AMITY UNIVERSITY RAJASTHAN
JAIPUR

Bachelor of Technology (Bioinformatics)
Program Code: BTF
Duration – 4 Years Full Time

Program Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2018 Batch

AMITY INSTITUTE OF BIOTECHNOLOGY
AMITY UNIVERSITY RAJASTHAN
JAIPUR

Credit Summary Table

B. Tech Program Bioinformatics					
Semester	**CC**	**DE**	**VA**	**OE**	**Total**
1	**16**	**3**	**4**	**-**	**23**
2	**16**	**3**	**4**	**3**	**26**
3	**18**	**3**	**4**	**3**	**28**
4	**18**	**3**	**4**	**3**	**28**
5	**17**	**3**	**4**	**3**	**27**
6	**18**	**3**	**4**	**3**	**28**
7	**21**	**3**	**4**	**-**	**28**
8	**20**	**-**	**-**	**-**	**20**
Total	**146**	**21**	**28**	**18**	**208**

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

Minor Track: Introductory Bioinformatics							
Sem	**Course Code**	**Course**	**Category**	**L**	**T**	**P/F W**	**Credits**
2	BTF 231	Biological Information and Databases	DE	3	-	-	3
3	BTF 332	Basics of PERL programming I	DE	3	-	-	3
4	BTF 432	Basics of PERL programming II & Python	DE	3	-	-	3
5	BTF 504	Molecular Modeling & Drug Designing	CC	2	-	-	2
6	BTF 632	Biocomputing Methods of Bioinformatics	DE	3	-	-	3
Total							**14**

B. Tech. Bioinformatics

Semester I

Code	Course	Category	L	T	P/FW	Credit
BTF 101	Applied Mathematics - I	CC	3	1	-	4
BTF 102	Applied Physics - I	CC	2	-	-	2
BTF 103	Applied Chemistry - I	CC	2	-	-	2
BTF 104	Introduction to Computers	CC	2	-	-	2
BTF 105	Life Sciences	CC	2	-	-	2
BTF 122	Applied Physics - I Lab	CC	-	-	2	1
BTF 123	Applied Chemistry – I Lab	CC	-	-	2	1
BTF 124	Introduction to Computers Lab	CC	-	-	2	1
BTF 125	Engineering Graphics Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 130	Term Paper	DE	3			3
BTF 131	Chemical Biology	DE	3			
BTF 132	Basics in Biotechnology	DE	3			
BTF 133	Introduction to Bioinformatics	DE	3			
BCS 101	English	VA	1	-	-	1
BSS 104	Understanding Self for Effectiveness – I	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
TOTAL						**23**

Semester II						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 201	Applied Mathematics - II	CC	3	1	-	4
BTF 202	Applied Physics - II	CC	2	-	-	2
BTF 203	Applied Chemistry - II	CC	2	-	-	2
BTF 204	Object Oriented Programming in C++	CC	2	-	-	2
BTF 205	Internet Technologies	CC	2	-	-	2
BTF 222	Applied Physics - II Lab	CC	-	-	2	1
BTF 223	Applied Chemistry – II Lab	CC	-	-	2	1
BTF 224	Object Oriented Programming in C++ Lab	CC	-	-	2	1
BTF 225	Internet Technologies Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 230	Term Paper	DE	3			3
BTF 231	Biological Information and Databases	DE	3			
BTF 232	Computational Biology	DE	3			
BTF 233	Database management System	DE	3			
OE	Open Elective-I	OE				3
BCS 201	English	VA	1	-	-	1
BSS 204	Understanding Self for Effectiveness – II	VA	1			1
	Foreign Language - II	VA	2	-	-	2
FLT 201	French					
FLG 201	German					
FLS 201	Spanish					
FLC 201	Chinese					
Total						**26**

Semester III						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 301	Cell Biology	CC	3	-	-	3
BTF 302	Biochemistry - I	CC	2	-	-	2
BTF 303	Microbiology	CC	3	-	-	3
BTF 304	Computer-I	CC	2	-	-	2
BTF 321	Cell Biology-Lab	CC	-	-	2	1
BTF 322	Biochemistry - I-Lab	CC	-	-	2	1
BTF 323	Microbiology -Lab	CC	-	-	2	1
BTF 324	Computer-I-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 330	Term Paper	DE				3
BTF 331	Metabolomics	DE				
BTF 332	Basics of PERL programming I	DE				
BTF 333	Chemiinformatics	DE				
OE	Open Elective-II	OE				3
EVS001	Environmental Sciences	CC	4	-	-	4
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 304	Understanding Self for Effectiveness – III	VA	1	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
Total						28

Semester IV						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 401	Biochemistry - II	CC	3	-	-	3
BTF 402	Molecular Biology	CC	3	-	-	3
BTF 403	Computers - II	CC	2	-	-	2
BTF 404	Genetics	CC	3	-	-	3
BTF 405	**Statistics for Biology**	**CC**	**3**	**-**	**-**	**3**
BTF 421	Biochemistry – II -Lab	CC	-	-	2	1
BTF 422	Molecular Biology-Lab	CC	-	-	2	1
BTF 423	Computers - II-Lab	CC	-	-	2	1
BTF 424	Genetics-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 430	Term paper	DE	3			3
BTF 431	Proteomics	DE	3			
BTF 432	Basics of PERL programming II & Python	DE	3			
BTF 433	Molecular Structure Visualization	DE	3			
OE	Open Elective-III	OE				3
BCS 401	Communication Skills – II	VA	1	-	-	1
BSS 404	Understanding Self for Effectiveness – IV	VA	1	-	-	1
	Foreign Language - IV	VA	2	-	-	2
FLT 401	French					
FLG 401	German					
FLS 401	Spanish					
FLC 401	Chinese					
Total						28

Semester V						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 501	Structural Biology	CC	3	-	-	3
BTF 502	Advanced Computational Biology – I	CC	3	-	-	3
BTF 503	Immunology	CC	2	-	-	2
BTF 504	Molecular Modeling & Drug Designing	CC	2	-	-	2
BTF 505	Computers - III	CC	2	-	-	2
BTF 521	Structural Biology -Lab	CC	-	-	2	1
BTF 522	Advanced Computational Biology – I-Lab	CC	-	-	2	1
BTF 523	Immunology-Lab	CC	-	-	2	1
BTF 524	Molecular Modeling & Drug Designing -Lab	CC	-	-	2	1
BTF 525	Computers - III-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 530	Term Paper	DE	3			3
BTF 531	Functional and Comparative genomics	DE	3			
BTF 532	Transcriptomics and Data Analysis	DE	3			
BTF 533	Immunoinformatics and Biochemical Techniques	DE	3			
OE	Open Elective-IV	OE				3
BCS 501	Communication Skills – III	VA	1	-	-	1
BSS 504	Understanding Self for Effectiveness – V	VA	1	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language - V French German Spanish Chinese	VA	2	-	-	2
	Total					**27**

Semester VI						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 601	Genomics	CC	3	-	-	3
BTF 602	Computational Proteomics	CC	3	-	-	3
BTF 603	Advanced Computational Biology - II	CC	3	-	-	3
BTF 604	Bioinformatics Algorithms	CC	3	-	-	3
BTF 605	Computers - IV	CC	2	-	-	2
BTF 621	Genomics -Lab	CC	-	-	2	1
BTF 622	Computational Proteomics-Lab	CC	-	-	2	1
BTF 623	Advanced Computational Biology - II -Lab	CC	-	-	2	1
BTF 625	Computers - IV-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 630	Term Paper & Industry Visit	DE	3			3
BTF 631	System Biology	DE	3			
BTF 632	Biocomputing Methods of Bioinformatics	DE	3			
BTF 633	IPR and Drug Regulatory Affairs	DE	3			
OE	Open Elective-V	OE				3
BCS 601	Communication Skills – IV	VA	1	-	-	1
BSS 604	Understanding Self for Effectiveness –V I	VA	1	-		1
FLT 601 FLG 601 FLS 601 FLC 601	Foreign Language - VI French German Spanish Chinese	VA	2	-	-	2
Total						**28**

Note: After completion of the End Term Examination the students must compulsorily undergo Industrial Training of 1 month. The evaluation of this training would be carried out in VII sem.

For domain elective: BTF630- 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)

Semester VII						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 701	Clinical Research & Pharmacovigilance	CC	3	-	-	3
BTF 702	Data Mining	CC	3	1	-	4
BTF 703	SAS (Statistical Analysis System) & Matlab	CC	3	1	-	4
BTF 704	R & Bioconductor	CC	3	1	-	4
BTF750	Industrial Training (Evaluation)	CC	-	-	-	3
BTF 722	Data Mining-Lab	CC	-	-	2	1
BTF 723	SAS (Statistical Analysis System) & Matlab-Lab	CC	-	-	2	1
BTF 724	R & Bioconductor-Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
BTF 730	Term Paper	DE	3			3
BTF 731	BioJava	DE	3			
BTF 732	Optimization Algorithm	DE	3			
BTF 732	BioPerl	DE	3			
BCS 701	Communication Skills – V	VA				1
BSS 704	Understanding Self for Effectiveness – VII	VA				1
FLT 701 FLG 701 FLS 701 FLC 701	Foreign Language - VII French German Spanish Chinese	VA				2
Total						28

Semester VIII						
Code	**Course**	**Category**	**L**	**T**	**P/FW**	**Credit**
BTF 860	Project / Dissertation	CC	-	-	-	20
Total						

APPLIED MATHEMATICS – I

Course Code: BTF101 **Credit Unit: 04**

Course Objective:

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

Course Contents:

Module I: Differential Calculus

Derivative of a function, Derivatives at a point, Fundamental rules for differentiation: Product Rule, Quotient Rule and Chain Rule, Differentiation of Implicit Functions, Parametric forms and Logarithmic Differentiation, Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's and Maclaurin's Theorem, Asymptote & Curvature, Partial Differentiation, Euler's Theorem, Maxima and Minima

Module II: Integral Calculus

Fundamental Integral Formulae, Methods of Integration: Integration by Substitution, By Parts, Partial Fractions, Definite Integral and its Properties, Reduction Formulae, Application to length, Area and Volume.

Module III: Ordinary Differential Equations

Definition of Order and Degree of differential equation, Formation of ODEs, Solution of Differential Equation of 1st Order and 1^{st} Degree: Variable Separation, Homogeneous Differential Equations, Linear Differential Equations, Exact Differential Equations, General Linear ODE of Second Order, Solution of Homogeneous Equation, Solution of Simple Simultaneous ODE

Examination Scheme:

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

Text & References:

Text & References:

Text:

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

References:

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

APPLIED PHYSICS - I
(FIELDS AND WAVES)

Course Code: BTF102 **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: BTF103 **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: BTF: 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: BTF: 105 **Credit Unit: 02**

Course Objective:

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

Course Contents:

Module I: Cell Biology

Organization of cell (Inorganic-Water and Ions; Organic-Proteins, Lipids and Carbohydrates constituents)
Physical structure of the cell-Brief introduction to the Cell Membrane, Cytoplasm and its Organelles (Nucleus, Mitochondria, Golgi, Endoplasmic Reticulum, Lysosomes, Peroxisomes, Ribosomes, Chloroplasts)
Cell cycle.

Module II: Introduction to Cell Physiology

Transport of substances through the cell membrane- Osmosis, Diffusion and its types, Active transport (Sodium-potassium pump) and Passive transport

Membrane potential, Measuring Membrane Potential, Action Potential
Electrocardiogram (ECG)
Electromyography (EMG)
Electroencephalography (EEG)

Module III: Environmental Biotechnology

Biosensors, Biochips and Biofilms
GMO's and Biofertilizers
Biofuels
Gene Therapy, Stem cell and Nanobiomolecules
Bio Informatics- Introduction and Applications

Examination Scheme:

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

Text & References:

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

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APPLIED PHYSICS – I-Lab

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

List of Experiments

1. To determine the wavelength of sodium light by Newtons's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Grif/fth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer

Examination Scheme:

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

APPLIED CHEMISTRY – I -Lab

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

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

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

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

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

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper
a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
f) Show evidence of what an author has said.
g) Avoid misrepresentation through restatement.
h) Save unnecessary writing when ideas have been well expressed by the original author.
i) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

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

Discussion

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

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

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: BTF 131 **Crédit Unit : 3**

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

Course Contents:

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

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

Module III: Structural chemical biology
Purine biosynthesis, thiamine biosynthesis, vitamin E biosynthesis, Steroids (Cholesterol), porphyrin biosynthesise.

