vitamins.

Module II: ***Enzymes:***

Introduction to kinetic and catalytic mechanisms of enzymes; Regulation of enzyme activity;
Effects of physical parameters on enzyme activity, enzyme inhibitors – types of inhibition.

Module III: ***Nucleic acids and Nucleotides:***

Classification of Nitrogenous bases, Types and properties of nucleotides, Structure and properties of various nucleic acids (DNA & RNA)

Module IV: ***Amino acid metabolism:***

Amino acid deamination, urea cycle, biosynthesis and breakdown of nutritionally non-essential amino acids (asparagines, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, Tyrosine.)
Specialized Products of Amino Acids, Nitrogen fixation

Module V: ***Nucleotide Metabolism:***

Metabolism of purines and pyrimidines, clinical significance of nucleotide metabolism, biosynthesis of nucleotide coenzymes (NAD, NADP, FAD, FMN), Catabolism of heam and clinical significance of bilirubin.

Examination Scheme:

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

Text & References:

Text Books:

- Lehninger Principles of Biochemistry by M.M. Cox and D.L. Nelson, 5th edition, 2008, W.H. Freeman and company, New York.
- Biochemistry by J.M. Berg, J.L. Tymoczko and L. Stryer, 5th edition, 2002, W.H. Freeman and Company, New York.
- Biochemistry by U.Satyanarayana, 3rd edition, 2006, New Central Book Agency (p) Lt.

Reference Books:

- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.
- Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
- Biochemistry, C.K. Mathews, K.E. Van Holde and K.G. Ahern, Benjamin / Cummings.
- Text book of Biochemistry, E.S. West, W.R. Todd, H.S. Mason, and J.T. Van Bruggen Oxford & IBH Publisher, Forth Edition.

GENETICS

Course code: UMT 402 **Credit Unit : 3**

Course Objective:

The objective of the course is to focus on the basic principles of genetics incorporating the concepts of classical, molecular and population genetics. Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.

GENE AND GENE VARIATION

Conventional and modern views. Mendelian inheritance and exceptions; Fine structure of gene, multiple alleles, Split genes, pseudogenes, non-coding genes, overlapping genes and multi-gene families**,** DNA markers -VNTR, STR, microsatellite, SNP and their detection, RFLP, RAPD, AFLP.

CHROMATIN STRUCTURE AND ORGANIZATION:

DNA and higher level organization; centromere and kinetochore, telomere and its maintenance, Functional states of chromatin (Heterochromatin and euchromatin), position effect variegation; Numerical and structural chromosomal aberrations

TECHNIQUES IN THE STUDY OF CHROMOSOMES

Chromosome preparations, Chromosomal, G/Q- banding, radiation hybrid, Fluorescence in situ hybridization, comparative genome hybridization (CGH), Gene identification using positional and functional cloning approach.

POPULATION GENETICS

Hardy-Weinberg principle, Linkage and linkage disequilibrium, Sources responsible for changes in gene frequencies: Mutation, selection, migration and isolation; random genetic drift; insights into human migration, natural selection and evolution.

APPLICATIONS

Human migration, Diseases and their diagnosis (Inborn errors of metabolism, Haemoglobinopathies; Multifactorial disorders) Mitochondrial myopathies, Molecular plant breeding fine mapping of QTL, Marker assisted breeding: Gene tagging.

Examination Scheme:

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

Suggested readings:

1. Concepts of Genetics. Klug W. S. and Cummings M. R Prentice-Hall 10 edition (2011)
2. Genetics-a Conceptual Approach Pierce B. A. Freeman 3rd edition (2013)
3. An Introduction to Genetic Analysis Griffith A. F. et al Freeman 11th edition (2015)
4. Principles of Genetics Snustad D. P. and Simmons M. J. John Wiley & Sons. 5th edition (2009)
5. Genetics Strickberger M. W. Prentice-Hall Pearson India (2015)

Reference

1. Quantitative Genetics, Genomics and Plant Breeding Kang M. S. CABI Publishing
2. An Introduction to Human Molecular Genetics: Mechanism of Inherited Diseases Pasternak J Fitzgerald Science Press

METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY

Course Code: UMT 403 **Credit Units: 02**

Course Objective:

The students will be exposed to techniques and instruments that are used in biotech industries.

Course Contents:

Module I: Electrophoresis

Agarose Gel Electrophoresis, SDS-PAGE, Isoelectric Focusing, Two-Dimensional Electrophoresis, Capillary Electrophoresis, Immuno Electrophoresis, Rocket Electrophoresis.

Module II: Chromatography

Adsorption Chromatography (Paper Chromatography, TLC), Molecular Exclusion Chromatography, Ion-Exchange Chromatography, Affinity Chromatography, HPLC and Gas Chromatography.

Module III: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy, Mass Spectrometry (Ionization Technique, Mass Analyzers, Detectors, MSMS), Nuclear Magnetic Resonance and Electron Spin Resonance spectroscopy,

Module IV

PCR, RT-PCR, ELISA, X-ray diffraction and X-ray Crystallography

Examination Scheme:

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

Text & References:

Text:

- Wilson, K. and Walker, J. 2008. Principles and techniques of biochemistry and molecular biology. 6th Ed., Cambridge University press, New Delhi.
- Sawhney, S. K. and Singh, R. 2011. Introductory practical biochemistry, 2nd Ed., Narosa publishing house New Delhi.
- Upadhyay, A., Upadhyay, K. and Nath, N. 2010. *Biophysical Chemistry (Principles and Techniques).* Himalaya Publishing House Pvt. Ltd, Mumbai.

References:

- Advanced Instrumentation, Data Interprtation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.

DATABASE MANAGEMENT SYSTEMS

Course Code: UMT 404 **Credit Units: 02**

Course Objective:

It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:

Module I: Overview and historical perspective

File systems vs. DBMS, advantages of DBMS;

Module II: Describing and storing data in DBMS

Levels of abstraction and data independence; Data models and their comparison; Entity relationship model - concepts, design, keys and features; Relational model -introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus -selection and projection, set operations, renaming, Joins, Division etc.

Module III: SQL and Perl

Module IV: Database design

Functional dependencies, Normal forms; Concurrency control and database discovery -concept of transaction: atomicity, consistency, isolation and durability, transactions and schedules, concurrent execution of transactions, Lock based concurrency control, Database recovery

Module V: Current trends

Distributed databases and multimedia databases;

Module VI: Data warehousing and Data Mining

Examination Scheme:

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

Text & References:

Text:

- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Data Mining, A.K. Pujari, Sangam Books Ltd.
- Database Management, P.C. Desai.
- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.

References:

- Principles of Database and Knowledge Based systems, J.D. Ullman, Computer Science Press.
- The Data Warehouse Lifecycle Toolkit, John Wiley and Sons Inc.
- The Data Warehouse Toolkit, R. Kimball et al, John Wiley and Sons Inc.

STATISTICS FOR BIOLOGY

Course Code: **UMT 405** **Credit Units: 03**

Course Objective:

The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

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, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module IV: Correlation

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. Rank correlation, Some examples.

Module V: Regression

Definition, Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module VI: 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.
Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.
Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.
Analysis of Variance: One way and Two way (only Examples)

Examination Scheme:

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

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

BIOCHEMISTRY- II LAB

Course Code: **UMT 421** **Credit Units: 01**

Course Contents:

Module I

Colour reactions of proteins (Ninhydrin test, Biuret test, Xanthoprotein test etc.).

Quantitative estimation of proteins.

Module II

Biochemical estimation of DNA

Biochemical estimation of RNA

Quantitative determination of DNA and RNA by spectrophotometric method using UV range.

Separation of DNA on Agrose gel.

Module III

Enzyme: Enzyme activity study of serum alkaline phosphotase

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

GENETICS LAB

Course Code : UMT 422 **Credit Units: 01**

Course Contents :

1. Characterization of genes, monohybrid ratios, sex-linkage (Virtual FlyLab, FlyBase)
2. Human pedigree analysis (Biology Labs Online)
3. Dihybrid crosses, independent assortment (Virtual FlyLab)
4. Linked genes and gene mapping
5. Molecular markers (Biology Labs Online), Genealogical Markers: mtDNA and the Y Chromosome

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

References:

- Desharnis, R. and Bell, J. 2001. Lab Manual for Biology Labs On-Line. Addison Wesley Longman.
- Genetic Variation: A Laboratory Manual 2007 Weiner M.P, Gabriel S.B, Stephens J.B *Motif BioSciences, New York* • 472 pp

METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY LAB

Course Code : UMT423 **Credit Units: 01**

Course Contents :

Module I
Agarose Gel electrophoresis,
SDS-PAGE,
Immuno-Electrophoresis

Module II
Chromatography –Paper Chromatography and Thin Layer Chromatography

Module III
Spectrophotometer techniques

Module IV
PCR and ELISA

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

DATABASE MANAGEMENT LAB

Course Code: UMT 424 **Credit Units: 01**

Course Contents:

Module I
Database creation using DDL and DML.

Module II
Defining the primary and secondary keys.

Module III
Implementation of selection, projection and joins (internal and external) with SQL and Perl.

Module IV
Normalization of databases with SQL and Perl

Module V
Implementation of transactions and schedules.

Module VI
Detection of association rules and knowledge recovery.

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

TERM PAPER

Course Code: UMT 430 **Credit Units: 03**

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

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

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.

Bibliographical 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/.

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: 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.)

DEVELOPMENTAL BIOLOGY

Course Code: UMT 431 **Credit Unit: 03**

THEORY

Course Objective:

To enable the students understand the process of development in various animals and the phenomena associated with it. It also includes the genetic involvement and the role of maternal environment on fetal development.

Course Contents:

Module I

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 II

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.

Module III

Genetic regulation in early development of Drosophila-Homeotic genes, Neurulation and Organogenesis. Eye lens induction in Caenorhabditis elegans. Limb development and regeneration in vertebrates. Post embryonic development-larva formation. Metamorphosis-environmental regulation in normal development

Module IV

Potency, commitment, specification of embryonic cells, Differentaition. Morphogenetic gradients in egg cytoplasm. Cell fate, cell lineages. Stem cells. Transgenics and their role in analysis of development. Programmed Cell Death, ageing and senescence

Examination Scheme

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

Text books:

3. Muller, W. A. Developmental Biology Springer, 1997.
4. Rastogi, V. B. and Jayaraj M. S. Developmental Biology. Meerut: Kedar Nath Ram Nath, 2009.

Reference books:

1. Wolpert, L. et al. Principles of Development. 2nd ed., Oxford, 2001.

INDUSTRIAL BIOTECHNOLOGY

Course Code: UMT 432 **Credit units: 03**

OBJECTIVE: Biotechnological and pharmaceutical industries require specialized trained manpower with production and manufacturing skills. B.Tech students specializing in Biotechnology need to know the following for effective and Industry oriented research, hence the following syllabus is designed to be pursued by students specializing in this important discipline.

Module II Bioprocess engineering

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 Operational modes of bioreactors-Fed batch cultivation, Cell recycle cultivation.Biorector scale up-regime analysis of bioreactor processes, oxygen mass transfer in bioreactors-microbial O_2 demand, methods for determination of mass transfer coefficient, mass transfer correlations. Sensors used in bioprocesses like pH, Temperature, Dissolved Oxygen, N, P, Anti foam etc.

Module III Downstream processing

Characteristics of Bioproducts; Coagulation, Flocculation and conditioning of broth, Mechanical separation; Cell disruption techniques; Protein precipitation and separation, Aqueous- two- phase extraction, Adsorption-desorption processes,Chromatographic methods of separation based on size, charge, hydrophobic interactions and biological affinity Membrane based separation; Dialysis, Electrodialysis; Micro filtration, Ultra filtration; Electrophoresis; Crystallization; Drying

Module IV Bioprocess plant design

Introduction; general design information; Mass and energy balance. Flow sheeting; Piping and instrumentation; Materials of construction for bioprocess plants; Vessels for biotechnology application; Design of fermenters; Design considerations for maintaining sterility of process streams processing equipment. Design of facilities for cleaning of process equipment used in biochemical industries. Utilities of biotechnology production plant; Safety considerations.

