

Bachelor of Technology (Biotechnology)

Programme Code: BTB

Duration – 4 Years Full Time

**Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2017-21 Batch**

**AMITY UNIVERSITY
RAJASTHAN**

Credit Summary Sheet

B.Tech Biotechnology					
Semester	CC	DE	VA	OE	Total
1	16	3	4	3	26
2	16	3	4	3	26
3	14	3	8	3	28
4	17	3	4	3	27
5	18	3	4	3	28
6	18	3	4	3	28
7	24	3	4	-	31
8	25	-	-	-	25
Total	148	21	32	18	219

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

Minor Track:

Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
Minor Track-I: Plant Biotechnology						
BTB133	Basic and Applied Biotechnology	DE	3	-	-	3
BTB231	Plant Science	DE	3	-	-	3
BTB305	Basic Bioanalytical Techniques	CC	3	-	-	3
BTB402	Genetics	CC	3	-	2	4
BTB503	Plant Biotechnology	CC	3	-	2	4
BTB601	Recombinant DNA Technology	CC	3	-	2	4
Total						21
Minor Track-II: Animal Biotechnology						
BTB131	Chemical Biology	DE	3	-	-	3
BTB232	Biodiversity	DE	3	-	-	3
BTB333	Animal Science	DE	3	-	-	3
BTB431	Developmental Biology	DE	3	-	-	3
BTB504	Animal Biotechnology	CC	3	-	2	4
BTB604	Immunology & Immunotechnology	CC	3	-	2	4
Total						20

Program Structure

B.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
BTB101	Applied Mathematics - I	CC	3	1	-	4
BTB102	Applied Physics - I	CC	2	-	-	2
BTB103	Applied Chemistry - I	CC	2	-	-	2
BTB104	Introduction to Computers	CC	2	-	-	2
BTB105	Life Sciences	CC	2	-	-	2
BTB122	Applied Physics - I -Lab	CC	-	-	2	1
BTB123	Applied Chemistry - I-Lab	CC	-	-	2	1
BTB124	Introduction to Computers-Lab	CC	-	-	2	1
BTB125	Engineering Graphics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB130	Term Paper	DE	3	-	-	3
BTB131	Chemical Biology	DE				
BTB132	Food Science	DE				
BTB133	Basic and Applied Biotechnology	DE				
OE1	Open Elective	OE	3	-	-	3
BCS 101	English	VA	1	-	-	1
BSS 104	Understanding Self for Effectiveness- I	VA	1	-	-	1
FLT 101	Foreign Language - I	VA	2	-	-	2
FLG 101	French					
FLS 101	German					
FLC 101	Spanish					
	TOTAL					26

B.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
BTB201	Applied Mathematics - II	CC	3	1	-	4
BTB202	Applied Physics - II	CC	2	-	-	2
BTB203	Applied Chemistry - II	CC	2	-	-	2
BTB204	Object Oriented Programming in C++	CC	2	-	-	2
BTB205	Data Structure & Algorithms	CC	2	-	-	2
BTB222	Applied Physics - II -Lab	CC	-	-	2	1
BTB223	Applied Chemistry - II-Lab	CC	-	-	2	1
BTB224	Object Oriented Programming in C++-Lab	CC	-	-	2	1
BTB225	Data Structure & Algorithms-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB230	Term Paper	DE	3	-	-	3
BTB231	Plant Science	DE				
BTB232	Biodiversity	DE				
BTB233	Food Microbiology	DE				
OE	Open Elective-I	OE	3	-	-	3
BCS 201	English	VA	1	-	-	1
BSS 204	Behavioral Science – II	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
TOTAL						26

B.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
BTB301	Cell Biology	CC	3	-	-	3
BTB302	Biochemistry - I	CC	2	-	-	2
BTB303	Microbiology	CC	3	-	-	3
BTB304	Basic Bioanalytical Techniques	CC	2	-	-	2
BTB321	Cell Biology-Lab	CC	-	-	2	1
BTB322	Biochemistry - I Lab	CC	-	-	2	1
BTB323	Microbiology Lab	CC	-	-	2	1
BTB324	Basic Bioanalytical Techniques Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB330	Term Paper	DE	3	-	-	3
BTB331	Biopesticides & Biofertilizers	DE				
BTB332	Industrial Waste Management	DE				
BTB333	Animal Science	DE				
OE	Open Elective-II	OE	3	-	-	3
EVS001	Environmental Sciences	VA	4	-	-	4
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 304	Understanding Self for Effectiveness– III	VA	1	-	-	1
FLT 301	Foreign Language - III	VA	2	-	-	2
FLG 301	French					
FLS 301	German					
FLC 301	Spanish					
	TOTAL					28