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

Examination Scheme:

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

Text & References:

- Waldmann, Herbert, and Petra Janning (2004), Chemical biology: a practical course. Wiley-VCH.
- Tanner, Julian A., and Ka To Shum, (2010), "Chemical Biology." Kirk-Othmer Encyclopedia of Chemical Technology.
- Sener, Bilge.(2009), Innovations in chemical biology. Springer.
- Schreiber, Stuart L. (2000), "Target-oriented and diversity-oriented organic synthesis in drug discovery." Science 287.5460, 1964-1969.
- Chan, Leo L., et al. (2008), A General Method for Discovering Inhibitors of Protein−DNA Interactions Using Photonic Crystal Biosensors Chem. Biol. 3 (7).
- Vineyard, Diana, et al (2007). Optimization of non-natural nucleotides for selective incorporation opposite damaged DNA Org. Biomol. Chem., 5, 3623 – 3630.

BASICS IN BIOTECHNOLOGY

Course Code: BTF: 132 **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.

INTORDUCTION TO BIOINFORMATICS

Course Code: BTF 133 **Crédit Unit : 3**

Course Objective:
Introduction of Bioinformatics is the filed that provides the detailed information about biological data generated by various information. This course is to provide basic information of the filed to the students.

Course Contents:

Module I: Introduction to Bioinformatics: What is Bioinformatics, its goals and scopes, Application of Bioinformatics, Human Genome Project, Role of Computers and Biology in Bioinformatics. Introduction to Biological Databases

Module II: Characteristics and Classification of Databases- Primary, secondary , Composite and Specialised Databases. ENTREZ, EBI, NCBI, ExPasy,

Module III: File Formats: FASTA, ASN.1, GenBank, EMBL, ClustalW , PHYLIP.

Sequence Analysis: Pairwise alignment: Global alignment and Needleman Wunsch Algorithm, Local alignment and Gap penalty and its Statistical significance Scoring Matrices: PAM, BLOSUM.

Module IV: Molecular interactions of Protein-Protein: Protein DNA, Protein carbohydrates, protein ligand, Protein-protein Interaction databases: BIND, DIP, GRID, STRING, KEGG, MetaCyc, EcoCyc.

Examination Scheme:

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

Text & References:

- Setubal Joao and Meidanis Joao, (1997), Introduction to computational molecular Biology, PWS Publishing Company(An International Thomsaon Publishing Company), Indian low priced edition.
- David Mount, (2004), Bioinformatics: sequence and Genome Analysis, by, second Edition. Cold Spring harbour laboratory press.
- A. Malcolm Campbell and Laurie J. Heyer, (2007), Discovering Genomics, Proteomics and bioinformatics, Publisher: Benjamin Cummings.
- Aluru, Srinivas, (2005), Handbook of computational molecular biology. CRC Press,.

ENGLISH

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

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

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats

O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

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

Text & References:

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

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

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

Course Code: BSS 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 Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

FRENCH - I

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

Course Objective:

To familiarize the students with the French language

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

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2
Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1: Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps

1. dire la date et l'heure

Contenu grammatical:

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - I

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

Course Objective:

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

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

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

Course Objective:

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

Course Contents:

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – I

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

Course Objective:

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

Course Contents:

Module I

Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II

Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III

Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV

Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V

Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

APPLIED MATHEMATICS – II

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

Course Objective:

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

Course Contents:

Module I: Linear Algebra

Definition of a Matrix, Operations on Matrices Determinants, Elementary Operations, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination and Gauss Jordan – Method, Eigen values and Eigen Vectors of Matrix, Caley-Hamilton theorem, Diagonalization of a matrix.

Module II: Complex Number

Definition of Complex Number, Equality, Conjugate and Modulus of a Complex Number, Polar form of a Complex Number, De-Moivre's Theorem, Roots of a Complex Number, Exponential and Circular function of a Complex Number, Hyperbolic Functions and their inverses.

Module III: Vector Calculus

Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plain (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof)

Module IV: Probability and Statistics

Frequency Distribution, Arithmetic Mean, Median, Partition Values, Mode, Variance and Standard Deviation, Curve Fitting, Principle of least squares, Linear regression.

Introduction to Probability, Addition and Multiplication theorem of Probability, Random variables and Probability Distribution,Expected values, Binomial distribution, Poisson distribution and Normal.

Distribution and their Applications.

Examination Scheme:

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

Text & References:

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

APPLIED PHYSICS - II

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

Course Objective:

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

Course Contents:

Module I: Wave Mechanics

de-Broglie matter waves, wave nature of particles, phase and group velocity, Heisenberg uncertainty principle, wave function and its physics interpretation, Operators, expectation values. Time dependent & time independent SchrÖdinger wave equation for free & bound states, square well potential (rigid wall), Concept of step potential.

Module II: Atomic Physics

Vector atom model, LS and j-j coupling, Zeeman effect & Paschen-Back effect, Bragg's law, X-ray spectra and energy level diagram, Laser – Einstein coefficient, population inversion, condition of light amplification, He-Ne and Ruby laser

Module III: Solid State Physics

Sommerfield's free electron theory of metals, Fermi energy, Energy bands in solids, physics of semi-conductors, doping, intrinsic and extrinsic semiconductors, Depletion layer, characteristics of PN junction, Forward and reverse baising, Breakdown voltage, Superconductivity, Meissner effect, Introduction to Nanomaterials

Examination Scheme:

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

Text & References:

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

APPLIED CHEMISTRY - II

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

Course Objective:

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

Course Contents:

Module I: Water

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

Module II: Lubricants

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

Module III: Fuel

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

Module IV: Polymers

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

Module V: Corrosion

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

Examination Scheme:

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

Text & References:

Text:

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

References:

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

OBJECT ORIENTED PROGRAMMING IN C++

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

Course Objective:

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

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

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

Text & References:

Text:

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

References:

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

INTERNET TECHNOLOGIES

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

Course Objective:

During this course, students learn basics of Internet and to use it for research/and educational purposes. They will be accustomed to web pages and will be able to browse using different browsers and different searching strategies. They will also be aware about the issues like safety, privacy, and exchanging information over electronic media etc.

Course Contents:

Module I

Introduction to Internet, its history, the working of Internet, components of Internet, Web sites and WebPages, Major protocols that make up the Web, the URL and the Domain Name System,

Module II

Web browsers, plug-ins, Active X, multimedia, A brief about Web programming languages and functions, Real-Time communication, Blogs and RSS

Browse using different browsers, Search Engines and searching the web, different searching strategies.

Module III

Awareness about cyber-crime, safety, privacy, and exchanging information over electronic media etc., Strategies for evaluating resources found on the Internet.

Module IV

Computer network, Types of computer networks, Network Topology, Different types of network topology with their advantages and disadvantages.

Examination Scheme:

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

Text & References:

Text:

- Bioinformatics: Databases and Systems, Stanley Letovsky
- Networking for Dummies by Lowe, Doug.

References:

- Introduction to Bioinformatics by Teresa Attwood, David Parry-Smith,
- Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Des Higgins (Editor), Willie Taylor
- Bioinformatics: A Biologist's Guide to Biocomputing and the Internet, Stuart M. Brown
- All about computers for dummies by Gookin Dass
- Bioinformatics: Sequence and Genome Analysis, David W. Mount.

APPLIED PHYSICS – II -Lab

Course Code: BTF: 222 **Credit Unit: 01**

Practicals

List of Experiments

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ("g") using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (Solar cell).

Examination Scheme:

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

APPLIED CHEMISTRY – II -Lab

Course Code: BTF: 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: BTF: 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

INTERNET TECHNOLOGIES LAB

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

Course Contents:

- Different types of search engines, searching the web, various strategies for efficient searching.
- Using web-based tools, working with Biological sequences:
  a) Conversions of sequence from one form to another (e.g., nucleic acid sequence to amino acid sequence etc.)
  b) Finding out different parameters of a given sequence (e.g., composition, molecular weight, complement, reverse complement etc.).
- Referencing in Scientific literature and their practical usage.
- Format conversion of Biological sequences.
- Pubmed and relevant literature databases: Features and usage.

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: BTF 230 **Credit Units: 03**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:
7. Choosing a subject
8. Finding sources of materials
9. Collecting the notes
10. Outlining the paper
11. Writing the first draft
12. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

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

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
d) Get facts, not just opinions. Compare the facts with author's conclusion.
e) In research studies, notice the methods and procedures, results & conclusions.
f) Check cross references.

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

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper
j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

k) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
l) Check for proper spelling, phrasing and sentence construction.
m) Check for proper form on footnotes, quotes, and punctuation.
n) Check to see that quotations serve one of the following purposes:
o) Show evidence of what an author has said.
p) Avoid misrepresentation through restatement.
q) Save unnecessary writing when ideas have been well expressed by the original author.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
8) Title page
9) Table of contents
10) Introduction
11) Review
12) Discussion & Conclusion
13) References
14) Appendix
Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

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

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

References
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

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.)

BIOLOGICAL INFORMATION AND DATABASES

Course Code: BTF 231 **Crédit Unit : 03**

Module I: Introduction to biological databases, Primary and Secondary databases. Nucleotide databases: GenBank, EMBL, DDBJ, Nucleotiide sequence flatfiles. Protein sequence databases: NBRF-PIR, SwissProt, Uniport Knowledgebase, Uniport Knowledgebase flatfile. Popular Sequence formats

Module II: Structure databases: Introduction to Structures, Structure database like PDB and MMDB, Structure file formats, Structure viewers, Structure similarity searching.

Module III: Information retrieval from Biological databases: Integrated Information retrieval: The Entrez system, SRS

Module IV: Genomic Mapping: Introduction, Relationship between mapping and sequencing, Genomic mapping elements, Types of maps, Comparitive Maps, Uses of Mapping resources. Genomic databases: Introduction, Genome projects, Genome browsers, UCSC, NCBI, Ensembl.

Module V: Protein-Protein Interaction Networks, databases and software: DIP (Database of Interacting Proteins), PPI Server, BIND - Biomolecular Interaction Network Database, PIM – Hybrigenics, PathCalling Yeast Interaction Database, MINT - a Molecular Interactions Database, GRID - The General Repository for Interaction Datasets, InterPreTS - protein interaction prediction through tertiary structure.

Examination Scheme:

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

Text & References:

- Mount, D. W., & Mount, D. W. (2001). *Bioinformatics: sequence and genome analysis* (Vol. 2). New York:: Cold spring harbor laboratory press.
- Sensen, C. W. (Ed.). (2008). *Essentials of genomics and bioinformatics*. John Wiley & Sons.
- Higgs, P. G., & Attwood, T. K. (2013). *Bioinformatics and molecular evolution*. John Wiley & Sons.

COMPUTATIONAL BIOLOGY

Course Code: BTF 232 **Crédit Unit : 03**

Course Objective:
Introduction of Bioinformatics is the field that provides the detailed information about biological data generated by various information. This course is to provide basic information of the filed to the students.

Course Contents:

Module I Sequence Analysis: Multiple sequence analysis, Application of MSA, scoring MSA, Methods of MSA, Profile and BLOCK analysis, Position Specific Scoring Matrices, MSA analysis software and tools.

Module II: Protein Structure Classification: Primary, Secondary and tertiary, protein structure databases and Visualization tools. Protein Structure classification and databases. Protein structure evaluation.

Module III: Genome Analysis: Prokaryotic and eukaryotic genome, sequence assembly and gene identification , comparative genomics- Synteny , Horizontal gene transfer. Functional Genomics.