Examination Scheme:

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

TEXT BOOKS

1. Shuler, Michael L. and Fikret Kargi, " Bioprocess Engineering ", Prentice Hall, 1992.
2. Doran, Pauline "of Bioprocess Engineering Principles ". Elsevier, 1995
3. Belter, P.A. E.L. Cussler And Wei-Houhu – "Bioseparations – Downstream Processing For Biotechnology, Wiley Interscience Pun. (1988).
4. Sivasankar, B. "Bioseparations: Principles and Techniques". PHI, 2005.

REFERENCES

1. Lydersen, Bjorn K. "Bioprocess Engineering Systems, Equipment and Facilities" John Wiley, 1994.
2. Bailey, James E. and David F. Ollis, " Biochemical Engineering Fundamentals", 2nd Edition. McGraw Hill, 1986.
3. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, Principles of Fermentation Technology, Science & Technology Books.

FOOD AND NUTRITION

Course Code: UMT 433 **Credit Unit: 03**

Objective

To acquaint the students about importance of nutrition, balanced diets, therapeutic diets for health and role of food and nutraceuticals in health.

UNIT I

Importance of nutrition to health and growth; Relation of food and diseases; Nutritional requirement of human body & RDA.

UNIT II

Preparation of balanced diets; Deficiencies of essential nutrients; Assessment of nutritional status of population; Effect of cooking and processing on nutrients; Nutritional value of processed foods; Therapeutic nutrition.

UNIT III

Nutritional requirements of special group of people such as infants, pregnant and lactating mothers, patients, aged, etc.; Planning of nutritionally balanced meals based upon the three food group system; Factors affecting meal planning; Formulation of special dietary foods.

UNIT IV

Functional foods and nutraceuticals with attributes to control cardiovascular diseases, cancer, obesity, ageing.

UNIT V

Functional aspects of dietary fibre, antioxidants, vitamins, fatty acids etc. Assessment of nutritional quality of food. Definition of Energy and Units of its measurement (Kcal), Concept of BMR, SDA.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

- Bamji MS, Rao NP & Reddy V (2003). *Textbook of Human Nutrition*. Oxford & IBH.
- Joshi SA. (1999). Nutrition and Dietetics. Tata McGraw Hill.
- Khanna K, Gupta S,Passi SJ, Seth R and Mahna R. (1997). Nutrition and Dietetics. Phoenix Publ.

Swaminathan M. (1994). Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.

COMMUNICATION SKILLS - II

Course Code : BCS 401 **Credit Units: 01**

Course Objective:

To teach the participants strategies for improving academic reading and writing.

Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

Course Contents:

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

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

Text & References:

- 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

UNDERSTANDING SELF FOR EFFECTIVENESS - IV
(RELATIONSHIP MANAGEMENT)

Course Code : BSS405 **Credit Units: 01**

Course Objective:
To understand the basis of interpersonal relationship.
To understand various communication style.
To learn the strategies for effective interpersonal relationship.
Course Contents:
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

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

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
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - IV

Course Code: FLT 401 **Credit Units: 02**

Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

Course Contents:

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

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - IV

Course Code: FLG 401 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.

Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

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 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

SPANISH - IV

Course Code: FLS 401 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

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:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

CHINESE – IV

Course Code: FLC 401 **Credit Units: 02**

Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

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:

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-2" Lesson 31-38

MOLECULAR BIOLOGY

Course Code: **UMT 501** **Credit Units: 03**

Course Objective:

The aim is to extend understanding of the molecular mechanisms via which genetic information is stored, expressed and transmitted among generations.

Course Contents:

Module I: DNA Replication and repair

Mechanism of Prokaryotic and Eukaryotic DNA replication, Enzymes and accessory proteins involved in DNA replication, DNA repair Mechanism.

Module II: Transcription

Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, General and specific transcription factors, Regulatory elements.

Module III: Modifications in RNA

5'-cap formation, transcription termination, 3 '-end processing and polyadenylation, Splicing, Editing, Nuclear export of mRNA and mRNA stability.

Module IV: Translation

Prokaryotic and Eukaryotic translation, the translation Machinery; Mechanisms of initiation, elongation and termination, regulation of translation, co-and post-translational modifications of proteins.

Module V: Regulation of Gene Expression in prokaryotic and eukaryotic systems

Lac operon, Ara operan, regulation in Eukaryotes

Module VI: Antisense and Ribozyme technology

Molecular mechanism of antisense molecules, inhibition of spilicing, polyadenylation and translation, disruption of RNA structure and capping, Biochemistry of Ribozyme; Hammerhead, hairpin and other ribozymes, strategies for designing ribozymes, applications of antisense and ribozyme technologies.

Examination Scheme:

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

Text & References:

Text:

- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education
- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Gene VIII, Benjamin Lewin 2005, Oxford University Press

References:

- Molecular Cell Biology, H. Lodish, A.Berk, S. Zipursky, P Matsundaira, D.Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.

JAVA-1

Course Code: UMT 502 **Credit Units: 02**

Course Objective:

This course will introduce the essential topics of Internet Programming predominately with the Java programming language. Students will design and write interactive WWW pages using Java, , CGI, VRML programming languages. Students will develop software that manipulates different forms of data such as hypertext, graphics, video, and sound. Advanced interactive/executable web pages will be developed.

Course Contents:

Module I: Introduction
Basics of computer communication, OSI Model of ISO, LAN, WAN, Internet, Evolution of Internet, Internet Applications, TCP/IP, Introduction to RFC, Addressing in Internet – IP and Domains, Internet Service Providesrs.

Module II: Introduction to JAVA Programming
Introduction to Java, Java features, An Overview of Java, Data Types, Variables, Arrays, Operators, and Control Statements.

Module III: Java with Object Orientated Features
Introducing Classes, A Closer look at Methods and Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O, and Applets.

Module VII: The Java Library

String Handling, Exploring java lang, Input/Output: Exploring java. io, Networking, and Event Handling.

Module VIII: GUI in Java

Introducing the AWT: Working with Windows, Layout Managers, and Images.

Examination Scheme:

Components	CT	HA/V/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Patrick Naughtn and Herbert Schildt The Complete Reference, Java 2, TMH
- Douglas E.Cmer, Computer Networks & Internet, Pearson.

References:

- The Internet :By- Douglas E.Cmer: TMH

PLANT BIOTECHNOLOGY

Course Code: **UMT 503** **Credit Units: 04**

Course Objective:

The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I

Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II

Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropopogation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module II

Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector meditated and vector less gene transfer.
Transgenic plants trans gene integration and expression

Module III

Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

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

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press

- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

ANIMAL BIOTECHNOLOGY

Course Code: **UMT 504** **Credit Units: 04**

Course Objective:

Course Contents:

Module I
Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering.

Module II
Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module III
In vitro fertilization and embryo transfer

Module IV
Somatic cell hybridization, hybridoma technology

Module V
Animal genetic engineering -vectors, gene transfer methods - microinjection, virus mediated and other methods of gene transfer

Module VI
Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic etc.

Module VII
Bioethical issues related to animal biotechnology,

Examination Scheme:

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

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

FUNDAMENTALS OF BIOCHEMICAL ENGINEERING

Course Code: UMT-505 **Credit Units: 03**

Course Objective:

The course material on the kinetics of microbial growth, substrate utilization and product formation etc. may help the students to understand the various principles involved in instrumentation and control of bioprocess.

Course Contents:

Module I

Kinetics of microbial growth, substrate utilization and product formation;

Module II

Sterilization of air and medium;

Module III

Batch, continuous and fed batch reactors; mass and energy balance in microbial processes

Module IV

Mass transfer in Biological reactions; Scale-up principles; Instrumentation and control of bioprocesses.

Examination Scheme:

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

Text & References:

Text:

- 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
- Biochemical Engineering Fundamentals, J E Baily and D F Oillis, McGraw Hill
- Bioprocess Engineering Principles, P Doran, Academic Press

References:

- Chemical Engineering, J M Coulson, and J F Richardson, Butterwirth Heinemann
- Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment, HC Vogel, CL Todaro, CC Todaro, Noyes Data Corporation/Noyes Publications
- Process Engineering in Biotechnology, A T Jackson, Prentice Hall

MOLECULAR BIOLOGY LAB

Course Code: **UMT 521** **Credit Units: 02**

Course Contents:

Module I
Preparation of DNA: genomic, Plasmid

Module II
Isolation of RNA

Module III
RFLP analysis

Module IV
Gel filtration

Module V
Preparation of Competent Cells

Module VI
Restriction Digestion and Ligation of DNA

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

JAVA-1 LAB

Course Code: **UMT 522** **Credit Units: 02**

Course Contents:

1. Write a Java Program to calculate & print first n Fibonacci numbers.
2. Write a Java Program to reverse the digits of a numbers.
3. Write a Java Program to compute & print factorial of any given number.
4. Write a Java Program to compute the sum of digits of a given integer.
5. Assume that a bank maintains two kinds of account for its customers, one called saving and other current. The saving account provides compound interest and withdrawal facilities but not cheque book. The current account provides cheque book but no interest. Current account holders should also maintain a min balance & if the balance falls below, a service charge is imposed. Create a class Account that stores customer name, account number & type of account. From this derive the classes Curr-acc & Sav-acc to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:
   a) Accept deposit from a customer and update the balance
   b) Display the balance.
   c) Compute and deposit interest
   d) Permit withdrawal and update the balance.
   e) Check for the minimum balance, impose penalty. If necessary, and update the balance
6. Write a Java Program to sort element of the array.
7. Write a Java Program to read marks out of 100 declare result as follows:
   a. 60 or more 1st class
   b. 50-59 2nd class
   c. 40-49 pass
   d. Less than 40 fail
8. Write a java program to check whether a year is a leap year or not.
9. Write a Java Program to read string from console and display the number of occurrence of each word
10. Write a Java Program to demonstrate use of Inheritance through vehicle, two wheeler, four wheeler and three-wheeler class.
11. Write a Java Program to take a filename as command line argument and display its contents.
12. Write a Java Program that reads a file and then displays it, with a line number before each line.
13. Write a Java Program that displays number of characters, lines and words in a text file.
14. Write a Java Program that appends the contents of one file to another.
15. Write a Java Program to demonstrate runtime polymorphism with the help of abstract classes.
16. Write a Java Program to demonstrate runtime polymorphism with the help of interfaces.
17. Write a java program to display the use of all access modifiers with the help of two packages
18. Write a Java Program to demonstrate how we can make sure that the main thread gets executed after the child threads finishes.
19. Write a Java Program to show exception handling. Also demonstrate the use of finally.
20. Write a Java program which takes as input a number and throws a user defined exception when number is greater than 10.

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

PLANT BIOTECHNOLOGY LAB

Course Code: **UMT 523** **Credit Units: 02**

Course Contents:

Module I

Sterilization of glasswares and equipments.
Preparation of cotton plugs and culture media
Preparation of stocks for culture media
Preparation of culture media

Module II

Preparation and sterilization of different explants
Inoculation of explants on culture media

Module III

Study of viability of seeds
Embryo culture

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

ANIMAL BIOTECHNOLOGY LAB

Course Code: **UMT 524** **CreditUnits: 01**

Course Contents:

1. Preparation, standardization and sterilization of culture media
2. Inoculation of specific tissues for callusing
3. Inoculation and maintenance of cell lines
4. Study of toxicity on cell lines

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

TERM PAPER

Course Code: UMT 530 **Credit Units: 03**

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 consist 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 idea.

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) Bibliography
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

Bibliography

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.

Bibliographical 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/.

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: 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.)

TISSUE ENGINEERING

Course Code: UMT 531 **Credit Units: 03**

Course Objective:

This course will cover topics related to the design and functional assessment of bioengineered tissue substitutes. Strategies for engineering tissues with a load-bearing function will be of particular focus. Strategies to study cell-surface and cell-cell interactions to physical stimuli, bioreactors, biological scaffolds and 3D cell-tissue constructs will be explored through recent papers.