B.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
BTB401	Biochemistry - II	CC	3	-	-	3
BTB402	Genetics	CC	3	-	-	3
BTB403	Methods & Instrumentation in Biotechnology	CC	2	-	-	2
BTB404	Database Management Systems	CC	2	-	-	2
BTB405	Statistics for Biology	CC	3	-	-	3
BTB421	Biochemistry – II-Lab	CC	-	-	2	1
BTB422	Genetics-Lab	CC	-	-	2	1
BTB423	Methods & Instrumentation in Biotechnology-Lab	CC	-	-	2	1
BTB424	Database Management Systems-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB430	Term Paper	DE	3	-	-	3
BTB431	Developmental Biology	DE				
BTB432	Industrial Biotechnology	DE				
BTB433	Food and Nutrition	DE				
OE	Open Elective-III	OE	3			3
BCS 401	Communication Skills – II	VA	1	-	-	1
BSS 404	Understanding Self for Effectiveness– IV	VA	1	-	-	1
FLT 401	Foreign Language - IV French	VA	2	-	-	2
FLG 401	German					
FLS 401	Spanish					
FLC 401	Chinese					
	TOTAL					27

B.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
BTB501	Molecular Biology	CC	3	-	-	3
BTB502	Java - I	CC	2	-	-	2
BTB503	Plant Biotechnology	CC	3	-	-	3
BTB504	Animal Biotechnology	CC	3	-	-	3
BTB505	Fundamentals of Biochemical Engineering	CC	3	-	-	3
BTB521	Molecular Biology -Lab	CC	3	-	2	1
BTB522	Java - I-Lab	CC	2	-	2	1
BTB523	Plant Biotechnology-Lab	CC	3	-	2	1
BTB524	Animal Biotechnology-Lab	CC	3	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB530	Term Paper	DE	3	-	-	3
BTB531	Tissue engineering	DE				
BTB532	Cancer Biology	DE				
BTB533	Clinical Microbiology	DE				
OE	Open Elective-IV	OE	3			3
BCS 501	Communication Skills – III	VA	1	-	-	1
BSS 504	Understanding Self for Effectiveness– V	VA	1	-	-	1
FLT 501	Foreign Language - V	VA	2	-	-	2
FLG 501	French					
FLS 501	German					
FLC 501	Spanish					
	TOTAL					28

B.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
BTB601	Recombinant DNA Technology	CC	3	-	-	3
BTB602	Enzymology & Enzyme Technology	CC	3	-	-	3
BTB603	Structural Biology	CC	2	-	-	2
BTB604	Immunology & Immunotechnology	CC	3	-	-	3
BTB605	Bioresource Technology	CC	3	-	-	3
BTB621	Recombinant DNA Technology - Lab	CC	-	-	2	1
BTB622	Enzymology & Enzyme Technology-Lab	CC	-	-	2	1
BTB623	Structural Biology-Lab	CC	-	-	2	1
BTB624	Immunology & Immunotechnology-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB630	Term Paper & Industry Visit	DE	3	-	-	3
BTB631	Virology	DE				
BTB632	Nanoscience and Nanotechnology	DE				
BTB633	IPR & Drug Regulatory Affairs	DE				
OE	Open Elective-V	OE	3			3
BCS 601	Communication Skills – IV	VA	1	-	-	1
BSS 604	Understanding Self for Effectiveness–V I	VA	1	-	-	1
FLT 601	Foreign Language - VI	VA	2	-	-	2
FLG 601	French					
FLS 601	German					
FLC 601	Spanish					
	TOTAL					28