Module IV: Principle of X ray Crystallography, NMR, Methods of single X ray diffraction of macromolecule-Molecular replacement Method and multiple isomorphous replacement method and direct method, fibre Diffraction

Examination Scheme:

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

Text & References:

- Setubal Joao and Meidanis Joao, (1997), Introduction to computational molecular Biology, PWS Publishing Company(An International Thomsaon Publishing Company), Indian low priced edition.
- David Mount, (2004), Bioinformatics: sequence and Genome Analysis, by, second Edition. Cold Spring harbour laboratory press.
- A. Malcolm Campbell and Laurie J. Heyer, (2007), Discovering Genomics, Proteomics and bioinformatics, Publisher: Benjamin Cummings.

Aluru, Srinivas, (2005), Handbook of computational molecular biology. CRC Press,.

DATABASE MANAGEMENT SYSTEMS

Course Code: BTF 233 Crédit Unit : 03

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:

- Han, J., Kamber, M., & Pei, J. (2011). Data mining: concepts and techniques: concepts and techniques. Elsevier.
- Pujari, A. K. (2001). Data mining techniques. Universities press.
- Elmasri, R. (2008). Fundamentals of database systems. Pearson Education India.
- Connolly, T. M., & Begg, C. E. (2005). Database systems: a practical approach to design, implementation, and management. Pearson Education.
- Jeffrey, D. U. (1989). Principles of database and knowledge-base systems.
- Kimball, R., & Ross, M. (2011). The data warehouse toolkit: the complete guide to dimensional modeling. John Wiley & Sons.

ENGLISH

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

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

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

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

Text & References:

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

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

Course Code: 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 Understanding Self for Effectiveness, Management Pfeiffer & Company.
- Bensley, A. D. (1998). Critical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole Publishing Company.

FRENCH - II

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

Course Objective:

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

Course Contents:

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5 : s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN – II

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

Course Objective:

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

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

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

Course Objective:

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

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Posessive pronouns

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

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – II

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

Course Objective:

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

Course Contents:

Module I

Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II

Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III

Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV

Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V

The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets

- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

CELL BIOLOGY

Course Code: BTF 301 Credit Units: 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:

1. Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
2. Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
3. Cell in Development and Inheritance, E.B. Wilson, Macmilian
4. Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
5. 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: BTF 302 Credit Units: 02

Course Contents:

Module I: ***Introduction, aims and scope:***

Chemical foundations of Biology -Properties of water, acids, bases and buffers, covalent bonds, Non-covalent interactions in biological systems.

Introduction to biomolecules:- Carbohydrates:

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

Module II: ***Lipids****:*

Definition and classification. Fatty acids: introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols: nomenclature, physical properties, chemical properties and characterization of fats - hydrolysis, saponification value, acid value, rancidity of fats, Reichert-Meissel number and reaction of glycerol. Biological significance of fats.

Lipids and biological membranes, Lipid linked proteins and lipoproteins.

Module III: ***Carbohydrate metabolism:***

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

Module IV: ***Lipid metabolism:***

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

Examination Scheme:

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

Text & References:

Text:

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

References:

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

MICROBIOLOGY

Course Code: BTF 303 **Credit Units: 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;

Module V
Classification of Bacteria; Bergeys Manual: brief introduction; Ribotyping, ARDRA, RAPD

Module VI
Normal Microbiota; Mechanism of microbial pathogenicity, Microbial Diseases: Typhoid, Cholera, Tuberculosis, Tetanus, HIV

Examination Scheme:

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

Text & References:

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

Reference:

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

COMPUTER I

Course Code: BTF 304 **Credit Units: 04**

Course Objective:

The aim of this course is two-folds. First to introduce the students to the basic concepts of computer science, and second to provide the students with a practical ability in scientific programming. The course will teach programming in C covering the standard elements of the language.

Course Contents:

Module I

C++ programming language – Classes and objects, Constructors and Destructors, Inheritance, Pointers, Virtual Functions, Polymorphism, Console IO operations, Data Files, Exception handling

Module II

Data Structures: - Linked list, doubly linked list, circular link list; stack implementation using array and linked list; Queue implementation using array & linked list; priority Queue

Module III

Traversal:- Preorder, Postorder, inorder; Tree: Binary tree, m-way tree, AVL tree,

Module IV

Sorting- Bubble sort, Insertion sort, Quick Sort, Selection sort, Merge sort; Searching: Linear search, Binary search

Examination Scheme:

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

Text & References:

Text:

- Let Us C++ by KanetKar, BPB
- Algorithm and Data Structure, RS Salaria

References:

- A comprehensive guide to c++ by Aklecha , BPB
- Introduction to object oriented Programming and C++ by KanetKar,:BPB

CELL BIOLOGY LAB

Course Code: BTF 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 check 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:

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

BIOCHEMISTRY-I LAB

Course Code: BTF 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: BTF 323 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.

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: BTF 330 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 consists of the following steps:
13. Choosing a subject
14. Finding sources of materials
15. Collecting the notes
16. Outlining the paper
17. Writing the first draft
18. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

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

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
g) Get facts, not just opinions. Compare the facts with author's conclusion.
h) In research studies, notice the methods and procedures, results & conclusions.
i) Check cross references.

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

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper
s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the

relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
u) Check for proper spelling, phrasing and sentence construction.
v) Check for proper form on footnotes, quotes, and punctuation.
w) Check to see that quotations serve one of the following purposes:
x) Show evidence of what an author has said.
y) Avoid misrepresentation through restatement.
z) Save unnecessary writing when ideas have been well expressed by the original author.
aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
15) Title page
16) Table of contents
17) Introduction
18) Review
19) Discussion & Conclusion
20) References
21) Appendix
Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

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

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
i) summary of question posed
j) summary of findings
k) summary of main limitations of the study at hand
l) details of possibilities for related future research

References
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from

the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

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.)

METABOLOMICS

Course Code: BTF 331 Credit Units: 3

Module I

Introduction to Metabolomics, metabolome, metabolites, metabonomics. Analytical methods for Metabolomics. Separation methods and Detection Methods.

Module II

Online Metabolomics Databases and Pipelines: ChemSpider, Human Metabolome Database (HMDB), Chemical Entities of Biological Interest (ChEBI), PubChem. Metabolic pathway databases: Kyoto Encyclopedia of Genes and Genomes (KEGG), BioCyc and the "Cyc" family of metabolic pathway databases, Human Metabolome Database (HMDB) Pathways, KNApSAcK.

Module III

Online analytical reference spectra for Metabolomics: Nuclear Magnetic Resonance (NMR) data, Gas-Chromatography / Mass-Spectrometry (GC/MS) data, Madison Metabolomics Consortium Database (MMCD), METLIN, MassBank, ReSpect for Phytochemicals, MS-MS Fragment Viewer 1.0, MetabolomeExpress.

Module IV

Computational Methods to Interpret and Integrate Metabolomic Data: Mass spectrometry (MS)-based Metabolomics, Single-cell Metabolomics, Biomarker discovery, Data clustering and visualization, Classification and prediction, Flux balance analysis.

Examination Scheme:

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

Text Book & References:

1. Metabolomics. Edited by Ute Roessner. Publisher- Janeza Trdine 9, 51000 Rijeka, Croatia, Copyright © 2012 InTech, First published February, 2012.

2. The Handbook of Metabolomics, 2012. Teresa Whei-Mei Fan • Andrew N.Lane • Richard M. Higashi. ISBN: 978-1-61779-617-3 (Print) 978-1-61779-618-0 (Online). Publisher Humana Press, Copyright Holder Springer Science+Business Media New York

BASICS OF PERL PROGRAMMING I

Course Code:BTF 332 Credit Units: 03

Course Objective:

The objective is to do learn basic syntax of PERL programming language and how use extract information by using some methods of PERL programming.

Course Contents:

Module I

Introduction, First Steps In Perl, Working with Simple Values, PERL programming: An Introduction, Perl features, Operators, Statements, Loops, Arrays, Arrays slices, Hashes, List Processing, File Handles, Pattern Matching. How to run PERL programs in Linux/Windows environment, Error Message, Debugging, Perl interpreters, Perl scripts.

Module II

Introduction to Linux: Basic architecture of Linux operating system, commands, Using the Terminal application, typing shortcuts, Path, File permissions, Locate, tar/zip, wild cards, root user, piping of command by awk, basics of shell script.

Scalar values and scalar variables, Strings and numbers, Assignment statements, Blocks, Arrays, Hashes, Operators, Binding operators, Loops, IO.

Module III

Input from file, Input from SDIN, Input from file named in command line.

Regular expression, Pattern matching, Meta symbols, Pattern modifiers, Built-in functions.

Module VI

Files and Data, References, Subroutines, Application of Perl in Bioinformatics: Representing strings and sequenced data in Perl, Program to store a DNA sequence, Concatenating DNA fragments, DNA to RNA transcription

Examination Scheme:

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

Text & References:

- Beginning Perl for Bioinformatics, Book by James Tisdall Shroff Publishers & Distributors, 01-Jan-2001
- Mastering Perl for Bioinformatics, James Tisdall, O'Reilly & Associates, Inc. Sebastopol, CA, USA ©2003

CHEMI-INFORMATICS

Course Code: BTF 333 Credit Units: 03

Course Objective:

This course is a 3-credit course intended to provide an introduction to the cheminformatics. The course objectives are to introduce different methods of cheminformatics with particular emphasis on applications including modern drug discovery.

Course Contents:

Module I

Cheminformatics Introduction:

Introduction to cheminformatics, History and Evolution of cheminformatics, Use of cheminformatics, Prospects of chemiinformatics.

Module II

REPRESENTATION AND MANIPULATION OF 2D MOLECULAR STRUCTURE. Introduction: Computer Representations of Chemical Structures ,Graph Theoretic, Representations of Chemical Structures, Connection Tables and Linear Notations,Canonical Representations of Molecular Structures, Nomenclature; Different types of Notations; SMILES Coding; Matrix Representations; Structure of Molfiles and Sdfiles; Libraries and toolkits; Different electronic effects; Reaction classification.

Module III

Structure Searching , Substructure Searching , Screening Methods,Algorithms for Subgraph Isomorphism , Practical Aspects of Structure Searching , Reaction Databases . REPRESENTATION AND MANIPULATION OF 3D MOLECULAR STRUCTURES, Introduction , Experimental 3D Databases, 3D Pharmacophores , Implementation of 3D Database Searching, Theoretical 3D Databases , Structure-Generation Programs, Conformational Search and Analysis, Systematic Conformational Search, Random Conformational Search, Other Approaches to Conformational Search, Comparison and Evaluation of Conformational Search Methods , The Generation of Distance Keys for Flexible Molecules, Pharmacophore and its mapping techniques.

Module IV

ADMET Properties, Quantitative Structure-Property Relations; Descriptor Analysis; Model Building; Modeling Toxicity; Target Identification and Validation; Lead Finding and Optimization; Virtual Screening; Design of Combinatorial Libraries; Ligand-Based and Structure Based Drug design; Application of Cheminformatics in Drug Design. Combinatorial library generation for molecules.

Examination Scheme:

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

Text & References:

Leach, Andrew R., and Valerie J. Gillet. An introduction to chemoinformatics. Springer Science & Business Media, 2007.

Cramer, Christopher J. Essentials of computational chemistry: theories and models. John Wiley & Sons, 2013.

Kuntz, Irwin D. "Structure-based strategies for drug design and discovery."Science 257.5073 (1992): 1078-1082.

Environmental Sciences

Course Code: EVS 001 **Credit Units: 04**

Course Objective:

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

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance
Need for public awareness

Module II: Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation

Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition
Causes, effects and control measures of:
a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development
Urban problems and related to energy
Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act
Air (Prevention and Control of Pollution) Act
Water (Prevention and control of Pollution) Act
Wildlife Protection Act
Forest Conservation Act
Issues involved in enforcement of environmental legislation
Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

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

Text & References:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

COMMUNICATION SKILLS - I

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

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

Course Contents:

Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats

Module III
Memo
Agenda and Minutes
Notice and Circulars

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

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

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

UNDERSTANDING SELF FOR EFFECTIVENESS - III (INTERPERSONAL COMMUNICATION)

Course Code: 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 behavioiural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interact ional 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 302 **Credit Units: 02**

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

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,
At the Tourist Information Office,
A tlelphone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions
To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch

- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

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

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

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

CHINESE – III

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

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

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g. ; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

Module V
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful

Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn't matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

BIOCHEMISTRY - II

Course Code: BTF 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:

* 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.