Course Contents:

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

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.

CANCER BIOLOGY

Course Code: UMT 532 **CreditUnits: 03**

Course objective - The profound impact of cancer on our society has been the driving force behind major research advances in this field. A better understanding of the basic biology of cancer and its impact on the human body has led to more effective treatments, enhanced detection methods, and the development of prevention strategies. This course will provide a comprehensive overview of the biology and pathology of cancer.

Module1

Introduction to the course, Cancer Defined, Overview of the hallmarks of cancer

Module 2

Mutagens, carcinogens, and mutations, Tumor viruses and the discovery of oncogenes, Tumor cells possess genetic abnormalities

Module 3

Mechanisms of oncogene activation, Role of growth factors and receptors in carcinogenesis

Module 4

RAS signaling in cancer,.Familial cancer syndromes and the discovery of tumor suppressors

Module 5

Cell cycle control and the pRb tumor suppressor Apoptosis and the p53 tumor suppressor

Module 6

Cellular senescence, Telomeres, cellular immortalization, and tumorigenesis

Examination Scheme:

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

Text & References:

1. Kleinsmith, L. J. (2006). Principles of cancer biology. Benjamin-Cummings Publishing Company.
2. Ruddon, R. W. (2007). Cancer biology. Oxford University Press.

Weinberg, R. (2013). The biology of cancer. Garland

CLINICAL MICROBIOLOGY

Course Code: **UMT 533** **Credit Units: 03**

Course Objective:

Aim of the course is to concentrate on principles of clinical microbiology developed through the units in basic microbiology and medical microbiology. Students will become familiar with diagnostic and public health microbiology, modern techniques for the identification of pathogens in diagnostic laboratories and antimicrobial chemotherapy in patient care.

Course Contents:

Module I

Introduction to clinical microbiology, history, scope, current status, diagnostic methods applied to clinical microbiology, host parasite interaction.

Module II

History, description mode of infection, treatment & prevention of bacterial diseases .i.e Anthrax, bacterial meningitis, Cholera, Diphtheria, Leprosy (Hansen's diseases), Pneumonia, Tuberculosis, Typhoid fever, Salmonella, Plague

Module III

History, description, mode of infection, treatmen & prevention of fungal diseases. i.e. Respiratory diseases, Aspergillosis, Blastomycosis, Candidiosis, Coccidioides immitis, Cryptococcosis, Histoplasmosis, Tiniapidis

Module IV

History, description, mode of infection, treatment & prevention of Viral diseases i.e. AIDS, Hepatitis's, Influenza, Measles & Mums, Rabies, Small pox, Poliomyelitis, Dengue fever

Module V

History, description mode of infection, treatment & prevention of i.e.Protozoans and Helminthes,Amebiasis, Ascariasis Fasioliasis, Faciolopsiasis, Filariasis, Kala azar (black fever), Malaria, Taeniosis

Module VI

Systemic infection disease, Disease of upper respiratory tract, Disease of lower respiratory tract, Blood stream infection, Uro-genital tract

Examination Scheme:

Components	A	CT	H	S	EE
Weightage (%)	5	15	5	5	70

Text & References:

- Biotechnological applications of microorganisms by Maheshwari
- Environmental Biotechnology by Indu Shekhar
- Industrial Biotechnology by Indu Shekhar
- Industrial hygiene and chemical safety by Fulekar
- Textbook of environmental Biotechnology by Mohapatra

COMMUNICATION SKILLS - III

Course Code: BCS 501 **Credit Units: 01**

Course Objective:

To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

Course Contents:

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

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

Text & References:

- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

UNDERSTANDING SELF FOR EFFECTIVENESS - V
(GROUP DYNAMICS AND TEAM BUILDING)

Course Code: BSS505 **Credit Units: 01**

Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

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

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

Text & References:

- 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 Understanding Self for Effectiveness, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - V

Course Code: **FLT 501** **Credit Units: 02**

Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life.

Course Contents:

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

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - V

Course Code: FLG 501 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

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

SPANISH - V

Course Code: FLS 501 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

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

Text & References:

- Español Sin Fronteras, Greenfield

CHINESE – V

Course Code: FLC 501 **Credit Units: 02**

Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

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:

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

RECOMBINANT DNA TECHNOLOGY

Course Code: UMT 601 **Credit Units: 04**

Course Objective:

A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I: Enzymes used in RDT

Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II: Cloning vectors

Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC). expression vectors (Bacteria and yeast), vector engineering (fusion tags, antibiotic markers), codon optimization, host engineering

Module III: Blotting techniques and hybridization

Southern, Northern and Western blotting techniques. Radioactive and non-radioactive probes.

Module IV: Nucleic acid amplification and its applications

Principles of PCR, designing of primers

Module V: Cloning Techniques

Basic cloning experiment: Design of cloning strategy and stepwise experimental procedure , Complementation, colony and plaque hybridization, restriction, PCR, plus-minus screening, immunoscreening.

Module VI: DNA Libraries

Purpose of constructing DNA libraries. Construction of cDNA and genomic libraries.

Module VII: Sequencing of DNA

DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.

Examination Scheme:

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

Text & References:

Text:

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

References:

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

ENZYMOLOGY AND ENZYME TECHNOLOGY

Course Code: **UMT 602** **Credit Units: 03**

Course Objective:

The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

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.

Module VI: Challenges and future trends

Enzyme catalysis in organic media; catalytic antibodies and non protein biomolecules as catalysts, biocatalysts from extreme thermophilic and hyper thermophilic Archae and Bacteria.

Examination Scheme:

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

Text & References:

Text:

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner.
- 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.

STRUCTURAL BIOLOGY

Course Code: **UMT 603** **Credit Units: 03**

Course Objective:

The course aims to provide an understanding of the principles and applications of proteins, enzymes and nucleic acids for their role in biochemical pathway as well as interactions among themselves.

Course Contents:

Module I: Chemistry of amino acids and peptides

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, homo and hetero-dimers, trimers and tetramers; forces governing protein-protein interactions; open tertiary structure; Classification of proteins; Structure and function of an antibody; structure of hemoglobin, muscle proteins; Sequence and structural motifs in proteins.

Module II: Protein-ligand interactions

Lock and key versus handshake mechanism of substrate recognition; structural basis of recognition; reaction mechanisms of enzymes, G-Protein coupled receptors.

Module III: Protein solubility, protein stability 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 IV: 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.

Examination Scheme:

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

Text & References:

Text:

- Biochemistry, R.H. Abeles, P.A. Frey and W.A. Jencks, Jones and Bartlett.
- Essentials of Molecular Biology, D. Freifelder, Jones and Bartlett Publications.
- Genes VII, B. Lewin, Oxford University Press.

References:

- Introduction to Protein Structure, C. Branden and J Tooze, Garland Publishing Company.
- Protein Structure, M. Perutz, Oxford University Press.

- Proteins (Structures and Molecular Properties), T.E. Creighton, W.H. Freeman and Company.
- Database Annotation in Molecular Biology, Arthur M. Lesk.
- From Genes to Clones, E.L. Winnacker.
- Genes & Genomes, M.S. Paul Berg.
- Structure and Machanism in Protein Science, Alan Fersht.

IMMUNOLOGY AND IMMUNOTECHNOLOGY

Course Code: UMT 604 **Credit Units: 03**

Course Objective:

Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Introduction

Phylogeny of Immune System, Innate and acquired immunity, clonal nature of Immune Response.
Organization and structure of lymphoid organs Nature and Biology of antigens and super antigens Antibody structure and function; Types of immunity- innate, acquired, active and passive.

Module II: Major Histocompatibilty

MHC, BCR and TCR, generation of antibody diversity, Complement system

Module III: 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

Module IV: 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

Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.

Module VI: Hypersensitivity

Module VII: Autoimmunity

Module VIII: Tumor immunology, Immunity to infectious agents

Module IX: Transplantation Immunology

Module X: Synthetic vaccines

Vaccines: General consideration, ideotype network hypothesis, Synthetic vaccines

Module XI: Hnmunological Techniques

Immuno diffusion, immuno-electrophoresis, ELISA, RIA, fluorescence activated cell sorter

Module XII: Hybridoma technology and its applications

Fusion of myeloma cells with lymphocytes

Examination Scheme:

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

Text & References:

Text:

- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:

- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

Bioresource Technology

Course Code: UMT- 605 **Credit Units: 03**

Course Objective:

This course has been designed with the objective to acquaint the students with bioresources, their traditional and non-traditional uses, current status and recent developments in value addition and future prospects.

UNIT-I

RENEWABLE ENERGY SOURCE Hydropower, geothermal power, solar power, wind power – Biofuel -Biomass - Feed stocks (agricultural crops, bioenergy crops, agricultural waste residues, wood residues, waste stream)

UNIT-II

FUEL TECHNOLOGY AND BIOCONVERSION History - Definition of biofuel, applications of biofuel (transport, direct electricity generation, home use and energy content of biofuel) - Bioconversion of lignocellulosics, cellulose saccharification, pretreatment technologies (air separation process, mechanical size reduction, autohydrolysis) - Pulping and bleaching – Enzymatic deinking.

UNIT-III

BIOGAS Biogas plant, feed stock materials, biogas production, factors affecting methane formation - Role of methanogens – Biohydrogen production - Oxygen sensitivity problems in hydrogenenases

UNIT-IV

BIO ETHANOL AND BUTANOL Advantages of ethanol over fossil fuels, production of ethanol from cellulosic materials, ethanol recovery - Biobutanol production, energy content and effects on fuel economy - Octane rating, air fuel ratio, specific energy, viscosity, heat of vaporization -Butanol fuel mixtures

UNIT-V

BIODIESEL Production of biodiesel, oil extraction from algae by chemical solvents, enzymatic, expeller press - Osmotic shock and ultrasonic assisted extraction - Applications of biodiesel, environmental benefits and concerns

Examination Scheme:

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

Suggested Books:

1. Alain A.V., Biomass to biofuels strategies for global Industries, John Wiley & sons ltd, 1st Edition, 2010.
2. Twidell., J & Weir., T., Renewable energy resources, Taylor & Francis 2nd Edition, 2006.

REFERENCE

1. Luque, R., Camp, J., Hand book of biofuel production processes and technologies, Woodhead publishing ltd., 1st Edition, 2011.

RECOMBINANT DNA TECHNOLOGY LAB

Course Code: **UMT 621** **Credit Units: 02**

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning (GFP CLONING)

Module II

Study of PCR

Module III

Study of Southern hybridiosation

Module IV

Study of RAPD

Module V

Site directed mutagenesis

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

ENZYMOLOGY AND ENZYME TECHNOLOGY LAB

Course Code: **UMT 622** **Credit Units: 01**

Course Objective:

The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I

Isolation of enzymes from plant and microbial sources.

Module II

Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III

Purification of Enzyme by ammonium sulphate fractionation.

Module IV

Enzyme Kinetics: Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity ($V_{max.}$) using Lineweaver-Burk plot.

Module V

Effect of Temperature and pH on enzyme activity.

Module VI

Enzyme immobilization

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

Text & References:

Text:

- Practical Biochemistry, Sawhney and Singh

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker

STRUCTURAL BIOLOGY LAB

Course Code: **UMT 623** **Credit Units: 01**

Course Contents:

1. Study of physical properties of proteins.
2. Analysis of protein structure.
3. Study of protein finger printing
4. Study of protein fractionation
5. Study of protein folding
6. Study of protein degadation.

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

IMMUNOLOGY AND IMMUNOTECHNOLOGY LAB

Course Code: UMT 624 **Credit Units: 01**

Course Contents:

Module I
Blood film preparation and identification of cells.

Module II
Identification of blood group.

Module III
Isolation of serum.

Module IV
Lymphoid organs and their microscopic organization.

Module V
WIDAL Test

Module VI
Radial Immuno Diffusion Test

Module VII
Ouchterlony Double diffusion Test

Module VIII: Elisa
DOT, SANDWICH

Module IX
Purification of lgG through affinity chromatography

Module X
Immunohistochemistry

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

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TERM PAPER & INDUSTRY VISIT

Course Code: UMT 630 **Credit Units: 03**

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 consist 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

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

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 idea.