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: BTB630- 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 Biotechnology: VII- SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
BTB701	Bioprocess Technology	CC	3	-	-	3
BTB702	Downstream Processing	CC	3	-	-	3
BTB703	Java - II	CC	2	-	-	2
BTB704	Genomic & Proteomics	CC	3	-	-	3
BTB705	Pharmaceutical Technology & Biotechnology	CC	3	-	-	3
BTB750	Industrial Training Evaluation	CC	-	-	-	6
BTB721	Bioprocess Technology-Lab	CC	-	-	2	1
BTB722	Downstream Processing-Lab	CC	-	-	2	1
BTB723	Java - II-Lab	CC	-	-	2	1
BTB724	Genomic & Proteomics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTB730	Term Paper	DE	3	-	-	3
BTB731	Bioethics & Biosafety	DE				
BTB732	Protein Engineering	DE				
BTB733	Nanotoxicology	DE				
BCS 701	Communication Skills – V	VA	1	-	-	1
BSS 704	Understanding Self for Effectiveness– VII	VA	1	-	-	1
FLT 701	Foreign Language - VII French	VA	2	-	-	2
FLG 701	German					
FLS 701	Spanish					
FLC 701	Chinese					
	TOTAL					31

B.Tech Biotechnology: VIII- SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
BTB860	Project /Dissertation	CC	-	-	-	25
	TOTAL					25

APPLIED MATHEMATICS – I**Course Code: BTB101****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 1st Degree: Variable Separation, Homogeneous Differential Equations, Linear Differential Equations, Exact Differential Equations, General Linear ODE of Second Order, Solution of Homogeneous Equation, Solution of Simple Simultaneous ODE

Examination Scheme:

Components	CT	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: BTB102

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: BTB103

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: BTB: 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: BTB: 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).

APPLIED PHYSICS – I-Lab

Course Code: BTB: 122
Credit Unit: 01
List of Experiments

1. To determine the wavelength of sodium light by Newton'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/ftth'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: BTB: 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: BTB: 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: BTB: 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: BTB 130

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.)

CHEMICAL BIOLOGY

Course Code: BTB: 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 synthesis: 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 biosynthesis.

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: BTB: 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: BTB: 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
O! Captain, My Captain.
Where the Mind is Without Fear
Psalm of Life

Keats
Walt Whitman
Rabindranath Tagore
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 104

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 Behavioural Science, 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, wohnen, 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 Diphthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalities 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: BTB: 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 mathematics, 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 Functions a: Functions and Graphs. Pearson Education, First ed.

APPLIED PHYSICS - II

Course Code: BTB: 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 biasing, 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: BTB: 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 O₂ (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 Liquefaction 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: BTB: 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, Principles 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 hierarchies, 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:

- Parsons. (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: BTB: 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, Deque.

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, binomial coefficients, optimal binary search trees, matrix chain multiplication, longest common subsequence, optimal triangulation.

Module IX: Graphs

Minimum spanning tree and Dijkstra'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: BTB: 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 tuning 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: BTB: 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: BTB: 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: BTB: 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: BTB 230

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.)

PLANT SCIENCE

Course Code: BTB: 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 cycle 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: BTB: 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: BTB: 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.
Where the Mind is Without Fear
Psalm of Life

Walt Whitman
Rabindranath Tagore
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: BSS 204

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 Behavioural Science, 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, lesen, 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 prepositions 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

Possessive pronouns

Module V

Writing/speaking essays like my friend, my house, my school/institution, myself....descriptions of people, objects etc, computer/internet related vocabulary

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 much it 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, wai 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: BTB 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: BTB 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, stereoisomerism 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-saccharides.

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: BTB 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 microorganisms and 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 of anaerobic 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: BTB 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

- 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 Interpretation, 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: BTB 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 chloroplast using Chili, Study of Leucoplasts using Potato.

Module IV: Cell Division

Mitosis and 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: BTB 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: BTB323****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 : BTB 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: BTB 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:

13. Choosing a subject
14. Finding sources of materials
15. Collecting the notes
16. Outlining the paper
17. Writing the first draft
18. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- g) Get facts, not just opinions. Compare the facts with author's conclusion.
- h) In research studies, notice the methods and procedures, results & conclusions.
- i) Check cross references.