MOLECULAR BIOLOGY

Course Code:BTF 402 **Credit Units: 03**

Course Objective:

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

Course Contents:

Module I: Structure of DNA and RNA, DNA Structure, Polynucleotide Chains, Hydrogen Bonding, Double Helix, Minor and Major Grooves, Circular DNA, Topoisomerases, Supercoiling in DNA, RNA structure, Complex tertiary RNA structures.

Module II: DNA replication and Repair, Chemistry of DNA synthesis, Mechanism of DNA polymerase, Replication fork, Specialization of DNA polymerases, DNA synthesis at the replication fork, Initiation of DNA replication, Binding and unwinding: origin selection and activation by the initiator protein, Finishing replication. Replication errors and their repair, DNA damage, Repair and tolerance of DNA damage.

Module III: Transcription, Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, General and specific transcription factors, Regulatory elements and mechanism of transcription regulation

Module IV: Modifications in RNA, 5'-cap formation, transcription termination, 3 '-end processing and polyadenylation, Splicing, Editing, Genetic Code and codon usage;

Module V: Translation, Prokaryotic and Eukaryotic translation, Mechanisms of initiation, elongation and termination, regulation of translation.

Examination Scheme:

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

Text & References:

• Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox, Worth Publishing.
• Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
• Watson J. D, Gann A, Baker T. A, Levine M, Bell S.P, Losick R (2013). Molecular Biology of the gene (7th edition).

COMPUTERS - II

Course Code: BTF 403 **Credit Units: 03**

Course Objective:
The objective of this course is to make students well versed with concepts and implementation of database systems, and visual basic, with an emphasis on bioinformatics applications.

Course Contents:

Section A: Database Concept with Oracle

Module I
Introduction to Database, RDBMS Vs DBMS, Normalisation.

Module II
Introduction to SQL, DDL, DML and DCL statements, Integrity Constraint.
Functions(Aggregate , Character , date) , Views , joins,Sub Queries with Any and All ,Sequences, data Dictionary, SQL reports, generating SQL statements, Introduction to LOBS Controlling the user access.

Module III
Introduction to Database Programming With PL/SQL, Control Flow Statements (IF Statements and Loops), Cursors(Implicit and Explicit),Function and Procedures, data base Triggers, Packages, Exception Handling

Section B: Programming With Visual basic 6.0.

Module I
Introduction to Visual basic, Features, Control flow statements, Event handling (click, lost focus, Got focus, Change , load etc.), array, Control Array , Creating Function and Procedures, modules

Module II
Insert, update, delete and navigation of records using DAO and ADO.

Module III
Introduction to controls like file, Directory, drive, timer, ComboBox, List Box, Progress bar, Creation of MDI form, menu, toolbar ,status bar, Tabstrip control .

Module IV
Advanced Concepts: Chart control, Flex grid control, mapi control. Packing and deployment ,Data Project, DLL creation, ActiveX

Examination Scheme:

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

Text & References:
Text:
- SQL, PL/SQL – The programming Language by Ivan Bayross: BPB
- Visual basic to advanced by dasgupta, Publisher: BPB

References:
- Oracle programming with Visual basic by Snowdon
- Introduction to Oracle 9i by Thomas, Publisher :BPB

Visual basic Developers Guide to ADO by Russel, Publisher: BPB

GENETICS

Subject code: BTF 404 **Credits : 3**

Module I

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.

Module II

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

Module III

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.

Module IV

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.

Module V

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

STATISTICS

Course Code: BTF 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 to develop the students' ability to apply the statistical techniques in problem solving situations.

Course Contents:

Module I: Introduction

Need and scope of statistics, Collection, Classification and Organization of Data.

Module II: Measures of Central Tendency and Dispersion

Measures of Central Tendency / Location and Dispersion of a set of data - Arithmetic Mean, Weighted Mean, Combined Mean, Corrected Mean, Geometric Mean, Median, Mode, Quartiles, Decile and Percentiles. Range, Interquartile Range,Mean Deviation, Standard Deviation, Variance and Coefficient of Variation.Skewness, Moments and Kurtosis.

Module III: Correlation and Regression

Correlation: Introduction, Importance, Types, Karl Pearson's coefficient of linear correlation and Spearman's Rank correlation. Regression Analysis: Introduction, Two lines of Regression, Regression Coefficient in a bivariate frequency distribution, Standard error of the estimate.

Module IV: Probability and Probability Distributions

Mathematical concept of probability, Set-theoretic notation in Probability, Rules of counting, Permutations and Combinations. Derivation and use of common laws of probability, Statistical Independence, Bayes' Theorem, Discrete and Continuous Variables, Random Variables and their Probability Distributions- Binomial Distribution, Poisson Distribution, Normal Distribution

Module V: Sampling and Test of Significance

Sampling theory, Methods of sampling: Random sampling: Simple Random, stratified, Systematic and Multi Stage sampling, Non-Random Sampling: Purposive, Cluster, Quota, convenience and Sequential Sampling. Null hypothesis, Alternative hypothesis, Critical region, Level of significance, Test of significance for large samples: Normal test for sample mean and population mean, normal test for two sample means, Test of significance for small samples: t-distribution, F-distribution, Chi-Square distribution, Test of goodness of fit, Test of independence and Analysis of Variance (ANOVA) – one way classification model.

Module VI: Time series and Forecasting

Introduction to Demography and vital statistics, analysis of time series, interpolation and extrapolation, Markov chains

Examination Scheme:

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

Text Books:

- Biostatistics by P. N. Arora and P. K. Malhan, Himalaya Publishing House.
- Fundamental of Biostatistics by Bernard Rosner. Oxford University Press
- Statistical Methods in Bioinformatics: An Introduction by G.R. Grant, W.J. Ewens. Springer Verlag.

Reference Books:

- Introduction to Probability Theory by P.G. Hoel. Houghton Mifflin College
- Introduction to Statistical Theory by P.G. Hoel, S.C. Port, C.J. Schiller, R.A. Srinivasan, A. Srivasan. McGraw-Hill Trade
- Schaum's Outline of Probability, Random Variables and Random Processes by H.P. Hsu. McGraw-Hill Trade.

- Mathematical Statistics by H.C. Saxena. S. Chand & Company
- Biometry – Case study by Nicholas Lange and Louise Ryan. John Wiley & Sons
- Statistics of Extremes by E.J. Gumbel. Columbia University Press.

BIOCHEMISTRY- II LAB

Course Code: BTF 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 phosphates

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

MOLECULAR BIOLOGY LAB

Course Code: BTF 422 **Credit Units: 02**

Course Contents:

Module I

Agarose gel electrophoresis,

Module II

Preparation of DNA: genomic, Plasmid

Module III

Isolation of RNA: total RNA and mRNA

Module IV

Bacterial transformation.

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

COMPUTERS LAB - II

Course Code:BTF 423 **Credit Units: 02**

Course Contents:

Module I
Creation of table, Insert, Update, Delete records, Implementing the integrity constraint: Primary Key, Not null, Foreign Key, Check, Unique. Using Implicit function: Date, Character and Aggregate Function, Sub queries.

Module II
Implementing Views, joins: Equi, Inner and Outer, creation of sequences, SQL reports.
Generating SQL statements. User management :(Create user, alter user, object privileges, system, Privileges,grant ,revoke,Role)

Module III
PL/SQL: Control Statements, Writing programs using Cursor, Implementing Functions and Procedures, Implementing data base Triggers and Packages. PL/SQL Tables.

Module IV
Visual basic: Form Creations, Working with controls from tool bar. Data base programming with the ADO and DAO. Implementing Chart control, Flex grid, Modules, Functions, package and deployment of the project, Reports using data project. File Handling

Module V
ActiveX creation, DLL creation

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

Subject Code: 422 **Credit: 1**

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

* 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

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: BTF 430 **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 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

bb) 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.

cc) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
dd) Check for proper spelling, phrasing and sentence construction.
ee) Check for proper form on footnotes, quotes, and punctuation.
ff) Check to see that quotations serve one of the following purposes:
gg) Show evidence of what an author has said.
hh) Avoid misrepresentation through restatement.
ii) 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:
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.

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.)

Proteomics

BTF 431 **Credit: 3**

Module I
Introduction and scope of proteomics; Protein sequencing methods, Current concepts of peptide sequencing with MS-MS methods, Post translational Modification in proteins, methods of detecting PTMs.

Module II
Protein separation techniques: ion-exchange, size exclusion and affinity chromatography techniques, Polyacrylamide gel electrophoresis; Isoelectric focusing (IEF); Two dimensional PAGE for proteome analysis; Image analysis of 2D gels.

Module III
Introduction to mass spectrometry; Strategies for protein identification; Protein sequencing; Protein modifications and proteomics; Applications of proteome analysis to drug; Protein-protein interaction: Two hybrid interaction screening.

Module IV
Protein engineering; Protein chips and functional proteomics; Clinical and biomedical application of proteomics; Proteome database; Proteomics industry.

Examination Scheme:

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

Text Book & References:
1. R.M.Twyman, Principles of Proteomics, BIOS Scientific Publishers, 2004.
2. P.Michael Conn, Handbook of Proteomic Method. Humana Press, Totowa, New Jersay, USA, 2003.
3. L.Stryer, Biochemistry, W. H. Freeman and Co., New York, 2007

Basics of PERL programming II & Python

BTF 432 **Credit: 3**

Course Objective:

The objective is to do advance programming in PERL for bioinformatics how use handle large files and databases to extract information by using various modules of PERL programming. Apart from Perl Programming Python language introduction and its application in bioinformatics is an important objective of the course.

Course Contents:

Module I
Reading proteins from files, finding motifs, counting nucleotides, exploding strings into arrays, Operating on strings. Introduction to BioPerl, Installation of Various Basic Packages, Modules and Widgets, Internet-related Libraries

Module II
A program to simulate DNA mutation, generating random DNA, Analyzing DNA, Translating DNA into proteins. Using Random DNA find the relation between randomly generated and naturally occurring DNA, RNA and Protein sequence on various parameters.

Module III
Course Introduction, Introduction to scripting, An Introduction to Python, Numbers and operators, Testing Python Scripts, Variables and Data types, Complex data types: strings, tuples (Accessing tuples, Operations, Working, Functions and Methods), lists, and dictionaries (Accessing values in dictionaries,Working with dictionaries, Properties, Functions).

Module VI
Decisions and Loops, Functions, Objects and Classes, Modules: Importing module, Math module, Random module, Packages, Composition, Advanced Python testing, File Access: Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions, Text processing and Regular Expressions, Accessing Databases, Network Programming, Web applications

Examination Scheme:

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

Text & References:

- Beginning Perl for Bioinformatics, Book by James Tisdall Shroff Publishers & Distributors, 01-Jan-2001
- Mastering Perl for Bioinformatics, James Tisdall, O'Reilly & Associates, Inc. Sebastopol, CA, USA ©2003
- Patrick O'Brien, Beginning Python for Bioinformatics, O'Reilly, 2002.
- Alex Martelli, Python in a Nutshell, O'Reilly, 2006.
- Cynthia Gibas, Per Jambeck, Developing Bioinformatics Computer Skills, O'Reilly, 2001.
- Harvey M. Deitel, Python: How to Program, Prentice Hall, 2002

MOLECULAR STRUCTURE VISUALIZATION

BTF 433 **Credit: 3**

Module I

Levels of protein structure · Primary structure · Secondary structure · Tertiary structure · Quaternary structure, Intermolecular forces · Types of intermolecular forces · Entropy and temperature · Protein folding · Levinthal Paradox. Motifs of protein structure · Hydrophobic and hydrophilic regions · Ramachandran plot · Alpha-helix · Beta sheets · Loops · Topology diagrams · various structural motifs.

Module II

Protein structure prediction · Impediments · Sequence considerations · Structural considerations · Energy consideration · Energy landscape · Validation, Structure prediction of small proteins using ab initio stochastic models · Lattice simulation · Random-walk model · Self-avoiding model · HP-models.