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) Bibliography
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:

m) summary of question posed
n) summary of findings
o) summary of main limitations of the study at hand
p) details of possibilities for related future research

Bibliography

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.

Bibliographical 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/.

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: 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.)

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)

VIROLOGY

Course Code: **UMT 631** **Credit Units: 03**

Course Objective:

The aim of the course is to give a vision about the viruses, their classification, ultrastructure, importance in plants, animals and human beings. The couse also gives a practical overveiw of the various viruses affecting livimg beings, their diagnostics by serology and molecular biology techniques, pathogenecity and control. The newly discovered viruses are also included in this course like SARS, Chickugonia, Birdflue etc.

Course Contents:

Module I: General Virology

Brief out1ine on discovery of viruses, nomenclature and classification of viruses; distinctive properties of viruses; morphology & ultrastructure; viral genome, their types and structures; virus related agents (viroids, prions).

Module II: General Methods of Diagnosis and Serology

Cultivation of viruses in embryonated eggs, experimental animals, and cell cultures; serological methods - haemagglutination; complement fixation; immunofluorescence methods, ELISA and Radioimmunoassays; assay of viruses - physical and chemical methods (protein, nucleic acid. radioactivity tracers, electron microscopy)- Infectivity assay (plaque method, end point method).

Module III: Bacterial Viruses

Bacteriophage structural organization; life cycle; brief details on M13, Mu, T3, T4, and Lamda P1.

Module IV: Plant Viruses

Classification and effects of viruses on plants; Symptomatology; common virus diseases of plants: paddy, cotton, tomato, and sugarcane; viruses of cyanobacteria, algae, fungi; life cycle; type species of plant viruses like TMV, Cauliflower mosaic virus and Potato virus x; transmission of plant viruses; diagnostics in seeds and diseased plants; prevention of crop loss due to virus infection, virus-free planting material; vector control.

Module V: Animal Viruses

Classification of animal human viruses; epidemiology, lifecycle, diagnosis, prevention and treatment of RNA Viruses Picorna, Ortho myxo, Paramyxo, Toga and other arthropod viruses, Rhabdo, Rota, HIV and other Oncogenic viruses; DNA viruses; Pox, Herpes. Adena, SV 40; Hepatitis viruses. viral vaccines (conventional vaccines, genetic recombinant vaccines, newer generation vaccines including DNA Vaccines with examples) interferons, and antiviral drugs.

Module VI

Emerging viruses: West Nile, Nijeah, SARS, Bird flue, Chikugonia

Examination Scheme:

Components	A	CT	H	S	EE
Weightage (%)	5	15	5	5	70

Text & References:

- Morag C and Timbury MC (1994) Medical virology-X Edition, Churchill Livingstone, London.

- Dimmock NJ, Primrose (1994) Introduction to Modern Virology, IV Edition, Blackwell Scientific Publications, Oxford
- Conrat HF, Kimball PC and Levy JA (1994) Virology-III Edition, Prentice Hall, Englewood cliff, New Jersey.
- Mathews RE (1992) Functionals of Plant virology, Academic press, San Diego.
- Topley and Wilson's (1995) Text Book on Principles of Bacteriology, Virology and Immunology, Edward Arnold London.
- Lennetter EH (1984) Diagnostic procedures for Viral and Rickettsial diseases, American Public Health Association, NY.

William Hayes (1985) The genetics of Bacteria and their Viruses, Blackwell Scientific Publishers, London

Nanoscience and Nanotechnology

Course Code: BTB 632 **Credit Units: 03**

Course objective: The objective of the course is to explain the fundamental principles of nanoscience and its application in diverse fields

Module I: Background to Nanotechnology

Scientific revolution- Atomic structures-Molecular and atomic size-Bohr radius – Emergence of Nanotechnology – Challenges in Nanotechnology - Carbon age–New form of carbon (from Graphene sheet to CNT).

Module II:Nucleation

Influence of nucleation rate on the size of the crystals- macroscopic to microscopic crystals and nanocrystals - large surface to volume ratio, top-down and bottom-up approaches-self assembly process-grain boundary volume in nanocrystals-defects in nanocrystals-surface effects on the properties.

Module III: Types of Nanostructures

Definition of a Nano system - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) nanostructured materials - Quantum dots - Quantum wireCore/Shell structures.

Module IV: Nanomaterials and properties

Carbon Nanotubes (CNT) - Metals (Au, Ag) - Metal oxides (TiO2, CeO2, ZnO) - Semiconductors (Si, Ge, CdS, ZnSe) - Ceramics and Composites - Dilute magnetic semiconductor- Biological system - DNA and RNA - Lipids - Size dependent properties - Mechanical, Physical and Chemical properties.

Module V: Applications of Nanomaterials

Molecular electronics and nanoelectronics – Quantum electronic devices - CNT based transistor and Field Emission Display - Biological applications - Biochemical sensor - Membrane based water purification.

Examination Scheme:

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

Texts abd Reference books:

1. M. Wilson, K. Kannangara, G Smith, M. Simmons, B. Raguse, Nanotechnology: Basic science and Emerging technologies, Overseas Press India Pvt Ltd, New Delhi, First Edition, 2005.
2. C.N.R.Rao, A.Muller, A.K.Cheetham (Eds), The chemistry of nanomaterials: Synthesis, properties and applications, Wiley VCH Verlag Gmbh&Co, Weinheim, 2004.
3. Kenneth J. Klabunde (Eds), Nanoscale Materials Science, John Wiley & Sons, InC, 2001.
4. C.S.S.R.Kumar, J.Hormes, C.Leuschner, Nanofabrication towards biomedical applications, Wiley –VCH Verlag GmbH & Co, Weinheim, 2004.
5. W. Rainer, Nano Electronics and information Technology, Wiley, 2003.
6. K.E.Drexler, Nano systems, Wiley, 1992.
7. G.Cao, Naostructures and Nanomaterials: Synthesis, properties and applications, Imperical College Press, 2004.

IPR & Drug Regulatory Affairs

Course Code: **UMT 633** **Credit Units: 03**

Course Objective:

Objective: Various types of Intellectual Property Rights Patentable Subject History of Indian Patent Protection, Patent filing procedure in India, Opposition- pre-grant opposition and post-grant opposition, Patent filing procedure under PCT, advantages, patent search and literature and Salient features of Indian Patents are discussed in detail.

UNIT I

a) Introduction, Types of Intellectual Property Rights (Patents, Trademarks, Copyrights, Geographical Indications Industrial Designs and Trade secrets), Patentable Subject Matter (Novelty, NonObviousness, Utility, enablement and Best mode)

UNIT II

a) History of Indian Patent Protection, Rationale behind Patent System, Objectives and Advantages of Patent System, and future challenges. Indian Patents Act 1970, Definitions and Key Terminology, Types of Patent applications, Inventions not patentable (section 3 and 4).

b) Patent filing procedure in India (Patent Prosecution), Specifications (Provisional and Complete), Claims- types of claims and legal importance of claims, Grant of patent, Rights of Patentee and coowners

c) Opposition- pre-grant opposition and post-grant opposition, Anticipation, Infringement, Compulsory Licensing, revocation of patents, and power of Controller.

d) Patent filing procedure under PCT, advantages, patent search and literature

UNIT III

a) Salient features of Indian Patents (Amendments) Act 1999, 2002 and 2005. US and European Patent System,

b) Background, Salient Features and Impact of International Treaties / Conventions like

i. Paris Convention, Berne convention
ii. World Trade Organization (WTO)
iii. World Intellectual Property Organization (WIPO)
iv. Trade Related Aspects of Intellectual Property Rights (TRIPS)
v. Patent Co-operation Treaty (PCT), Mandrid Protocol

UNIT IV

Drug Regulatory affairs and its importance.

Pharmaceutical Regulatory Procedures in India: Hierarchy and working flow of FDA in India, Role of DCGI / CDSCO in drug control, Drug Control Authority and its documentation in the state.

National drug regulatory requirements, national drug policy, drug and cosmetic act and rules, over view of schedule M, schedule Y, US FDA guidelines on IND, new drug approvals(NDA), ANDA approvals, SUPAC Changes, SNDA & post marketing surveillance.

Overview of GMP, GLP, ISOs- Production design, certification.

Examination Scheme:

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

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.
7. **Good Manufacturing Practices for Pharmaceuticals, S.H. Wiling, Vol. 78, Marcel Decker.**
8. Drugs and Cosmetics act by Vijay Malik.

COMMUNICATION SKILLS - IV

Course Code: **BCS 601** **Credit Units: 01**

Course Objective:
To enhance the skills needed to work in an English-speaking global business environment.

Course Contents:

Module I: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

Module II: Social Communication
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

Module III: Business Communication
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

Module IV: Presentations
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

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

Text & References:

- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

UNDERSTANDING SELF FOR EFFECTIVENESS - VI
(STRESS AND COPING STRATEGIES)

Course Code: **BSS605** **Credit Units: 01**

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

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 interact ional 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
Peer group and social support
Happiness and well-being

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

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

FRENCH - VI

Course Code: **FLT 601** **Credit Units: 02**

Course Objective:

To strengthen the language of the students both in oral and written so that they can:

i) express their sentiments, emotions and opinions, reacting to information, situations;

ii) narrate incidents, events;

iii) perform certain simple communicative tasks.

Course Contents:

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:

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

GERMAN - VI

Course Code: **FLG 601** **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

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.

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:

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

SPANISH – VI

Course Code: **FLS 601** **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

Course Contents:

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:

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

CHINESE – VI

Course Code: **FLC 601** **Credit Units: 02**

Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

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:

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-2 ,3 ; Lesson 47-54

BIOPROCESS TECHNOLOGY

Course Code: **UMT 701** **Credit Units: 04**

Course Objective:

The objective of the course is to apply the principles of biochemical engineering in large scale cultivation of microorganism for production of important products.

Course Contents:

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Bioseparation, Large scale recombinant protein production, 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.

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 III

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.

Module IV

Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

Examination Scheme:

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

Text & References:

- 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

DOWNSTREAM PROCESSING

Course Code: **UMT 702** **Credit Units: 04**

Course Objective:

The syllabus will help the students to characterize the Bioproducts due to downstreaming process of biotechnological importance.

Course Contents:

Module I

Characteristics of Bioproducts; Coagulation, Flocculation and conditioning of broth.

Module II

Mechanical separation; Cell disruption techniques

Module III

Protein precipitation and separation

Module IV

Aqueous- two- phase extraction, Adsorption-desorption processes

Module V

Chromatographic methods of separation based on size, charge, hydrophobic interactions and biological affinity

Module VI

Membrane based separation; Dialysis, Electrodialysis; Micro filtration, Ultra filtration; Nano fitration units, Electrophoresis

Module VII

Crystallization; Drying

Examination Scheme:

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

Text & References:

Text:

- 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.

References:

- 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.

JAVA – II

Course Code: UMT703 **Credit Units: 02**

Course Objective:

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I

Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming

Module II

Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML. JSP: Introduction to JSP, JSP implicit objects, JSP based Applications

Module III

ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology; Evolving Nature of Area

Module IV

Enterprise Java Beans:-EJB roles—EJB Client-Object -container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification.

Module V

The J2EE Platform, The J2EE connector Architecture, J2EE Packaging and Deployment

Examination Scheme:

Components	CT	HA/V/Q	A	EE
Weightage (%)	15	10	5	70

CT: Class Test, HA: Home Assignment, V/Q: Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming (a Press) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition (PHI) By Webber

References:

- David Flanagan, Jim Parley, William Crawford & Kris Magnusson , Java Enterprise in a nutshell- A desktop Quick reference -O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002

Dietal and Deital, “JAVA 2” PEARSON publication

GENOMIC AND PROTEOMICS

Course Code: **UMT 704** **Credit Units: 04**

Course Objective:
The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

GENOMICS

Module I: Genome Evolution
Origin of genomes, Acquisition of new genes, DNA sequencing – chemical and enzymatic methods, The origins of introns, Genetics to genomics to functional genomics. Forward genetics (Phenotype to gene structure) and Reverse genetics (Gene structure to phenotype).