4. Outlining the paper

- e) Review notes to find main sub-divisions of the subject.
- f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- m) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- n) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- o) Check for proper spelling, phrasing and sentence construction.
- p) Check for proper form on footnotes, quotes, and punctuation.
- q) Check to see that quotations serve one of the following purposes:
 - (vii) Show evidence of what an author has said.
 - (viii) Avoid misrepresentation through restatement.
 - (ix) Save unnecessary writing when ideas have been well expressed by the original author.
- r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 15) Title page
- 16) Table of contents
- 17) Introduction
- 18) Review
- 19) Discussion & Conclusion
- 20) References
- 21) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- i) summary of question posed
- j) summary of findings
- k) summary of main limitations of the study at hand
- l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

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: BTB331

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: BTB332

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.
1. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.
2. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Hand book", Lewis Publisher, New Yark, 1998
3. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995.
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000.

ANIMAL SCIENCE

Course Code: BTB 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 pathogenicity 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. Dhama, P.S. and Dhama, 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 & Weston, 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 Environmental 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: BSS 304

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 behavioural 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 telephone conversation

Module VII: Directions

Names of the directions

Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions

To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	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 pronunciation 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 “hui” 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 “cai” (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: BTB 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: BTB 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: BTB 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 Interpretation, 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: BTB 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: BTB 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 LABCourse Code: **BTB 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 phosphatase

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 : BTB 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 : BTB423****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: BTB 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: BTB 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:

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 ideas.

6. Editing & Preparing the final Paper

- s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- u) Check for proper spelling, phrasing and sentence construction.
- v) Check for proper form on footnotes, quotes, and punctuation.
- w) Check to see that quotations serve one of the following purposes:
 - (x) Show evidence of what an author has said.
 - (xi) Avoid misrepresentation through restatement.
 - (xii) Save unnecessary writing when ideas have been well expressed by the original author.
- x) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 22) Title page
- 23) Table of contents
- 24) Introduction
- 25) Review
- 26) Discussion & Conclusion
- 27) References
- 28) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- 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

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: BTB 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 maturation. 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, Differentiation. 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: BTB 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. Bioreactor scale up-regime analysis of bioreactor processes, oxygen mass transfer in bioreactors-microbial O₂ 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: BTB 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 : BSS 404

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 prepositions 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: BTB 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 operon, regulation in Eukaryotes

Module VI: Antisense and Ribozyme technology

Molecular mechanism of antisense molecules, inhibition of splicing, 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: BTB 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 Providers.

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: BTB 503

Credit Units: 03

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.

Micropopagation, pathogen free plants. production haploids,

Somaclonal variation.preservation of germplasm.

Module II

Genetic engineering in plants, - transformation vectors

Gene transfer techniques-vector mediated 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 Academic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

ANIMAL BIOTECHNOLOGY**Course Code: BTB 504****Credit Units: 03****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: BTB-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: BTB 520****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: BTB 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: BTB 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: BTB 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: BTB 530

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:**

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: BTB 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: BTB 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 science.

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, treatment & 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: BSS 504

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 Behavioural Science, 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 prepositions 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 are ginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'ai 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, good 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 using it.

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 about 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: BTB 601

Credit Units: 03

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. Baviess and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel 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.

ENZYMOLGY AND ENZYME TECHNOLOGY

Course Code:

BTB 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, Albery 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: BTB 603

Credit Units: 02

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 grooves, dyad symmetry, base pair stacking, propellor twist, A and Z- DNA, triple stranded DNA, telomeric sequences and structure, G-quartets, 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 Mechanism in Protein Science, Alan Fersht.

IMMUNOLOGY AND IMMUNOTECHNOLOGY

Course Code: BTB 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 Histocompatibility

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: Immunological 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/	EE
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			Project/Seminar/Quiz	
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: BTB 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 hydrogenases

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: BTB 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 hybridisation

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

ENZYMOLGY AND ENZYME TECHNOLOGY LAB

Course Code: **BTB 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 LABCourse Code: **BTB 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 degradation.

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: BTB 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 IgG 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

TERM PAPER & INDUSTRY VISIT

Course Code: BTB 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:

31. Choosing a subject
32. Finding sources of materials
33. Collecting the notes
34. Outlining the paper
35. Writing the first draft
36. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- p) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- q) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- r) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- p) Get facts, not just opinions. Compare the facts with author's conclusion.
- q) In research studies, notice the methods and procedures, results & conclusions.
- r) Check cross references.