Module III

Structure prediction of small proteins using ab initio deterministic models · Ergodic hypothesis · Use of Newtonian equations of motion · Optimization techniques: Steepest descent, GA, simulated annealing · Force fields (Amber, CHARMM). X-Ray crystallography and NMR , Nucleic acid structures · DNA structures · RNA structures .

Module IV

Useful tools · Visualization using VMD, Pymol, Rasmol, SPDBV, CHIME, etc. Structure analysis and validation: Pdbsum, Whatcheck, Procheck,Verify3D and ProsaII.

Examination Scheme:

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

Text Book & References:

1. Molecular Modelling: Principles and Applications (2nd Edition) Andrew R. Leach (Prentice Hall)
2. Introduction to Protein Structure Carl Branden, John Tooze (Garland)
3. Proteins: Structures and Molecular Properties Thomas E. Creighton (Freeman)
4. Principles of Nucleic Acid Structure Stephen Neidle (Academic Press)

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: FLG401 **Credit Units: 02**

Course Objective:

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

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

Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

Module I: Present perfect tense

Present perfect tense, usage and applicability

Usage of this tense to indicate near past

Universal applicability of this tense in German

Module II: Letter writing

To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions

Usage of prepositions with both accusative and dative cases, Usage of verbs fixed with prepositions Emphasizing on the action and position factor

Module IV: Past tense

Introduction to simple past tense, Learning the verb forms in past tense, Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale

Comprehension and narration

- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case

Genitive case – Explain the concept of possession in genitive, Mentioning the structure of weak nouns

Module VII: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture; Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

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

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch

- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja , Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - IV

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

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

Course Contents:

Module I
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

Module II
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

Module III
Imperatives (positive and negative commands of regular verbs)

Module IV
Coomercial/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: FLC401 **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

STRUCTURAL BIOLOGY

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

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

Course Contents:

Module I: Chemistry of amino acids and peptides (side chain structure and function in protein folding and functionality)
Secondary structure of proteins -helices, sheets, loops and turns; Structural and functional proteins. Tertiary structure of proteins, homo and hetero-dimers, trimers and tetramers; forces governing protein-protein interactions; open tertiary structure; Classification of proteins; Structure and function of an antibody; structure of hemoglobin, muscle proteins; Sequence and structural motifs in proteins.

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

Module III: Protein solubility, protein stability and stabilization
Salting in and salting out, Parameters affecting; enthalpic and entropic stabilization, mutations increasing stability, .helix capping; Native, partially denatured and denatured proteins; Protein denaturation, Physical and chemical denaturants; Refolding

Module IV: DNA structure
covalent structure of DNA, base pairing, hydrogen bonding, DNA melting and annealing, difference between AT and GC pairing, DNA models, The Watson Crick model; Crystal structure of B-DNA, major and minor groves, dyad symmetry, base pair stacking, propellor twist, A and Z- DNA, triple stranded DNA, telomeric sequences and structure, G-quartcts, palindromic and tandem sequences, Base pair flipping and DNA bulges, DNA methylation; Protein-DNA interactions; drug-DNA interactions

Examination Scheme:

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

Text & References:

Text:
- Introduction to Protein Structure by C. Branden and J Tooze. Garland Publishing Company
- Biochemistry by R.H. Abeles, P.A. Frey and W.A. Jencks. Jones and Bartlett

References:
- Essentials of Molecular Biology by D. Freifelder. Jones and Bartlett Publications
- Genes VII by B. Lewin. Oxford University Press
- Protein Structure by M. Perutz. Oxford University Press
- Proteins (Structures and Molecular Properties) by T.E. Creighton. Publishers : W.H. Freeman and Company
- Database Annotation in Molecular Biology by Arthur M. Lesk
- From Genes to Clones by E.L. Winnacker
- Genes & Genomes by M.S. Paul Berg

Structure and Machanism in Protein Science by Alan Fersht

ADVANCED COMPUTATIONAL BIOLOGY - I

Course Code: BTF 502 **Credit Units: 03**

Course Objective:
The objective is to describe how molecular data can be used to construct a phylogenetic tree and Characterize the rates and causes of nucleotide substitutions. The aim is also to explain how a gene/protein family arises and the mechanisms which underlie evolution at the molecular level.

Course Contents:

Module I: Phylogenetic prediction
Phylogenetic trees: Phylogenetic representations, Definition and description, various types of trees, Methods of phylogenetic analysis: Distance method (UPGMA, The Neighbour Joining, The Fitch/Margoliash method) and Character-based methods (Maximum Parsimony, Maximum Likelihood).

Module II: Tree Evaluation and packages
Approaches for tree reconstruction: Character optimization, delayed and accelerated transformation, Reliability of trees, Bootstrap, jackknife, decay, randomization tests. Applications of phylogeny analyses, Comparison of Phylogenetic Trees obtained using DNA seq. Vs. protein seq. Vs. Full genomes. Softwares for phylogenetic analysis: Survey of software programs available for phylogenetic analysis

Module III Protein structure prediction
Protein structure prediction: Protein structures, α- Helix, β-Sheet, Loops and coils,Protein secondary structure prediction methods: The Chou-Fasman and GOR methods, Neural Network models and Nearest-Neighbor methods. Tertiary structure prediction methods: Molecular modelling, Threading, Ab initio structure prediction, Protein-Protein interaction, Protein structure prediction softwares, Protein Structural Visualization. Ramachandaran plot, Forces in protein interactions. Classes of Protein Structure, Protein structure classification databases: SCOP, CATH, FSSP, HSSP, MMDB, SARF database.

Module IV Systems Biology
Systems Biology: Overview, Networks and Graphs, Network structure and dynamics. Micro array – definition, Applications of Micro Arrays in systems biology. Self organizing maps and Connectivity maps - definition and its uses. Networks and Pathways – Types and methods. Metabolic networks.

Examination Scheme:

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

Text & References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield. Publisher: Cambridge University Press
- Biocomputing hypertext coursebook at http://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins A.D. Baxevanis and B.F.F. Ouellette. Publisher: Wiley-interscience.
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor Laboratory Press
- Computational Modeling of Genetic and Biochemical Networks by J.M. Bower and H. Bolouri. MIT Press
- Computational Molecular Biology: An Algorithmic Approach by P.A. Pevzner. Publisher: MIT Press
- Computer Methods for Macromolecular Sequence Analysis by R.F. Doolittle, J.N, Abelson, M.I. Simon. Publisher: Academic press
- Essentials of Genomics and Bioinformatics by C.W. Sensen. John Wiley and Sons Inc.
- Introduction to Bioinformatics by T. Attwood and D. Parry-Smith. Prentice Hall
- Introduction to Computational Biology: Maps, Sequences and Genomes by M. Waterman. Chapman and Hall

- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. V. Heijne and G.V. Heijne. Academic Press
- Synthetic Biology, A New Paradigm for Biological Discovery, a report by Beachhead Consulting, 2006
- Systems Biology: Definitions and perspectives by L.Alberghina H.V.westerhoff, Springer. 2005

IMMUNOLOGY

Course Code: **BTF 503** **Credit Units: 02**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immunogenetics 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
Innate and acquired immunity, Active and Passive immunity, Cell mediated and Humoral immune response, Primary and secondary immune response,Factors affecting individual immunity,clonal nature of Immune Response.

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

Module III:
Nature and biology of Antigen: Immunogen vs. Antigen, factors affecting immunogenicity, Hapten and carriers, Adjuvants, Super antigens
Antibody structure, types of antibodies, Monoclonal antibodies: production and applications, Generation of antibody diversity,

Module IV
MHC: Structure of MHC class I, II & III, exogenous and endogenous antigen presentation by MHC, MHC restriction, Self-tolerance in relation to MHC.
Autoimmunity and autoimmune diseases: Hashimoto's thyroiditis; Myasthenia gravis; Rheumatoid Arthritis, Anemia- Pernicious and autoimmune hemolytic anaemia.
Transplantation immunology: types of grafts, mechanism and types of rejection, tissue typing.

Module V
Complement system
Vaccines
Tumor immunology
Antigen - antibody interaction: agglutination and precipitation, ELISA, RIA, IFA and their applications

Examination Scheme:

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

Text & References:

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

References:

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

MOLECULAR MODELING AND DRUG DESIGNING

Course Code: BTF 504 **Credit Units: 02**

Course Objective:
Molecular modeling and computer graphics are powerful tools in the study of the relationships between molecular structure and biological activity, and thus essential in the process of rational drug design. Different methods of drug designing will be discussed.

Course Contents:

Module I
Introduction to drug designing, drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, toxicology considerations, problems and drawbacks on drug discovery and development.

Module II
Drug Target classification, identification and validation strategies, Design and development of combinatorial libraries for new lead generation

Module III
Structure-based design – 'de novo' design methodologies 3D-database searching techniques, docking

Module IV
QSAR: Statistical techniques behind QSAR, classical QSAR, molecular descriptors 3D QSAR and COMFA

Module V
Basic principles of molecular modeling, molecular dynamics simulation techniques.

Examination Scheme:

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

Text & References:

- Principles of molecular modeling by Andrew Leach
- Principles of Drug Action by W.B. Pratt and P. Taylor. Churchill Livingston
- Principles of Medicinal Chemistry by W.O. Foye, T.L. Lemke, and D.A. Williams. Williams and Wilkins
- Essentials of Drug Designing by V. Kothekar
- Drug Design by Cohen

COMPUTERS – III

Course Code: BTF 505 **Credit Units: 02**

Course Objective:
It enables the students to access biological information networks and databases to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases. It will enable them to interact with the Linux GUI and command line interface. It also provides a step by step, theoretical and practical introduction to the development of useful tools for automation of complex computer jobs, and making these tools accessible on the network from a Web browser.

Course Contents:

Section A: Web page Designing

Module I
Introduction to HTML, Tags for bold, italic, underline, list, marque, inserting images, Hyperlinks, Paragraphs, Heading, Font, table creation with rowspan and colspan, Form tag, frameset, Mapping a Image

Module II
Introduction to PHP Servers: Introducing Apache, PHP, MySql, Installing Apache, PHP, MySql, Configuring Apache for PHP, Registering Domains, Parking Web sites, Publishing with FTP

Module III
Simple Animation creation using Flash.

Section B: Linux

Module I
Introduction to Operating system, Functions of an OS, Features of Linux, Introduction to Kernel and Shell of Linux, Dircetory Structure, Shell commands for Directory and Files.

Module II
Working with the vi and Pico Editors Shell commands: - wc, sort, tail finger, find, diff, comm.,cut ,cp Paste, grep, Tee, ps, kill, in, who, tty who, who am I, su, chown,chmod, date, unique, touch, file.

Module III
Introduction to Shell script, shell variables, System variables, Control statements, Global variables, positional Parameters, set command, shift command

Module IV
System administrations: create, update and delete a user, Modifying and deleting groups. Introduction to file System, Mounting and unmounting the file system, FSCK command, creating a file system using FDISK Command, Back tips, back up schedule, Back up Tools.

Examination Scheme:

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

Text & References:

Text:
- ASP in 21 Days by Scott Mitchell, James Atkinson publisher SAMS
- Red Hat linux 6 fast and Easy by WitherSpoon, Publisher BPB

References:
- ASP 3.0 A Beginner's Guide by Mercer, TataMcGraw Hill
- Linux Complete by Sybex, BPB
- Learning macromedia Flash 5 by Weixel Publisher: BPB
- Teach your self macromedia Flash 5 in 24 Hours by Kerman Publisher: BPB

STRUCTURAL BIOLOGY LAB

Course Code: BTF 521 **Credit Units: 01**

Course Contents:

Module I
Chemical modification of proteins

Module II
Peptide mapping

Module III
Analysis of amino acid composition.

Module IV
Analysis and interpretation of Spectrophotometric data for denaturation studies.

Module V
Crystallization of Lysozyme -pH driven and salt driven crystallization.