Module II: Structural Genomics
Chromosome structure and Genome organization, Genome sequencing methods, Genome assembly, Gene identification methods, Sequences Comparison Techniques, Genome annotation techniques.

Module III: Comparative Genomics
Phylogeny, COGS [Cluster of orthologues genes], paralogues and gene displacement, Metabolic Reconstruction, The Basic Principles and Methodology.

Module IV: Functional Genomics
ESTs, SAGE, cDNA Microarrays, Oligonucleotide Microarray Chips, Cancer and genomic microarrays, Application of Microarrays with examples, Microarray Data Analysis; Real Time PCR; Gene finding tools

Module V: Genotyping Background and Applications.
Genetic and physical mapping: Introduction to molecular markers-RFLP, RAPD, AFLP, SSRs and others. Genetic and physical maps, map based cloning, mapping population, southern and *in situ* hybridization for genome analysis, DNA fingerprinting; Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, MiRNA, ; Human Genome Project; Pharmacogenomics: Ethical considerations of genetic testing; Genomics in drug discovery.

PROTEOMICS

Module VI: Fundamentals of Proteomics
Proteomics Basics and 2D Gel Electrophoresis,
Protein Identification and Analysis:

a. Protein preparation and Separation
b. Protein Identification by mass spectrometry
c. Identification of post translation modification

Protein Expression Mapping,
High-throughput cloning of ORFs,
Protein Protein Interaction Mapping: Experimental and Computational. Its application in health and disease.
Microarray - the technique, Experimental design & mass spectrometric data analysis, Application of Microarray in proteome analysis, Proteins Arrays and Protein Chips,
Proteomics Tools and Databases

Examination Scheme:

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

Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette,
- John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlena, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown

PHARMACEUTICAL TECHNOLOGY AND BIOTECHNOLOGY

Course Code: UMT 705 **Credit Units: 03**

Course Objective:
The main objectives are to cover representative pharmaceutical dosage forms and general issues of formulation, production, quality requirements, validation and uses and to gain an understanding of the challenges associated with quality pharmaceutical manufacturing

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:
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-IV
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	Other Components	Attendance	MTE	ESE
Weightage (%)	10	5	15	70

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 1st Ed.CBS Publishers & Distributors.

INDUSTRIAL TRAINING EVALUATION

Course Code: **UMT 750** **Credit Units: 06**

Methodology

The students will go to various research institutes/R&D Labs of industries to learn various biotechnological tools and procedures and their utility in commercial applications. The aim of this training is to train the students in the various industrial/Research aspects of commercialization of biotechnological systems.

The students will be supervised by the internal faculty during the tenure of training.

The students shall submit a dissertation on the training undertaken which shall be evaluated by the concerned internal faculty. The Viva Voce shall then be conducted by an external Examiner

Examination Scheme:

Dissertation:	50
Viva Voce:	50
Total:	**100**

BIOPROCESS TECHNOLOGY LAB

Course Code: **UMT 721** **Credit Units: 02**

Course Contents:

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 Krant fermentation

Module VIII
Use of alginate for cell immobilization

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

DOWNSTREAM PROCESSING LAB

Course Code: UMT 722 **Credit Units: 02**

Course Objective:

The laboratory will help the students to extract different bioproducts during their characterization since any of these products may be of biotechnological importance. They can be exploited in exploring the future biotechnology.

Course Contents:

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

Text & References:

Text:

- Practical Biochemistry, Sawhney and Singh

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher
- Protein Purification, M.R. Lodisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society

JAVA II LAB

Course Code: UMT 723 **Credit Units: 02**

Course Contents:

Assignments:

- WAP. To display an image and a string in a label on the JFrame.
- WAP to display label on a frame with the help of JFrame
- WAP to display six buttons on a panel using JFrame.
- WAP that implement a JApplet and display the following frame
    a. Customer name
    b. Customer number
    c. Age
    d. Address

  WAP that implement a JApplet that display a simple label
- WAP to access a table Product Master from MS-Access using Java code.
- WAP that implement a simple servlet program.
- WAP for authentication, which validate the login-id and password by the servlet code.
- WAP to connecting a database using user-id and password.
- WAP to insert data into the database using the prepared statement.
- WAP to read data from the database using the Resultset.
- WAP to read data send by the client (HTML page) using servlet.
- WAP to include a HTML page into a JSP page.
- WAP to handle the JSPException.
- WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

GENOMICS AND PROTEOMICS LAB

Course Code: **UMT 724** **Credit Units: 02**

Course Contents:

Module I
Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II
DNA sequencing methods

Module III
Gene finding tools and Genome annotation

Module IV
Comparison of two given genomes

Module V
Analysis of 2D – IEF data

Module VI
Microarray and Microarray data analysis

Module VII
Inference of protein function from structure

Module IX
Two-hybrid methods

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

TERM PAPER

Course Code: UMT 730 **Credit Units: 03**

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:

25. Choosing a subject
26. Finding sources of materials
27. Collecting the notes
28. Outlining the paper
29. Writing the first draft
30. 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

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:

q) summary of question posed

r) summary of findings

s) summary of main limitations of the study at hand

t) 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.

Bibliographical 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/.

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.)	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%

BIOETHICS & BIOSAFETY

Course code: UMT731 **Credit Units: 03**

Course Objective:

The objectives of the course are to explain the fundamental principles of biosafety and bioethics issues from different perspectives

Module I

Public acceptance issues for biotechnology: Case studies/experiences from developing and developed countries.

Module II

Biotechnology and hunger: Challenges for the Indian Biotechnological research and industries.

Module III

The Cartagena protocol on biosafety. Biosafety management: Key to the environmentally responsible use of biotechnology.

Module IV

Ethical implications of biotechnological products and techniques. Social and ethical implications of biological weapons.

Examination Scheme:

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

Text & References:

***Text*:**

- The Law & Strategy of Biotechnology Patents, Sibley Kenneth,
- Safety Considerations for Biotechnology, Paris, OECD, 1992 and latest publications.

***References*:**

- Biological Warfare in the 21st century, by M.R. Dano, Brassies London, 1994.
- Biosafety Management by P.L. Traynor, Virginia polytechnic Institute Publication, 2000.
- Cartagena Protocol on Biosafety, January 2000.

PROTEIN ENGINEERING

Course Code: BTB 732 **Credit Units: 03**

Course Objective:

The aim of the course is to teach the students the basic methodology of recombinant DNA technology leading to the generation of genetically engineered proteins, proteinfolding and its characterization. The course would also
emphasize the requirement of protein engineering technique in the generation of novel proteins for specif ic
purposes of industrial importance.

Course Contents:

Module I

Dynamics and Structural Evolution Protein Engineering: Study of molecular interaction forces (Hydrogen, I onic, covalent, van- der walls and others), Structure andchemical properties of the building blocks of biological materials (amino acids, sugars, nucleic acids).

Module II

Protein structure and folding; Mechanism of folding; Principles of protein secondary structures, alpha-helix, beta-helix, beta-sheet, beta-turns, random coils, coiled coils, and others and case
studies with Keratin, collagen and green fluorescence protein. Methods and tools used tocharacterize the mo lecular structures of biological materials (Circular dichroism, NMR, X-ray diffraction, FTIR, scanning electron microscopy and others).

Module III

Protein dynamics, Protein Folding (10,20,30 & 40), Proteins design and engineering, Random and site direct ed mutagenesis; Strategies to alter catalytic efficiency;structure prediction and modeling proteins; Molecu lar graphics in protein engineering; Dynamics and mechanics; Signal transduction.

Module IV

Receptors and hormones; antigen-antibody relationship; Drug-
protein interactions and Design applications of
engineered proteins. Molecular chaperons, Heat shock protein, case study of misfolded prions; Drugs-protein interactions and Design; Protein engineering benefits inindustry and medicine; Engineering of antibodies

Examination Scheme:

Components	H/Q	S	CT	EE
Weightage (%)	10	10	10	70

Text & References:

Text:

- Protein Engineering Protocol: Methods in Molecular Biology, Vol. 352 Muller, Kristian.
- Protein Engineering in Industrial Biotechnology, Lilia Alberghina (Editor), Hard wood academic Publisher.

References:

- Plant Protein Engineering: edited by Peter R Shewry and Steven Gutteridge, Press Syndicate of the University of Cambridge.
- Protein Engineering Hand book Vol, Stefan Lutz, Uwe Theo Bornscheuer.

NANOTOXICOLOGY

BTB733 **Credit Units: 03**

Course objective: The objective of the course is to explain the fundamental principles of nanotoxicity on different organisms and mechanism involved in it

Module I: 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.

Module II: Toxicity of Carbon nanotube

CNT implication for toxicological studies – Effect of CNT on Keratinocyte protein expression – exposure and risk and cardiovascular effects – insights from drug delivery

Module III: Toxicity: Handling of Nanomaterials

Physicochemical characteristics of nanomaterials – Nanoparticle interaction with biological membrane – Neurotoxicology - Toxicity of nanoparticles in the EYE.

Module IV : Health impact of Nanomaterials

Introduction – source of nanoparticles –epidemiological evidence –entry routes into the human body: Lungs – Inhalation – Deposition and translocation – Intestinal tract - Skin –

Module V: Environmental toxicity

Classifications and source of pollutants - Air - Water - Soil - biomarkers – Enviornmental implication of nanomaterials – Occurrences, Fate and characterisation of Nanomaterials in the environment.

Examination Scheme:

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

Reference books :

1. Nancy A. Monteiro – Riviere and C. Lang Tran, Nanotoxicology: Characterization, Dosing and Health Effects, Informa Healthcare. 2007.
2. Kumar, Challa S. S. R. (ed.) Nanomaterials - Toxicity, Health and Environmental Issues, Wiley-VCH, Weinheim, 2006.

COMMUNICATION SKILLS - V

Course Code: **BCS 701** **Credit Units: 01**

Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

Course Contents:

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

Module IV: Basic Telephony Skills

Guidelines for Making a Call
Guidelines for Answering a Call

Module V: Work Place Speaking

Negotiations
Participation in Meetings
Keynote Speeches

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

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice

UNDERSTANDING SELF FOR EFFECTIVENESS - VII
(INDIVIDUAL, SOCIETY AND NATION)

Course Code: **BSS705** **Credit Units: 01**

Course Objective:

This course aims at enabling students towards:
Understand the importance of individual differences
Better understanding of self in relation to society and nation
Facilitation for a meaningful existence and adjustment in society
Inculcating patriotism and national pride

Course Contents:

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
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.

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

Text & References:

- Davis, K. Organizational Behaviour,
- 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
- 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.
- Robbins O.B.Stephen;. Organizational Behaviour

FRENCH - VII

Course Code: **FLT 701** **Credit Units: 02**

Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

Course Contents:

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:

1. Le passé : passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles : expressions
9. Le subjonctif : volonté, obligation

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 2

GERMAN - VII

Course Code: **FLG 701** **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

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.

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

SPANISH - VII

Course Code: **FLS 701** **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

Course Contents:

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:

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, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

CHINESE – VII

Course Code: **FLC 701** **Credit Units: 02**

Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

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:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- “Kan tu shuo hua” Part-I Lesson 1-7

PLANT BIOCHEMISTRY AND METABOLISM

Course Code: UMT 801 **Credit Units: 03**

Course Objective: The objective pof this course is to make students understand the biochemistry in plants and the metabolism involved in it.

Course Contents:

Module I

Electron transport system in plants, oxidative phosphorylation, mitochondrial respiratory complexes, order and organization of electron carriers, electrochemical gradient, chemiosmotic theory, ATP synthase and mechanism of ATP synthesis.

Module II

Nitrate assimilation, structural features of nitrate reductase and nitrite reductase, incorporation of ammonia into organic compounds, regulation of nitrate assimilation.