4. Outlining the paper

- k) Review notes to find main sub-divisions of the subject.
- l) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is.

You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper

- ee) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- ff) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- gg) Check for proper spelling, phrasing and sentence construction.
- hh) Check for proper form on footnotes, quotes, and punctuation.
- ii) Check to see that quotations serve one of the following purposes:
 - (xvi) Show evidence of what an author has said.
 - (xvii) Avoid misrepresentation through restatement.
 - (xviii) Save unnecessary writing when ideas have been well expressed by the original author.
- jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 36) Title page
- 37) Table of contents
- 38) Introduction
- 39) Review
- 40) Discussion & Conclusion
- 41) Bibliography
- 42) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- u) summary of question posed
- v) summary of findings
- w) summary of main limitations of the study at hand
- x) 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: BTB 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 course also gives a practical overview of the various viruses affecting living beings, their diagnostics by serology and molecular biology techniques, pathogenicity and control. The newly discovered viruses are also included in this course like SARS, Chickugonia, Birdflue etc.

Course Contents:

Module I: General Virology

Brief outline 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 Lambda 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.
- Lenetter 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 and 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, Nanostructures and Nanomaterials: Synthesis, properties and applications, Imperial College Press, 2004.

IPR & Drug Regulatory Affairs

Course Code: BTB 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), Madrid 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 Sachintkar, 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: BSS 604

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 interactional model.

Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress

Personal

Organizational

Environmental

Module IV: Consequences of stress

Effect on behaviour and personality

Effect of stress on performance

Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management

Importance of stress management

Healthy and Unhealthy strategies

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 in 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: BTB 701

Credit Units: 03

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 Biotechnology, A T Jackson , Prentice Hall

DOWNSTREAM PROCESSING

Course Code: BTB 702

Credit Units: 03

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 filtration 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.
- Bioseparations, 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: BTB703

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: BTB 704

Credit Units: 03

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: BTB 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 Vaccines, 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:

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

INDUSTRIAL TRAINING EVALUATION**Course Code: BTB 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:** BTB 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: BTB 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: BTB 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:** BTB 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: BTB 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:

37. Choosing a subject
38. Finding sources of materials
39. Collecting the notes
40. Outlining the paper
41. Writing the first draft
42. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- s) 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.
- t) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- u) 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.

- s) Get facts, not just opinions. Compare the facts with author's conclusion.
- t) In research studies, notice the methods and procedures, results & conclusions.
- u) Check cross references.

4. Outlining the paper

- m) Review notes to find main sub-divisions of the subject.
- n) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- kk) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- ll) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- mm) Check for proper spelling, phrasing and sentence construction.
- nn) Check for proper form on footnotes, quotes, and punctuation.
- oo) Check to see that quotations serve one of the following purposes:
 - (xix) Show evidence of what an author has said.
 - (xx) Avoid misrepresentation through restatement.
 - (xxi) Save unnecessary writing when ideas have been well expressed by the original author.
- pp) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 43) Title page
- 44) Table of contents
- 45) Introduction
- 46) Review
- 47) Discussion & Conclusion
- 48) References
- 49) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- y) summary of question posed
- z) summary of findings
- aa) summary of main limitations of the study at hand
- bb) 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.)

BIOETHICS & BIOSAFETY

Course code: BTB731

Credit Units: 03

Course Objective:

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

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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: BTB732

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, protein folding and its characterization. The course would also emphasize the requirement of protein engineering technique in the generation of novel proteins for specific purposes of industrial importance.

Course Contents:

Module I

Dynamics and Structural Evolution Protein Engineering: Study of molecular interaction forces (Hydrogen, Ionic, covalent, van-der Waals and others), Structure and chemical 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 to characterize the molecular structures of biological materials (Circular dichroism, NMR, X-ray diffraction, FTIR, scanning electron microscopy and others).

Module III

Protein dynamics, Protein Folding (1^o, 2^o, 3^o & 4^o), Proteins design and engineering, Random and site directed mutagenesis; Strategies to alter catalytic efficiency; structure prediction and modeling proteins; Molecular 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 in industry 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 – Environmental 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: BSS 704

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. Propositions 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

PROJECT/ DISSERTATION

Course Code: BTB 860

Credit Units: 25

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 examination.

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 sections, 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