Module VI
Effect of concentration. BMCD

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

ADVANCED COMPUTATIONAL BIOLOGY – I-LAB

Course Code: BTF 522 **Credit Units: 01**

Module I:

Biological Databases: Format & databases of Nucleic Acids & Proteins(GENBANK, EMBL, DDBJ, PIR, UNIPROT, PDB, SCOP, CATH, PRINT, Pfam etc) .

Module II:

Sequence analysis, Pairwise and multiple sequence analysis

Module III:

Phylogenetic Analysis

Tree Building using different tools, Tree evaluation, Phylip Package, MEGA.

Module IV

Protein Structure Prediction

Protein Secondary structure prediction, tertiary structure prediction, structure evaluation and validation, Ramachandran plot.

Module V: Metabolic Pathway databases

Protein interaction databases, visualizing protein interaction networks, predicting interaction.

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 LAB

Course Code: **BTF 523** **Credit Units: 01**

Course Contents:

Module I
Blood film preparation and identification of cells.

Module II
Lymphoid organs and their microscopic organization.

Module III
Immunization, collection of serum.

Module IV
Purification of IgG from serum.

Module V
Separation of mononuclear cells by Ficoll-Hypaque.

Module VI
Con-A induced proliferation of thymocytes (by MTT method). .

Module VII
Elisa.

Module VIII
Hapten conjugation and quantitation.

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

MOLECULAR MODELING AND DRUG DESIGNING LAB

Course Code: **BTF 524** **Credit Units: 01**

Course Contents:

Module I
Building of Molecules

Module II
Structure based drug design

Module III
QSAR

Module IV
Energy minimisation and simulation techniques.

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

COMPUTERS LAB – III

Course Code: BTF 525 **Credit Units: 01**

Course Contents:

Module I

Designing the Static web pages using HTML, Front page.

Module II

Designing the Dynamic web pages using PHP: Insert update delete and retrieval of records from a Database (Oracle,SQL server, Ms –Access) through PHP.

Module III

Sending and receiving mail using SMTP. Designing a page using paging.

Module IV

Working with Linux commands like: ls, wc, sort, tail finger, find, diff, comm., cut, cp Paste, grep, Tee, ps, kill, in, who, tty who, who am I, su, chown,chmod, date, unique, touch, file.

Module V

Designing the Shell Scripts, create, update and delete a user, Modifying and deleting groups.

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: BTF 530 **Credit Units: 03**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may 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

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:
pp) Show evidence of what an author has said.
qq) Avoid misrepresentation through restatement.
rr) Save unnecessary writing when ideas have been well expressed by the original author.
ss) 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.

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.)

Functional and Comparative genomics

Course Code : BTF-531 **Credit Units:3**

Course Objective:
The recent proliferation of genomic data has transformed biology, making previously laborious and expensive experiments easier and cheaper, enabling new avenues of inquiry, and fundamentally altering our understanding of biology and medicine. This course will introduce you to the questions that can be asked and answered with genomic data, and to the computational tools available to analyze that data.

Module I: Introduction to Genome and Gene families
Genome projects, Human genome organization, introduction to transcriptomics, proteomics. Human genome browser- ENSEMBLE. Mitochondrial genome, CpG islands. Gene families: Multigene families – Classical gene families, families with conserved domains, Gene superfamilies, Repetitive DNA and transposable elements, Origin of gene families.
Module II: Genome sequencing techniques and applications
Basic genome sequencing techniques, Next-Generation sequencers, Sequencing strategies and the shotgun method Massive parallel sequencing and its applications.
Module III: **Comparative Genomics**
Overview of prokaryotic and eukaryotic genomes, C-value, number of genes and complexity of genomes, Conservation and diversity of genomes, Comparative genomics as an aid to gene mapping and study of human disease genes.
Module IV: Functional genomics
Functional Genomics: Sequence-Based Approaches, MicroarrayBased Approaches, Comparison of SAGE and DNA Microarrays. Differential display, Protein functions on genome-wide scale, Knock-out analysis, Anti-sense and RNA interference (RNAi).

Examination Scheme:

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

Text Book & References:
1. Richard J Reece (2003), Analysis of Genes and Genomes, Wiley Publications,
2. Mount, D. (2004) “Bioinformatics: Sequence and Genome Analysis”; Cold Spring Harbor Laboratory Press, New York.
3. Baxevanis, A.D. and Francis Ouellellette, B.F. (1998) “Bioinformatics – a practical guide to the analysis of Genes and Proteins”; John Wiley & Sons, UK.
4. Comparative genomics: empirical and analytical approaches to gene order dynamics, map alignment and the evolution of gene families by Sankoff, D. & Nadeau, J.H., Netherlands, Kluwer Academic Publishers, 2000.

Transcriptomics and Data Analysis

BTF 532 **Credit Units:3**

Course Objective:

The main objective of this course is to provide detail insight of RNA and its data analysis using software and methods. Transcriptomic analysis of organism and it comparative analysis other species

Module I

Introduction to the Biological Systems and Genomics, Introduction to "Omics", Next generation genome sequencing , Introduction of Bioinformatics' tools in genome sequencing , Applications of next generation sequencing in medicine and agriculture , Personalized genomics and medicine

Module II

Transcriptomics and Construction of Regulatory Networks, Next generation transcriptomics technologies, Generation of transcriptional regulatory networks, Data mining and bioinformatics software to build transcriptional regulatory modules, Introduction of databases and software for transcriptomics , High-throughput genetic screens to understand signaling pathways in model and non-model organisms , High-throughput genetic manipulations.

Module III

Proteomics and Generation of Interactomics, High-throughput proteomics, Construction of interactomics, Bioinformatics and data visualization software for proteomics, Diseasomes, Bioinformatics methods to predict protein-protein interactions.

Module IV

Microarray data: normalization and analysis. Genevestigator and OncoMine - browsing microarray-derived gene expression profiles, tissue and stage-of-development-specific patterns of expression, coexpression of genes, precomputed lists of differentially expressed genes. Standalone analysis of publicly available microarray expression data: GEO database, TM4 analysis suite. Assembly of EST: CAP3 program.

Examination Scheme:

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

Text & References:

1. Genomes, 2nd edition, Terence A Brown., Department of Biomolecular Sciences, UMIST, Manchester, UK, Oxford: Wiley-Liss; 2002. ISBN-10: 0-471-25046-5
2. Sequence - Evolution - Function: Computational Approaches in Comparative Genomics. Koonin EV, Galperin MY. Boston: Kluwer Academic; 2003.
3. Drăghici, Sorin. Data analysis tools for DNA microarrays. CRC Press, 2003.
4. Pevsner, Jonathan. Bioinformatics and functional genomics. John Wiley & Sons, 2015.

Immunoinformatics and Biochemical Techniques

Course Code: BTF 533 **Credit Units: 01**

Module I

Immune System: Humoral immunity, Introduction, Lymphocytes: Their origin and differentiation, Types of immune responses, B- Lymphocytes and their activation, structure and function of immunologic, immunologic classes and subclasses, generation of antibody diversity, Major, Histocompatibility Complex. Immune system: Cellular immunity Thymus derived lymphocytes (T cells) and their classification, Antigen presenting cells(APC), Macrophages, Langerhans cells their origin and function, mechanism of phagocytosis, Identification of cell type of immune system, immunosuperresion, immmuno tolerance.

Module II

Computational vaccinology, Quantitative approach, international immunogenetics information system, generating data for databases- peptide repertoire if HLA molecules, HLA nomenclature and IMGT/HLA sequence databases. Immunogenetics to immunomics Functional prospects of gene and transcripts, Mathematical models of HIV and immune system, Immunogenomics- towards digital immune system, Integration of immune models using Petri Nets, Viral bioinformatics- computational views of host and pathogen.

Module III

Immunotechniques: Antiserum production, immunofluorescences, ELISA, immunoblotting, monoclonal antibodies, Fluoroscence assisted cell sorting (Flowcytometry).
Chromatography: Definition, Principle and types: Paper, thin-layer, Adsorption, Ion-Exchange, Affinity, Gel-filteration, Gas, HPLC and FPLC.

Module IV

Biochemical Methods of Analysis, Electrophoresis: Principles, types, moving paper Starch gel agar gel, immunoelectrophoresis Colorimertry, Flourier and Spectrometry: Principle of Beer and Lambert's law: Principle, description and application. Principle of NMR, ESR, Mass spectrometer and X-ray diffraction, Fourier Transform: Fourier Transform of discretely sampled data, Fast Fourier Transform (FFT)

Examination Scheme:

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

Recommended Books:

1. I. Roitt, Essential Immunology, Blackwell Scientific Publications, Oxford(1991).
2. E. Benjamin and S. Leskwitz, Immunology: Ashort course, Wiley Liss NY(1991)
3. Kuby, Immunology, Fourth edition.

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

FRENCH - V

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

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

Course Contents:

Module D: pp. 131 – 156 Unités 10, 11

Contenu lexical: **Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - V

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

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

Course Contents:

Module I: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module II: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

Module IV: Verbs with fixed prepositions
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

Module V: Texts
A poem 'Maxi'
A text Rocko

Module VI: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture; Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - V

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

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

Course Contents:

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

CHINESE – V

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

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

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- "Elementary Chinese Reader " Part-II Lesson 39-46

SEMESTER VI
GENOMICS

Course Code: BTF 601 **Credit Units:2**

Course Objective:
The objective is to explain the structure, function, replication and evolution of eukaryotic genomes. Emphasis will be on current gene expression profiling techniques, different tools for analysis of human genomes
Course Contents:

Module I

Introduction to Genomics, Size and structure of genomes in different organisms

Genome sequencing, Identification of genes, Databases and web-based resources for genomics research and analysis.

Module II

NGS(Next Generation Data) analysis methods: File formats, Key features of File formats, Various pipelines applied in Genomics, Transcriptomics, Metagenomics, and other omics methods with Tools applied. GATK pipelines for reference based and de novo assembly.

Module III

Gene expression profiling, Applications of Gene expression profiling. Comparative genome analysis.

Module IV

Alternative splicing models, Pharmaco-genomics and toxico-genomics

Module V

DNA microarray, Microarray Databases, Implications in Cancer genetics, Meta-genomics

Examination Scheme:

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

Text & References:
Text:
Introduction to Computational Molecular Biology, Joao Meidanis, Joao C. Setabal,
Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D. Baxevanis, B. F. Francis Ouellette

References:
Handbook of Comparative Genomics: Principles and Methodology, Cecilia Saccone, Graziano Pesole
Sequence - Evolution - Function: Computational Approaches in Comparative Genomics, Eugene V. Koonin, Michael Y. Galperin
Comparative Genomics - Empirical and Analytical Approaches to Gene Order Dynamics, Map Alignment and the Evolution of Gene Families, David Sankoff and Joseph H. Nadeau, Comparative Genomics, Melody Clark
Bioinformatics: Sequence and Genome Analysis, David W. Mount.
Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D. Baxevanis, B. F. Francis Ouellette.

COMPUTATIONAL PROTEOMICS

Course Code: BTF 602 **Credit Units**:3

Course Objective:
The broad objective of this course is to describe basic principles of protein structure including protein structure motifs, properties of alpha helices and beta sheets and protein folding. The aim is to explain to the students how a protein's conformation determines its biochemical activity, how a protein's structure enables binding to other molecules and how a protein's function can be deduced from its primary structure. It describes the techniques used for solving the 3-D structure of a protein.

Course Contents:

Module I: Introduction to Proteomics
Introduction to Proteome analysis, 2D-gel electrophoresis, high-throughput proteome analysis with 2D-IEF, chromatography-HPLC, GC; amino acid sequencing, mass spectrometry,

Module II
Structure function relationship
Protein-protein interactions – Large molecular complexes – RNA polymerase II, ribosome; SUMO Protein-protein interactions in health and disease; Postranslational modifications – concepts of how protein function is rapidly and dynamically modulated through posttranslational modifications, how posttranslational modifications precede altered transcription levels.

Module III
Structure determination – experimental and theoretical methods for determination of protein molecular size, X-ray diffraction technique, NMR spectroscopy, Databases for protein structures. Protein Structure Evaluation Methods. (VADAR, Prosa, ProcheckNT, Procheck AQUA).

Module IV
Protein Engineering Techniques. ZEBRA, Pocket optimizer, Hot Spot Identification Technique.