Module III

Photosynthesis – Photosynthetic apparatus, pigments of photosynthesis, role of carotenoids, photosystems I and II, their location; Hill reaction, photosynthetic electron transport and generation of NADPH & ATP, cyclic and non-cyclic photophosphorylations, complexes associated with thylakoid membranes; light harvesting complexes, path of carbon in photosynthesis – C3 and C4 pathway of carbon reduction and its regulation, Photorespiration.

Module IV

Special features of secondary plant metabolism, terpenes (classification, biosynthesis), lignin, tannins, pigments, phytochrome, waxes, alkaloids, biosynthesis of nicotine, functions of alkaloids, cell wall components.

Module V

Toxins of plant origin – mycotoxins, phytohemagglutinins, lathyrogens, nitriles, protease inhibitors, protein toxins.

Module VI

Stress metabolism in plants – Environmental stresses, salinity, water stress, heat, chilling, anaerobiosis, pathogenesis, heavy metals, radiations and their impact on plant growth and metabolism, criteria of stress tolerance.

Module VII

Antioxidative defence system in plants – reactive oxygen species and their generation, enzymic and non-enzymic components of antioxidative defence mechanism.

Examination Scheme:

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

Text & References:

1. Bonner, J., & Varner, J. E. (Eds.). (2012). Plant biochemistry. Elsevier.
2. Dey, P. M., & Harborne, J. B. (Eds.). (1997). Plant biochemistry. Academic press.
3. Stumpf, W., Conn, P. M., & Preiss, J. (2012). The biochemistry of plants: Carbohydrates (Vol. 14). Academic Press.

INDUSTRIAL MICROBIOLOGY

Course code: UMT802 **Credit Units: 04**

Course Objective: The objective pof this course is to make students understand the fundamentals and applications of industrial microbiology.

Module I

Exploitation of microorganisms and their products, screening, strain development strategies, immobilization methods, fermentation media, raw material used in media production, antifoaming agents, buffers, downstream processing.

Module II

Fermentation equipment and its uses, fermentor design, Types of fermentors and fermentations- single, batch, continuous, multiple, surface, submerged and solid state.

Module III

Industrial products from microorganisms- antibiotics: production of penicillin, streptomycin. Interferons, vaccines, hormones, vitamins.

Module IV

Enzymes from microbes: amylase, protease. Organic acids: citric acid, acetic acid, amino acids: glutamic acid, lysine.

Module V

Production of alcoholic beverages: bear and wine, biofuels: ethanol, methane, biogas.

Examination Scheme:

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

Text & References:

1. Whitaker and Stanbury. Principles of Fermentation Technology.
2. Casida. Industrial Microbiology. Tata McGraw Hill.

BIOSEPERATION TECHNOLOGY

Course code UMT 803 **Credit Units: 04**

Course objective - The course provides an opportunity to understand the importance of the Bioseparation process, economics and process design criteria for various classes of bio products.

Module I INTRODUCTION TO BIOSEPARATION PROCESS

Role and importance of Bioseparation process in biotechnological processes. Problems and requirements of bioproduct purification. Cost- cutting strategies Characteristics of biological mixtures – Process of Classification of Bioproducts - Biological activity Analysis of purity-Process economics-Capital and operating cost analysis

Module II CELL DISRUPTION AND SEDIMENTATION

Cell disruption methods for intracellular products, removal of insolubles, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and filtration methods.

Module III FILTRATION, PRECIPITATION AND EXTRACTION

Membrane based separations micro and ultra filtration theory, design and configuration of membrane separation equipment, applications, precipitation methods (with salts, organic solvents, and polymers, extractive separations, aqueous two-phase extraction, supercritical extraction), in situ product removal.

Module IV CHROMATOGRAPHY AND ELECTROPHORESIS

Adsorptive chromatographic separation processes, gel permeation chromatography, all electrophoresis techniques including capillary electrophoresis, hybrid separation technologies-membrane chromatography, electro chromatography. -HPLC

Module V PRODUCT CRYSTALLISATION AND DRYING

Crystallisation.-Principles-Nucleation-Crystal growth-Kinetics-Batch crystallizers-Process crystallizers of proteinsScale-up and design- Drying –Principles-Water in biological solids-Heat and mass transfer-Dryer description and operation-Vacuum shelf and rotary dryer-Freeze dryer-Spray dryer-Scale-up and design-spreadsheet and simulators.

Examination Scheme:

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

TEXT BOOKS

1. Roger G Harrison et al “Bioseparation Science and Engineering” Oxford University Press, 2003
2. Belter PA and Cussler E, “ Bioseparations ”, Wiley 1985

REFERENCE BOOKS

1. Wankat P.C, “ Rate controlled separations ”, Elsevier, 1990
2. Asenjo J.M., “ Separation processes in Biotechnology ” Marcel Dekker Inc. 1993.

BIOINFORMATICS

Course Code: **UMT 804** **Credit Units: 03**

Course Objective:

The objective is to describe data models and database management systems with an emphasis on biologically important techniques to store various data on DNA sequencing structures, genetic mapping, phylogenetic analysis. Multiple sequence alignment, protein structure prediction, and comparative genome analysis.

Course Contents:

Module I: Introduction and overview

The NCBI, sequence databases, sequence retrieval, sequence file formats, submitting DNA, protein sequences and sequence assembly.

Module II

Exact string matching -classical comparison based methods, semi numerical string matching, suffix trees - construction and application, Databases and rapid sequence analysis –Blast and Fasta , sequence comparison by statistical content; Dynamic programming alignment -The number of alignments, shortest and longest paths in a network, global distance and similarity alignments, Fitting one sequence onto the other, trace backs, parametric sequence comparison

Module III

Global and local alignments, scoring matrices-pam and blosum and gap penalties, filtering, position specific scoring matrices, internet resources , uses of multiple sequence alignment programs and methods pattern searching programs, family and superfamily representation & profit analysis.

Module IV

Trees-representation of sequences, tree interpretation, Distance – additive, ultrameric and nonadditive distances, tree building methods, phylogenetic analysis, parsimony, Bootstrap, maximum likelihood trees , estimating the rate of change, likelihood and trees; analysis software.

Module V

Annotation, ESTs – databases, comparative genome analysis clustering, gene discovery, 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, Genome analysis, genome rearrangements with inversions, gene identification, gene expression, expression analysis, gene identification and functional classification.

Examination Scheme:

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

Text & References:

Text:

- Essentials of Genomics and Bioinformaticsby C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount, Cold Spring Harbor Laboratory Press.
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and B.F.F Ouellette, Wiley – interscience.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield, Cambridge University Press
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. Von Heijne and G. Von Heijne, Academic Press.
- Computational Molecular Biology: An Algorithmic Approach by P.A. Pevzner, MIT Press
- Computer Methods for Macromolecular Sequence Analysis by R.F. Doolittle, J.N, Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Computational Biology: Maps, Sequences and Genomes by M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. V. Heijne and G.V. Heijne, Academic Press

PROJECT MANAGEMENT

Course Code: **UMT 805** **Credit Units: 03**

Course Objective:

The course aims at making an understanding of the tools and the framework necessary to build a cohesive workflow plan that will help develop industry-standard process. Students will also learn project management skills specifically to all design and redesign projects, from the simplest to the most complex

Course Contents:

Module I: Introduction

Conceiving a project, Strategic Management and Project Selection, Portfolio Management System.

Module II: Project Training

Conflict and Negotiation, Developing a project, Appraisal of project – financial, marketing appraisal, technology appraisal, managing the project, Project in Contemporary Organizations.

Module III: Project initiation

Project implementation – Scheduling, Resource Allocation, Monitoring and Information, Project Control

Module IV: Managing Risk

Risk Identification, Risk Assessment, Risk Response Development.

Module V: Project Termination

Project Auditing and Termination

Examination Scheme:

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

Text & References:

Text:

- Project Management: A Managerial Approach, J.P. Meredith and S.J. Mantel, John Wiley and Sons Inc.

References:

- Project Management: The Managerial Process, Clifford F. Gray and Erik W. Larson (Tata McGraw Hill)

INDUSTRIAL MICROBIOLOGY –LAB

Course code - UMT822 **Credit Units: 01**

1. Bacteriological analysis of food products.
2. Microbes isolation for Amylase production
3. Microbes isolation for protease production
4. Microbes isolation for cellulose production
5. Microbes isolation for antibiotics production
6. Isolation and identification of major bacterial pathogens such as Staphylococcus, Streptococcus etc.

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

BIOSEPERATION TECHNOLOGY-LAB

Course code - UMT823 **Credit Units: 01**

1. Chemical cell disruption and assay for intracellular products
2. Mechanical cell disruption and assay for intracellular products
3. Separation of insolubles by filtration / sedimentation / centrifugation
4. Ammonium sulphate precipitation and dialysis
5. Gel analysis/ assay for dialysed product
6. Ion Exchange chromatography
7. Gel filtration
8. FPLC
9. HPLC
10. Gas chromatography

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

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

BIOINFORMATICS LAB

Course Code: **UMT 824** **Credit Units: 01**

Course Objective:

To demonstrate the techniques and soft wares used for sequence analysis, alignment, structure prediction of the proteins and other compounds and finding the phylogenetic relationships

Course Contents:

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

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

TERM PAPER

Course Code: UMT 830 **Credit Units: 03**

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 consist 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 magazine 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 idea.

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

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/.

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.)	**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%**

ENVIRONMENTAL BIOTECHNOLOGY

Course Code: UMT 831 **Credit Units: 03**

Course Objective:

The objective of this course is to familiarize the students with the processes and micro organism that can be employed for a cleaner environment. The students will be applying basic knowledge of microbiology for developing the practices for a cleaner environment, water, fuel, fertilizer, pesticides etc. The course also aims to make the students aware of legislation and acts prevalent to control the degradation of our eco system.

Course Contents:

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.

Module VI

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

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

ADVANCED PLANT BREEDING

Course code - UMT832 **Credit Units: 03**

Course objective - This is a course on applied plant genetics. This course primarily deals with how to undertake plant genome analysis and gene mapping through the use of DNA markers and how this information could be utilized in bringing the efficiencies in selection methods of plant breeding and gene isolation through forward genetics approach.

Module I

Plant Breeding: History, genetic diversity in plant breeding. Natural breeding systems in plants and their application in plant breeding. Conventional breeding methods for self, cross-pollinated and vegetatively propagated crop plants.

Module II

Heterosis breeding, Polyploidy and haploids in plant breeding, Cytogenetic tools in Plant breeding, Seed production and variety development, Molecular plant breeding: Introduction - molecular markers as new efficient tools in breeding.

Module III

Molecular markers for genome mapping: Principles of genetic linkage, concept of genetic distance, development and choice of mapping populations, linkage map construction – relational, integrated and comparative maps. Dissection of quantitative traits: Principles and methods of QTL mapping, fine mapping of QTL.

Module IV

Marker assisted breeding: Gene tagging, marker aided selection – foreground and background selection, concept of graphical genotypes, elimination of linkage drags. Cloning plant genes: Comparative genomics and cloning, positional cloning.

Examination Scheme:

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

Text & References:

1. Allard, R. W. (1999). Principles of plant breeding. John Wiley & Sons.
2. Richards, A. J. (1997). Plant breeding systems. Garland Science.
3. Henry, R. J. (Ed.). (2001). Plant genotyping: the DNA fingerprinting of plants. CABI.

INDUSTRIAL SAFETY AND MANAGEMENT

Course Code: **UMT 833** **Credit Units: 03**

Course Objective:

Course addresses management and engineering design concepts required for process safety in chemical and biotechnology systems, with pharmaceutical manufacturing applications. Content focuses on sound engineering principles and practices as they apply to industrial situations, project design, risk mitigation, process and equipment integrity, and engineering codes and standards.

Course Contents:

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

Text & References:

Text:

- Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Allocation. Van vostrand Reinhold Company, New York.
- Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett & W.S .Wood Wiley Interscience,

References:

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

COMMUNICATION SKILLS - VI

Course Code: BCS 801 **Credit Units: 01**

Course Objective:

The modules are designed to enhance the communicative competence of the learners to equip them with efficient interpersonal communication.