Examination Scheme:

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

Text & References:

- Introduction to Protein Structure by Carl-Ivar Branden, John Tooze
- Principles of Protein structure by Schultz, G. E., and Schirmer, R. H.,Proteomics by Daniel C. Leibler
- Proteins: Structures and Molecular Principles (2d ed.). by TE Creighton
- Organic spectroscopy by William Kemp
- Proteome Research: Two-Dimensional Gel Electrophoresis and Detection Methods (Principles and Practice), T. Rabilloud (Editor), 2000, Springer Verlag
- Bioinformatics: A practical guide to the analysis of genes and proteins by A.D. Baxevanis and B.F.F. Ouellette. John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs by T. Lengauer. John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor Laboratory Press
- Database Annotation in Molecular Biology : Principles and Practice by Arthur M. Lesk
- Proteomics by T. Palzkill. Publisher: Kluwer Academic Publishers

ADVANCED COMPUTATIONAL BIOLOGY - II

Course Code : BTF 603 **Credit Units:3**

Module I
Genomics and Metagenomics: Large scale genome sequencing strategies. Metagenomics, basic principles, applications and interpretation of results. Basic concepts on identification of disease genes, role of bioinformatics-OMIM database, reference genome sequence, Genome mapping and types , gene expression profiling; identification of SNPs, SNP database (DbSNP). Role of SNP in Pharmacogenomics, SNP arrays.

Module II
Protein arrays: basic principles. Computational methods for identification of polypeptides from mass spectrometry. Identification of proteins by PMF and MS/MS data; Database search engines for MS data analysis (Mascot, Sequest, and others); Proteomics informatics strategies for biomarker discovery, analysis of protein functions and pathways. Applications of proteomics (Disease diagnosis, drug development, and plant biotechnology). Protein-protein interactions: databases such as DIP, PPI server and tools for analysis of protein-protein interactions.

Module III
Biological networks: Complex Biological Systems, Types of Biological networks, Intra-cellular networks: Gene-regulatory network, Protein-interaction network, Metabolic networks and Signaling network; Inter-cellular networks: Neuronal networks, Network motifs.

Module IV
NGS Platforms: Introduction to NGS, Roche/454 FLX, Illumina/Solexa Genome Analyzer, Applied Biosystems SOLiD system, Helicos Heliscope, Pacific Biosciences/single molecule real time (SMRT) sequencing.

Examination Scheme:

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

Text & References:
1. Simpson R. J."Proteins and Proteomics - A Laboratory Manual". Cold Spring Harbour Laboratory Press, 2002.
2. Pennington S. R. and Dunn M. J. "Proteomics - From Protein Sequence to Function. Viva Books, 2002.
3. Twyman R. M. "Principles of Proteomics". Taylor & Francis. 2004.
4. Principles of Genome Analysis and Genomics (3rd Ed.) by Primrose, S.B. and Twyman, R.M., Blackwell Publishing Company, Oxford, UK. 2003.
5. Bioinformatics: Sequence and Genome Analysis by Mount, D., Cold Spring Harbor Laboratory Press, New York. 2004.

BIOINFORMATICS ALGORITHMS

Course Code: BTF 604 **Credit Units**:3

Course Objective*:*
The objective of this course is to provide exposure to students to the broad range of algorithms in the field of bioinformatics. It is important to acquire a knowledge of the algorithms employed in various software systems to understand and evaluate them rather than just use them.

Course Contents:

Module I
Introduction to algorithms, Difference between – Biological vs Computer algorithms, Correct vs Incorrect algorithms, Iterative vs Recursive algorithms, Fast vs Slow algorithms, Tractable vs Intractable problems.

Module II
Big-O notation, Brief about the different types of algorithm design techniques (Exhaustive search, Branch-and-Bound algorithms, Greedy algorithms, Dynamic programming, Divide-and-Conquer algorithms, Machine Learning, Randomized algorithms)

Module III
Neural Network, Hidden Markov Models. SVM, Random Forest, and Various other Classifiers.

Module IV
Dynamic programming – its background (sequence alignment – local, global, Gap penalties, scoring of alignments), Needleman-Wunch algorithm, Smith-Waterman algorithm.

Examination Scheme:

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

Text & References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield. Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and B.F.F. Quellette. Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor Laboratory Press.
- Essentials of Genomics and Bioinformatics – by C.W. Sensen. John Wiley and Sons
- Introduction to Bioinformatics by T. Attwood and D. Parry-Smity. Prentice Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Triviabl Pursuit by G. Von Heijne and G. Von Heijne. Academic Press.

COMPUTERS – IV

Course Code: BTF 605 **Credit Units**:2

Course Objective:
The objective is to introduce students to a modern programming language and help them gain sufficient fluency to undertake research projects with a programming component; to lay the foundations for more advanced study of object-oriented languages
Emphasis is on to understand the basic concepts of programming; to learn the syntax and semantics of Java; to be able to use a program development environment

Course Contents:

Module I: (Core Java)
Introduction to Java - Features, Inheritance, Strings, Packages , Interfaces; Multi- Threading, Applet Programming: AWT- Components,Menus, Layout manager, etc., Event Handling,Swings , Java Packages - java.util, -java.io; exception handling,

Module II
JDBC
Introduction to Client Server Application
Java Drivers
java.sql Package
Executing SQL Statements

Module III
Java Servlets
Introduction to Server Side Application Development
Basics of Servlet Programming
Web Container
Session Tracking
Servlet Context

Module IV
JSP - Java Server Pages
JSP and Servlets (Differences and Similarity)
JSP details -directives, scriplets, expressions, JSP tags

Module V: Basics of XML
Features & uses of XML.
Parsers, Entities, Attributes
DTD

Examination Scheme:

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

Text & References:

- Complete reference by Herbert Schildt TataMcGraw Hill
- Programming with java A Primer by Balagurusamy Publisher: TataMcGraw Hill
- The complete Guide to java by Siple.TataMcGraw Hill

GENOMICS LAB

Course Code: BTF 621 **Credit Units: 01**

Course Contents:
All the lab. work would be done using Web based tools.

Module I
Comparative genome analysis.

Module II
Databases and web based resources for genomics research and analysis.

Module III
Gene expression profiling & Applications of Gene expression profiling

Module IV
Tools for analysis of human genome

Module V
Web based resources for Microarray Technologies

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

COMPUTATIONAL PROTEOMICS LAB

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

Course Contents:
The coursework for this practical session will follow the theory syllabus.

Module I
Protein identification, physico-chemical properties, motifs and patterns, structure, folding classes, structure classification

Module II
Databases for 2D GEL and MS data.

Module III
Web based Graphics Visualisation and analysis tools like Protein Explorer.

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

ADVANCED COMPUTATIONAL BIOLOGY LAB - II

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

Course Contents:

Module I: Biological Databases
Format & databases of Nucleic Acids & Proteins(GENBANK, EMBL, DDBJ, PIR, UNIPROT, PDB, SCOP, CATH, PRINT, Pfam etc) .

Module II: Sequence analysis
Pairwise and multiple sequence analysis

Module III: Phylogenetic Analysis
Tree Building using different tools, Tree evaluation, Phylip Package, MEGA.

Module IV: Protein Structure Prediction
Protein Secondary structure prediction, tertiary structure prediction, structure evaluation and validation, Ramachandran plot.

Module V: Metabolic Pathway databases
Protein interaction databases, visualizing protein interaction networks, predicting interaction.

Examination Scheme:

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

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COMPUTERS LAB - IV

Course Code: **BTF 625** **Credit Units: 01**

Course Contents:
The coursework for this practical session will follow the theory syllabus.

Module I
Class, Object, Inheritance, Packages, Multithreading, Exception Handling, Strings.

Module II
Designing User interface using AWT, Swings

Module III
Developing Event Handling programs

Module IV
Developing Java programs to Interact with the Database: Fetching, retrival, updation and deletion of the Records from the database like Orcale, SQL Server, and Ms Access.

Module V
Client server computing with JSP and Serve lets

Module VI
Designing the XML program using DTD

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: BTF 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 consists 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 ideas.

6. Editing & Preparing the final Paper

tt) 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.

uu) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
vv) Check for proper spelling, phrasing and sentence construction.
ww) Check for proper form on footnotes, quotes, and punctuation.
xx) Check to see that quotations serve one of the following purposes:
yy) Show evidence of what an author has said.
zz) Avoid misrepresentation through restatement.
aaa) Save unnecessary writing when ideas have been well expressed by the original author.
bbb) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
36) Title page
37) Table of contents
38) Introduction
39) Review
40) Discussion & Conclusion
41) References
42) Appendix
Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

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

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

References
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation
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)

SYSTEM BIOLOGY

Course Code: BTF 631 **Credit: 03**

Course Objective:
Includes the basics of analysing metabolic pathways using bioinformatics tools and also the simulation of cellular environment. Goals: To understand the gradual maturation of genomics and proteomics into biology insilico. Convergence of genomics, proteomics, transcriptomics and metabolomics in to phenomics. Objectives: Students should be able to understand the interaction within biological networks and simulation of cells.

Module I
Introduction to Systems Biology
What is systems biology? Integrating Networks. Methods of study: Micro array –definition, types of array, micro array analysis: Hierarchical clustering, Self- organizing maps. Applications of micro arrays in system biology.Metabolomics & Metabolic Pathways Digestion of proteins and protein metabolism, Transport metabolism, Carbohydrate metabolism – glycolysis, TCA cycle, PPP, glycogenesis, glycogenolysis, gluconeogenesis, PPP, ETC, Translating biochemical pathways into linear algebra.

Module II
Whole cell simulation, Principle and levels of simulation, Virtual erythrocytes, Pathological analysis, Fermentation analysis , Flux balance analysis, Minimal gene complement.

Module III
Relationship analysis, Predicting ligand binding function, Guilt by association, Use of gene cluster Comparative genome analysis, Binding surface comparisons, Detecting protein – protein interaction.

Module IV
Creative Bioinformatics, Novel use for database, Use of EST database – Unigene, Gene discovery, Primer design, Restriction mapping, Pharmacophore building, Position specific cloning, SNP database, Target identification, Epitope identification

Examination Scheme:

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

References
1. Bioinformatics A Practical Guide to the Analysis of Genes and Proteins. Ed. AndreasD. Baxevanis and B. F. Francis Ouellette. John Wiley & Sons, Inc., Publications (For Micro array).
2. Shanmughavel, P. 2006. Trends in Bioinformatics, Pointer Publishers, Jaipur, India.
3. The underlying pathway structure of biochemical reaction networks. Christopher H. Schilling et. al. 1998. PNAS. 95:4193-8
4. Towards metabolic phenomics: Analysis of Genomics Data Using Flux Balances. Christopher H. Schilling et. al. 1999. Biotechnology. Prog. 15: 288-295.
5. The Minimal Gene Complement of Mycoplasma genitalium. Claire M. Fraser et. al. 1995. Science, 270: 397- 403.
6. Molecular Classification of Cancer: Class Discovery and Class prediction by Gene Expression Monitoring. Golub TR. et. al. 1999. . Science, 286: 531 – 537.

Biocomputing Methods of Bioinformatics

Course Code BTF 632 **Credit: 03**

Course Objective:

The objective of the course is to provide detail explanation of various mathematical models or biomodels used in bioinformatics

Module I

Molecular modelling methods: Semi-empirical methods, Empirical methods.

Module II

Molecular Mechanics, Conformations: global vs. local Force fields: expressions for stretch, bond, torsion, etc. Description of various force fields: MM3, Dreiding, AMBER, CHARMM Mechanics of Bio-macromolecules.

Module III

Molecular Dynamics, Newton's equations for many particles Verlet and related algorithms Types of dynamics simulations: adiabatic, constant T, simulated annealing, etc. Conformational searching using MD and other methods Free energy calculations Dynamics of Bio-macromolecules Electrostatics of biomolecules.