Course Contents:

Module I: Dynamics of Group Discussion

Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels

Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Effective Public Speaking

Types
Essentials
Success in Public Speaking
Dos and Don'ts

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

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge.
- Krishnaswamy, N, Creative English for Communication, Macmillan.
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice.

UNDERSTANDING SELF FOR EFFECTIVENESS – VIII
(POSITIVE PERSONAL GROWTH)

Course Code: BSS805 **Credit Units: 01**

Course Objective:

- To have a great deal of insight into one's character.
- Understanding of positive emotions
- To explore the dimensions of happiness, well-being, Optimism and hope
- Quick understanding of different situations and grasp new concepts.

Course Contents:

Module I: Positivity in personality
Importance of Positivity in personality
Positivity Vs Negativity
Introspection and personal growth

Module II: Positive Emotions
Understanding positive emotions
Importance of Positive emotion
Types and identification of positive emotions (Love, happiness, Contentment, Resilience, etc.)

Module III: Hope, Optimism and Resilience
Positive approach towards future
Benefits of Positive approach
Resilience during challenge and loss

Module IV: Application of Positive Emotions
Application of positive emotions in relationships, and organizations
Creating healthy organizational climate
Positive emotions enhances performance

Module V: Happiness and Well Being
Concept of Happiness & Well-Being
Secret of happy mind and healthy life
Work life balance

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioral change as a result of training
Exit Level Rating by Self and Observer

Text & References:

- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan, D. (2005). Information and Knowledge Management. Macmillan India Ltd. Delhi

FRENCH - VIII

Course Code: **FLT 801** **Credit Units: 02**

Course Objective:

Provide students with the necessary linguistic tools

- to face up to different situations of communication
- to enhance their capacity in oral/written comprehension/expression

Course Contents:

Module B: Unités 4, 5, 6: PP. 48 - 86

Contenu lexical: **Unité 4:**
1. Présenter une information/les circonstances d'un événement
2. Exprimer la possibilité/la probabilité
3. Exprimer une quantité indéfinie
4. Comprendre et raconter un fait div

Unité 5:
1. Parler d'une passion, d'une aventure
2. Choisir/créer
3. Exprimer la surpirse/des sentiments

Unité 6:
1. Exprimer la cause et la conséquence
2. Exprimer la crainte et rassurer
3. Faire une démonstration

Contenu grammatical:

1. la construction passive
2. la forme impersonnelle
3. l'interrogation
4. les adjectifs et les pronoms indéfinis
5. les pronoms interrogatifs et démonstratifs
6. la construction avec deux pronoms
7. le subjonctif dans l'expression des sentiments, de la crainte, du but
8. constructions permettant l'expression de la cause et de la conséquence
9. l'enchaînement des idées : succession et opposition

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & Références:

- le livre à suivre : Campus: Tome 2

GERMAN - VIII

Course Code: FLG 801 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Reading and comprehension

Reading texts and comprehending them

Module II: Information about German History

Acquiring information about German History through appropriate texts and stories

Module III: Bio data/Curriculam vitae

Writing a bio-data in the proper format with all essential components

Module IV: Informal letters

Reading and writing informal letters

Module V: Business etiquette

Business etiquette in Germany and types of companies

Module VI: Interview skills

To learn to face interviews

Read a text 'Interviewspiel'

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:

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.

SPANISH – VIII

Course Code: FLS 801 **Credit Units: 02**

Course Objective:

To enable students to deal with Spanish situations putting things in perspective, using Past Tense. Enabling them to comprehend and form slightly complex sentences. Give students vocabulary of various situations.

Course Contents:

Module I

Situational exercises/Picture Description:
At the cine
At the Chemist's/Hospital

Module II

At a corporate client's informal/formal meeting/gathering
Looking for accommodation

Module III

Past Tense (Indefinido) of regular verbs
Past Tense (Indefinido) of irregular verbs
Exercises related to the above

Module IV

Past Tense (Imperfecto)

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, 1B.
- Español Sin Fronteras.
- Material provided by the teacher from various sources.

CHINESE – VIII

Course Code: FLC 801 **Credit Units: 02**

Course Objective:

Paper was first invented n China in 105 AD. It was a closely guarded secret and didn't reach Europe until the 8th Century. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
The aspect particle "le" and the modal particle "le".

Module II

Optative verbs
Texts based on different topics
Enriching vocabulary by dealing with various daily scenarios and situations.

Module III

Sentences with subject predicate construction as its predicate
Pronunciation and intonation
Character writing and stroke order

Module IV

About china Part I Lesson 2,3
Chinese to English and English to Chinese translations from the news paper.

Module V

Questions with an interrogative pronoun
Essays, writing formal letters.
Conversation practice.

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:

- "Kan tu shuo hua" Part-I Lesson 8-13.

NANOBIOTECHNOLOGY

Course Code: UMT 901 **Credit Units: 04**

Course Objective:

To evolve a detail understanding into the application of nanotechnology in the field of biological sciences.

Course Contents:

Module I

Biosensors as Precursors of Bioelectronics, Functionlization of Sensing Substrates, Biochip, Nanosensors-Miniaturization of Biosensors, Nanomaterial Based Biosensors.

Module II

Electron Transfer of Biomolecules, Nanoparticle-Biomaterial Hybrid Systems for Sensing and Electronic Devices

Module III

DNA Templated Electronics, Sequence –specific molecular lithography, Single Biomolecule Manipulation for Bioelectronics, DNA as a semiconductor.

Module IV

Applications of nanobiotechnology in medical diagnostics and other biomedical field.

Examination Scheme:

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

Text & References:

***Text*:**

- Smart Biosensor Technology, George K. Knopf, Amarjeet S. Bassi, CRC press, 2006

***References*:**

- Bioelectronics: From Theory to Applications Willner, Itamar / Katz, Eugenii (eds.) Wiley-VCH, 2005
- Electrochemical Methods Fundamentals and Applications, 2nd Edition, by Allen J. Bard and Larry R. Faulkner
- Analytical Electrochemistry, by Joseph Wang

BIO-PHARMACEUTICS & PHARMACOKINETICS.

Course code – UMT 902 **Credit units - 04**

Course Objective:

The objective of this course is to evolve a detail understanding of pharmacokinetics and pharmaceutics of drug.

Unit-I:

Introduction to Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting.

Unit-II: Biopharmaceutics

Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis), Factors influencing absorption - Physicochemical, physiological and pharmaceutical, Drug distribution in the body, plasma protein binding.

Unit-III: Phamacokinetics

Significance of plasma drug concentration measurement, Pharmacokinetics of drug absorption - Zero order and first order absorption rate constant using Wagner - Nelson and Loo- Reigelman method, Volume of distribution and distribution coefficient, Compartment kinetics - One compartment and two compartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route, Clearance concept, Mechanism of renal clearance, clearance ratio, determination of renal clearance, Extraction ratio, hepatic clearance, biliary excretion, Extrahepatic circulation.

UNIT-IV: Bioavailability and bioequivalence:

Measures of bioavailability, Cmax, t max, and Area Under the Curve (AUe), Design of single dose bioequivalence study and relevant statistics, Review of regulatory requirements for conduction of bioequivalent studies.

Examination Scheme:

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

Text & References:

***Text*:**

- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston
- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Biopharmaceutics and Pharmacokinetics A Treatise by B.M.Brahmankar, Vallabh Prakashan.

***References*:**

- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins
- Side Effects and Drug Design, E.J. Lien, Marcel Dekker
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press
- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press
- Drug Delivery: Engineering Principles for Drug Therapy (Topics in Chemical Engineering), W.M. Saltzman, Oxford University Press
- Handbook of Biodegradable Polymers (Drug Targeting and Delivery), A.J. Domb, J. Kost and D.M. Wiseman, Dunitz Martin Ltd.
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher

MEDICAL BIOTECHNOLOGY

Course code – UMT 903 **Credit units – 03**

Course Objective - The students shall study the following syllabus as course work to understand modren methods applicable in field of medical and health care.

Module I : Gene Therapy

Clinical experiences with gene therapy, Prerequisite to gene therapy, Approaches of gene therapy – replacement, repair, gene silencing - siRNA, miRNA, Gene therapy vectors – Viral vectors, Non-viral vectors, Computational methods applied in gene therapy, Routes of administration, Molecular targeting, Problems with gene therapy.

Module II : Vaccines

Immunization – Passive and Active. Whole-organism vaccines - Live attenuated vaccines, Killed or inactivated vaccines. Purified macromolecules – Toxoids, Capsular Polysaccharide vaccines, Polypeptide vaccines. Recombinant vaccines - Recombinant Protein vaccines, Recombinant vector vaccines, Subunit Vaccines, Polynucleotide vaccines (DNA vaccine). Future vaacines - Multivalent subunit vaccine, Anti-idiotype vaccine, Plant vaccine. Malaria vaccine, Tumor vaccine. Various computational approach for vaccine designing.

Module III : Stem Cell Engineering

Stem cells – Properties, sources (adult stem cells, haematopoietic stem cells, bone marrow stromal stem cells, embryonic stem cells), Totipotency, Pluripotency, Multipotency, Induced pluripotency. Bioscaffold (Naturally derived materials - collagen and alginate; Synthetic polymers - polyglycolic acid, poly-lactic acid and poly lactic-co-glycolic acid, Bioactive Molecules. Scaffold Processing and Fabrication, Electrospining, Regulatory issues.

Module IV : Disease Diagnosis

Immunological techniques for diagnosis of diseases: ELISA, RIA, IFA, Blood group test, widal test. Microbiological Techniques: Cultural and morphological characteristics, Biochemical test, Antibiotic sensitivity assays, Phage based diagnostic techniques. Hematological techniques: blood smear, TLC and DLC, blood biochemistry. Molecular techniques: RT-PCR, PCR, DNA Microarray. Early diagnosis of cancer - Tissue microenvironment, Genome, Proteome and Secretome, Biomarker screening and validation,

Examination Scheme:

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

Text & References :

1. Medical Biotechnology. Judit Pongracz, Mary Keen. Churchill Livingstone Elsevier. 2009.
2. Stem Cell Engineering: Principles and Applications. By Gerhard M. Artmann, Stephen Minger, Jürgen Hescheler. Springer. 2011.
3. Cell-Based Biosensors: Principles and Applications. edited by Ping Wang, Qingjun Liu. Artech house 2010
4. Bionics: Judith Jango-Cohen, Bionics by Vincent J. Marteka

BIOPROCESS PLANT DESIGN

Course Code: UMT 904 **Credit Units: 04**

Course Objective:

The objective of this paper is to include the application of chemical engineering principles/unit operations to bioprocess systems and the principles of disciplines of mechanical, electrical and industrial engineering to design a completely economically optimal process using living or subcomponent of cells.

Course Contents:

Module I

Introduction; general design information; Mass and energy balance.

Module II

Flow sheeting; Piping and instrumentation; Materials of construction for bioprocess plants; Mechanical design of process equipment.

Module III

Vessels for biotechnology application; Design of fermenters; Design considerations for maintaining sterility of process streams processing equipment.

Module IV

Selection and specification of equipment for handling fluids and solids; Selection, specification, design of heat and mass transfer equipment used in bioprocess industries.

Module V

Design of facilities for cleaning of process equipment used in biochemical industries.

Module VI

Utilities of biotechnology production plants; Process economics; Bioprocess validation; Safety considerations; Case studies.

Examination Scheme:

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

Text & References:

Text:

- Applied Process Design for Chemical and Petrochemical Plants by E.E. Ludwig, Butterworth-Heinemann.
- Chemical Engineering by R.K. Sinnott, J.M. Coulson and J.F. Richardson, Butterworth-Heinemann.

References:

- Chemical Engineers Handbook by R.H. Perry and D.W. Green, McGraw-Hill
- Manufacturing Facilities Design and Material Handling by F.E. Meyers and M.P. Stephens, Prentice Hall
- Plant Design and Economics for Chemical Engineers by M. Peters and K. Timmerhaus, McGraw-Hill
- Process Plant Layout and Piping Design by E. Bausbacher and R. Hunt, Prentice Hall PTR.

RESEARCH METHODOLOGY

Course Code: UMT 905 **Credit Units: 02**

Course Objective:

To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents:

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)

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.

Module III: Sampling techniques

Sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning - Relevance's, Limitations and cautions. Statistics 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	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Statistical Methods By S.P. Gupta

***References*:**

- Research Methodology Methods and Techniques By C.R. Kothari
- Statistics(Theory and Practice) By B.N. Gupta
- Research Methodology Methods and statistical Techniques By Santosh Gupta
- Scientific journals and magazines

MINOR PROJECT

Course Code: **UMT 960** **Credit Units: 06**

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.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

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 Infec*, **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:

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

NANOBIOTECHNOLOGY-LAB

Course code : UMT 921 **Credit Units: 01**

1. Synthesis of nanoparticles from bacteria
2. Synthesis of nanoparticles from fungi
3. Synthesis of nanoparticles from plant
4. Characterization of nanoparticles

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

MEDICAL BIOTECHNOLOGY –LAB

Couse code - UMT923 **Credit Units: 01**

1. Isolation of bacteria from oral cavity
2. Characterization of bacteria
3. Antibacterial susceptibility test
4. Isolation of red blood cells

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

TERM PAPER

Course Code: UMT 930 **Credit Units: 03**

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 consist 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:

g) statement of purpose
h) main body of the paper
i) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

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:
   (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.
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. Bibliography
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:

9. summary of question posed
10. summary of findings
11. summary of main limitations of the study at hand
12. details of possibilities for related future research

Bibliography

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.

Bibliographical 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/.

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: 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.)

STEM CELL ENGINEERING

Course Code: UMT 931 **Credit Units: 03**

Course Objective:

The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I

Introduction to Gene Therapy, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects

Module II: Gene Delivery

Adenoviral Vectors, Adeno-associated virus (AAV) Vectors, Non-viral Vectors and Physical Methods, Retroviral and Lentiviral Vectors, Herpes Virus Vectors & Combinatorial methods, Gene transfer methods

Module III

Innate and Acquired Immune Response to Cell and Gene Therapy, Gene Therapy and the Immune System: Genetic Immunization

Module IV

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module V

Cell, Disease, and Genetic Perspectives for Gene Therapy, , Cell and Gene Therapy of the Nervous System, Cancer Gene Therapy, Cell and Gene Therapy for Vascular Disorders, Bone marrow transplants, Cancer Gene Therapy, Immunotherapy, Autoimmune Diseases and the Promise of Stem Cell-Based Therapies, Stem Cells and Diabetes, Stem Cells and heart Repair

Module VI

Regulatory and Ethical Considerations of Cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

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

Text & References:

***Text*:**

- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.

- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by Aluízio Borém, Fabrício R. Santos, David E. Bowen, Prentice Hall
- Cell Therapy: Stem Cell Transplantation, Gene Therapy, and Cellular Immunotherapy (Cancer: Clinical Science in Practice) George Morstyn, William Sheridan, Cambridge University Press,

ANALYTICAL METHODS IN MICROBIOLOGY

Course code – UMT 932 **Credit Units: 03**

Course Objective:

The course is designed to give fundamental techniques involved in studying the features of microorganisms.

Module I

Definitions and Principles: Culture, Pure culture, Auxenic culture, strains, Pure culture techniques; pour plate, streak plate and spread plate method, Enrichment culture technique, Rolling tube and Candle jar method, Plaque assay techniques, Camera lucida, micrometry

Module II

Instruments, basic principles and usage: pH meter, fluorimetry, colorimetry, Spectrophotometry (visible, UV, infra-red), polarography, centrifugation, Principle & application of scanning & transmission electron microscopy. Principle of Fixation and staining techniques for cell wall, capsule, flagella, endospore, EM, freeze-etch and freeze-fracture method for EM. Direct & indirect staining, negative staining

Module III

Principle and application of electrophoresis: Agarose gel electrophoresis, Density gradient gel electrophoresis, capillary electrophoresis, Pulsed field gel electrophoresis. Southern blotting, Northern blotting. Hybridization. DNA sequencing, pyrosequencing.

Module IV

Principles and application of electrophoresis: SDS-PAGE and NATIVE-PAGE, Isolectric focusing and 2- D PAGE, Western Blotting, MALDI-TOF, N-terminal sequencing.

Module V

Principles and methods used for analysis biopolymers; X-ray Crystallography, fluorescence, ORD/CD, NMR & ESR spectroscopy; Hydrodynamic methods; Atomic absorption & Plasma emission spectroscopy.

Examination Scheme:

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

Text & References:

1. Harrigan, W. F. (1998). Laboratory methods in food microbiology. Gulf Professional Publishing.
2. Norris, J. R., & Ribbons, D. W. (1971). Methods in microbiology (Vol. 5). Academic Press.
3. Goldman, E., & Green, L. H. (Eds.). (2015). Practical handbook of microbiology. CRC Press.

GENETIC MODIFICATIONS

Course Code: **UMT 933** **Credit Units: 03**

Course Objective:

To understand the basis of genetic analysis in plants and microbes and their use in Recombinant DNA Technology

Course Contents:

Module 1

The practice of plant genetic manipulation: Techniques of DNA manipulation, plant transformation and the analysis of the transformed plant. RNA and DNA extraction. DNA cloning, including design of inserts and use of vectors. Selection of vectors. Transformation using Agrobacterium and by particle bombardment. Introduction to reporter genes and their associated promoters. (Use of promoter gene products.).

Module II

Analysis of the genome and transcriptome - radiolabelling probes, Southern analysis, Northern analysis. Reverse transcriptase (RT)-PCR and real time RT-PCR.

Module III

Gene transfer mechanisms in microbes- Transformation, transduction, conjugation and transfection. Mechanism and applications. Genetic analysis in bacteria and yeast

Examination Scheme:

Components	A	CT	H	S	EE
Weightage (%)	5	15	5	5	70

Text & References:

- Immobilized Enzymes in Analytical and Clinical Chemistry by Carr and Bowers, John Willy and Sons, N.Y.
- Fundamentals of Biochemical Engineering (Volume I and II) by Ramachandran, BEC, IIT-Delhi
- Microbial Enzymes and Bioconversions. Economic Microbiology (Volume XIV) by Rose, Academic Press

COMMUNICATION SKILLS - VII

Course Code: BCS 111 **Credit Units: 01**

Course Objective:

One cannot communicate'. This course is designed to facilitate our young Amitians to communicate effectively by emphasizing on practical communication through refurbishing their existing language skills and also to bring one and all to a common take-of level.

Course Contents:

Module I: Fundamentals of communication

Relevance of communication
Effective communication
Models of communication
Effective use of language

Module II: Tools of communication

Proficiency in English – The international
Language of business
Building vocabulary
(Denotative & connotative)
Extensive vocabulary drills
(Synonyms / Antonyms / Homonyms)
One Word substitution
Idioms & phrases
Mechanics and Semantics of sentences
Writing sentences that really communicate
(Brevity, Clarity, and Simplicity)
Improving the tone and style of sentences

Module III: Barriers to Effective use of language

Avoiding clichés
Removing redundancies
Getting rid of ambiguity
Euphemism
Jargons
Code switching

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

Text & References:

- M. Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill, 2005.
- Meenakshi Raman &Prakash Singh, Business Communication, Oxford, 2006.
- Madhulika Jha, Echoes, Orient Longman, 2006.
- M. Swan Practical English Usage, second Edition, Oxford, 2005.
- Leo Jones, Working in English, Cambridge University Press, 2001.

UNDERSTANDING SELF FOR EFFECTIVENESS – IX
(CAREER MANAGEMENT)

Course Code: BSS905 **Credit Units: 01**

Course Objective:

This course will help the students to:

- Explore interest and attitude
- Explore career opportunities
- Set career goals
- Developing attributes that employers value

Course Contents:

Module I: Exploring one's interest and aptitude

Meaning: Interest and Aptitude
Knowing and assessing one's Interest
Knowing and assessing one's Aptitude

Module II: Explore Career

Selecting from available resources
Career selection (Jobs)
Career planning and development

Module III: Self Reliance Skills

Self awareness, Self promotion, Self confidence
Action planning, Networking, Negotiation
Political awareness, Coping with uncertainty,
Development focus, Transfer skills

Module IV: Employability skills

Developing positive attributes at work place (personal and professional)
Continued reflection of Self (Placements, events, Seminars, Conferences, Projects, Extracurricular Activities etc.)

Module V: Goal Setting for Career Development

Goal setting and career planning
Sustaining and maintaining career excellence
Assessment of career graph (introduction, growth, maturity, stagnation and decline)

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

FRENCH - IX

Course Code: **FLT 901** **Credit Units: 02**

Course Objective:
Provide more exposure to day to day real life in France through dialogues, written documents and projects

Course Contents:

Module C: Unités 7, 8: PP. 89 - 116

Contenu lexical: **Unité 7:**
1. Exprimer l'appartenance
2. Dire le droit, réclamer, donner les directions à l'oral et à l'écrit
3. Gérer l'argent
4. Décrire, définir un objet. Donner sa fonction
5. Parler de la vie professionnelle

Unité 8:
1. Exprimer les rapports de temps. Faire une chronologie
2. Rapporter des paroles
3. Indiquer les circonstances d'une action
4. Parler d'éducation, de recherche, d'histoire
5. Réfléchir à l'apprentissage du vocabulaire

Contenu grammatical:
1. Les pronoms possessifs
2. Les constructions relatives avec auquel, dont, préposition + lequel
3. Le subjonctif - possibilité, impossibilité, doute
4. Le participe présent et le gérondif
5. Le plus-que-parfait
6. Situation dans le temps (ce jour-là, la veille)
7. Le discours indirect au passé

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 2

GERMAN - IX

Course Code: FLG 901 **Credit Units: 02**

Course Objective:

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany, and thereby enhance the capacity of the students to comprehend literary and business texts and hence increase their vocabulary of relative terminology.

Course Contents:

Module I

Comprehension of Business text

Module II

Comprehension of Literary text

Module III

Translation of Business text

Module IV

Translation of Literary text

Module V: 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

SPANISH – IX

Course Code: FLS 901 **Credit Units: 02**

Course Objective:

To enable students to deal with Spanish situations, writing formal/informal letters, using Past Tense, juxtaposing it with *preterito imperfecto*. Enabling them to comprehend and form complex sentences. Give students vocabulary of various situations.

Course Contents:

Module I

Name of food items, cuisines, vegetables, fruits.

Polite conversation, informal chats, in a restaurant… more useful vocabulary like at a stationery, books in a library, consumer items in shops.

Module II

Letter Writing (Formal/Informal) how to invite, how to accept or refuse invitation e concept of gerund.

Module III

At the post office

At a business appointment

At an official interview etc

Module IV

Conditional

Exercises related to the above

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 B, Español Sin Fronteras, Ven
- Material provided by the teacher from various sources

CHINESE – IX

Course Code: FLC 901 **Credit Units: 02**

Course Objective:

The Great Wall of China is NOT visible from outer space. It's too thin. It's just myth that it can be seen. The only man-made structures visible from space are: The Pyramids of Giza and the Hoover Dam. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills.
Dialogue practice
Observe picture and answer the question.

Module II

Enriching vocabulary by dealing with various daily scenarios and situations.
Pronunciation and intonation.

Module III

Character writing and stroke order

Module IV

About china Part I Lesson 3, 4
Short stories

Module V

Text based on –
Literature
History
Economy
Culture
Politics

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:

- "Kan tu shuo hua" Part-II Lesson 14-19.

MAJOR PROJECT/ DISSERTATION

Course Code: **UMT 060** **Credit Units: 30**

Course Objective:
The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce axamination.

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:

Dissertation:	100
Viva Voce:	100
Total:	**200**