Module IV

Energy Minimization, Golden section, derivative based method (SD, CG, Newton-Raphson) Docking simulations, Rigid docking, Flexible docking, Different Scoring schemes

Examination Scheme:

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

References

1. Höltje Hans-Dieter, Sippl Wolfgang, Rognan Didier, Folkers Gerd. Molecular Modeling: Basic Principles and Applications. Publisher: New York, Wiley-VCH.2003. ISBN: 3527305890.
2. Friesner Richard A. Computational Methods for Protein Folding:advances in Chemical Physics Volume 120 Kindle Edition. Publisher: New York, John Wiley &Sons. 2002 ISBN: 0471209554
3. Leach, Andrew. Molecular Modelling: Principles and Applications. Publisher:Prentice Hall. 2001. ISBN: 0582239338.
4. Höltje Hans-Dieter, Folkers Gerd. Molecular Modeling: Basic Principles andApplications (Methods and Principles in Medicinal Chemistry) Vol. 5. Publisher:New York, Wiley-VCH , 1997. ISBN: 3527293841.
5. McCammon Andrew J., Harvey Stephen C. Dynamics of Proteins and Nucleic Acids Publisher: New York, Cambridge University Press, 1987. ISBN: 0521356520.

IPR AND DRUG REGULATORY ISSUES

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

Course Objective:

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

UNIT I

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

UNIT II

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

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

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

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

UNIT III

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

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

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

UNIT IV

Drug Regulatory affairs and its importance.

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

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

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

Examination Scheme:

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

Suggested Books:

1. Drug Regulatory Affairs by Dr. N.S. Vyawahare and SachinItkar, NiraliPrakashan.
2. Pharmaceutical Regulatory Affairs by C.V.S. Subrahmanyam& J. ThimmaSetty, VallabhPrakashan.
3. Quality Assurance of Pharmaceutics Vol I & II of WHO publications, 1999.
4. GMPs by Mehra
5. How to Practice GMP by P.P.Sharma.
6. GMP of Pharmaceuticals by Willing and Stoker.
7. **Good Manufacturing Practices for Pharmaceuticals, S.H. Wiling, Vol. 78, Marcel Decker.**
8. Drugs and Cosmetics act by Vijay Malik.

COMMUNICATION SKILLS - IV

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

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

Course Contents:

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

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

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

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

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

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

- 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 interact ional model.
Pressure – environment fit model of stress.
Module III: Causes and symptoms of stress
Personal
Organizational
Environmental
Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health
Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

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

Text & References:

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

FRENCH - VI

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

Course Objective:
To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events ;
iii) perform certain simple communicative tasks.

Course Contents:

Module D: pp. 157 – 168 – Unité 12

Unité 12: s'évader
1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - VI

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

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

Course Contents:

Module I: Adjective endings
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

Module II: Comparative adverbs
Comparative adverbs as and like

Module III: Compound words
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

Module IV: Infinitive sentence
Special usage of 'to' sentences called zu+ infinitive sentences

Module V: Texts
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – VI

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

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

Course Contents:

Module I
Revision of the earlier modules

Module II
Present Perfect Tense

Module III
Commands of irregular verbs

Module IV
Expressions with **Tener que** and **Hay que**

Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – VI

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

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

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

Module II
Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

Module III
Temperature – how to say – What is the temperature in May here?
- How is the weather in summer in your area?
- Around 30 degrees
- Heating, air-conditioning
- Is winter is Shanghai very cold?

Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is …… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ……. (do what)? At week end, I ……. On Sundays I usually …… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ……. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Elementary Chinese Reader Part-2 ,3 ; Lesson 47-54

SEMESTER VII
CLINICAL RESEARCH & PHARMACOVIGILANCE
Course Code: BTF 701 **Credit Units: 03**

Module-I
Basics of general Pharmacology & Drug discovery process
Drug, Receptors, Dosage forms, routes of drug administration, drug receptor interactions, drug drug interactions, drug resistance, drug tolerance, drug dependence, Pharmacokinetic (ADME) and Pharmacodynamic of drugs, Adverse drug effects.General introduction about Drug discovery and development process, Bioavailability /Bioequivalence Studies and Pharmacovigilance.

Module-II
Basics of Clinical trials - Basics of clinical trials, Introduction and history of clinical trials, Types of clinical trials, Inclusion and exclusion criteria, Primary and Secondary outcome/endpoint of clinical trials, Needs of Clinical trials and Phases of clinical trials.
Various Key documents, application filling and Ethical regulation of Clinical trials:
- Investigator Brochure (IB), Protocol & Amendment in Protocol , Case Report Form (CRF),
- Informed Consent Form (ICF) , Essential Documents in Clinical Trial Good Clinical Practice: ICH guidelines, Indian GCP guidelines (CDCSO guidelines),
- Investigational new drug (IND) / clinical trial exception (CTX) / clinical trial authorization (CTA) application
- New drug application (NDA/ANDA) / marketing authorization application (MAA)
- ICMR Guideline - Ethical Guideline for Biomedical Research on Human Subjects & Schedule Y
- Ethical Codes – The Declaration of Helsinki.

Module-III
Clinical trial design: Need of clinical trial design, Treatment studies- Randomized controlled trial, Adaptive clinical trial, Nonrandomized trial, Observational studies- Cohort study, Case control study, Cross sectional study, Ecological study

Module-IV
Pharmacovigilance:Introduction to adverse drug reactions: Definitions and classification of ADRs, Detection and eporting, Causality assessment, Severity and seriousness assessment , Predictability and preventability assessment, Management of adverse drug reactions.
Introduction to pharmacovigilance: History and development of pharmacovigilance, Importance of safety monitoring / Why pharmacovigilance
National and international scenario: Pharmacovigilance in India, Pharmacovigilance global perspective, WHO international drug monitoring programme
Adverse drug reaction reporting: Introduction to reporting systems, Spontaneous reporting system , Reporting to regulatory authorities , Guidelines for reporting ADRs in biomedical literature
Drug dictionaries and coding in pharmacovigilance: WHO adverse reaction terminologies, MedDRA and Standardised MedDRA queries.

Examination Scheme:

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

Reference Books
1. Methodology of Clinical Drug Trials, 2nd Edition. Spriet A., Dupin-Spriet T., Simon P. Publisher: Karger.

2. Design and Analysis of Clinical Trials: Concepts and Methodologies, 3rd Edition. SheinChung Chow, Jen-Pei Liu. Publisher: Wiley.
3. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.
4. Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
5. Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd.
6. A Textbook of Pharmacovigilance: Concept and Practice, by Guru Prasad Mohanta, Published by PharmaMed Press/BSP Books (2015).
7. An Introduction to Pharmacovigilance, by Patrick Waller, Published by October 2009, Wiley-Blackwell.

DATA MINING

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

Course Objective:
The course is designed to introduce data mining and its related elements to the students. In striving to achieve this objective, the course uses besides others, lectures on various important aspects like Graph theory, different algorithms etc.

Course Contents:

Module I
Knowledge Discovery in Databases, Concept of datamining, Need of datamining, Data mining functionalities.

Module II
Concept of Data Warehouse, Data Warehouse Architecture, Online Analytical Processing (OLAP), Development of Data Warehouse life cycle.

Module III
Data preprocessing, Basic methods of data cleaning, data integration and Transformation, Data reduction, Discretization and Concept Hierarchy Generation

Module IV
Data mining Primitives, Data Mining Query Language, Mining Complex Type of data: Multimedia database, Mining Spatial database, Mining text database, Archtecture of data mining system, multidimentional data mining

Examination Scheme:

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

Text & References:

1. Data Mining: Multimedia, Soft Computing, and Bioinformatics by Mitra, Sushmita Acharya, Tinku, John Wiley & Sons Inc
2. Bioinformatics: The Machine Learning Approach by Pierre Baldi, Sren Brunak
3. Data Mining in Bioinformatics, Series: Advanced Information and Knowledge Processing, by Wang, J.T.L.; Zaki, M.J.; Toivonen, H.T.T.; Shasha, D.E. (Eds.)2005, XI, 340 p. , Springer publications

SAS (STATISTICAL ANALYSIS SYSTEM) AND MATLAB

Course Code: BTF 703 **Credit Units: 04**

Course Objective:
SAS software provides a complete, comprehensive set of tools that can meet the data analysis needs. The course is designed to familiarize students with the skills necessary to produce simple reports and data sets as well as providing an understanding of how SAS analyses and views data.
The students will also work on R which is a language and environment for statistical computing and graphics. provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, ...) and graphical techniques, and is highly extensible

Course Contents:
Module I
Introduction to SAS

Module II: Manipulating Data
SAS syntax, variable naming rules, and entering your own data, Creating a SAS data set from raw data, Grouping Data values, Reading and combining SAS data sets. Relating information from multiple sources, Data translation tools, Manipulating and formatting date values

Module III: Programming Techniques
Plotting Data, Random Number Generators, If-Then-Else and Do Loops, Arrays, Retaining data across observations, Macro Programming

Module IV: Presenting Data
Writing simple reports, Descriptive statistics and summaries, Formatting tools, Charting data, Plotting data

Module V: MATLAB
Introduction to MATLAB: Welcome,Getting used to the environment, Algorithms, Pseudo-code, Tracing a program/algorithm step-by-step, Debugging with breakpoints and print statements, Divide and conquer, Variables, Data Types, Conditional program flow (if), Iteration / Looping (while), Solve a problem for one case, then iterate (Take care of middle, then first and last), Functions, Abstraction and Encapsulation, Planning a large program, working with stubs, Working with Images, Reading and Writing files, Recursion, Compression

Examination Scheme:

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

Text & References:
Text:
- Delwiche, Lora D. and Susan J. Slaughter (1998), The Little SAS Book, Second Edition, Cary, NC: SAS Institute, Inc. ISBN: 1-58025-239-7.

References:
- Cody, Ron (1999), Cody's Data Cleaning Techniques Using SAS Software, Cary, NC: SAS Institute, Inc. ISBN: 1-58025-600-7.
- Cody, Ronald P. and Jeffrey K. Smith (1997), Applied Statistics and the SAS Programming Language, Prentice Hall Engineering, Science and Math, ISBN: 0-13-743642-4.
- Gilmore, Jodie (1999), Painless Windows: A Handbook for SAS Users, Second Edition, Cary, NC: SAS Institute, Inc. ISBN: 1-58035-238-9.
- SAS Learning Edition

R AND BIOCONDUCTOR

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

Course Objective:
R package provides a complete, comprehensive set of tools that can meet the data analysis needs. The course is designed to familiarize students with the skills necessary to produce simple reports and data sets as well as providing an understanding of how R analyses and views data. The students will also work on R which is a language and environment for statistical computing and graphics. provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, ...) and graphical techniques, and is highly extensible

Course Contents:

Module I: R
Introduction and preliminaries of R, Simple manipulations; numbers and vectors, Objects, their modes and attributes, Ordered and unordered factors, Arrays and matrices, Lists and data frames, reading data from files, Probability distributions, Grouping, loops and conditional execution, Writing your own functions, Statistical models in R, Graphical procedures, Packages.

Module II:
BioCondoctor
Introduction to BioConductor, Intro to microarrays, installing and maintaining bioconductor, BioConductor Packages importation and QC, normalization, exprSets, filtering, data analysis options, annotation, GO/pathways/graphs.

Module III:
Case Study
Limma, Case study on Mircroarray Classification, incorporating biological metadata in genomic analyses, Statistical modeling of differential gene expression data Visualizing genomic data, applying machine learing clustering and classifying methods to genomic data.

Examination Scheme:

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

Text & References:

Text:
- Delwiche, Lora D. and Susan J. Slaughter (1998), The Little SAS Book, Second Edition, Cary, NC: SAS Institute, Inc. ISBN: 1-58025-239-7.

References:
- Cody, Ron (1999), Cody's Data Cleaning Techniques Using SAS Software, Cary, NC: SAS Institute, Inc. ISBN: 1-58025-600-7.
- Cody, Ronald P. and Jeffrey K. Smith (1997), Applied Statistics and the SAS Programming Language, Prentice Hall Engineering, Science and Math, ISBN: 0-13-743642-4.
- Gilmore, Jodie (1999), Painless Windows: A Handbook for SAS Users, Second Edition, Cary, NC: SAS Institute, Inc. ISBN: 1-58035-238-9.
- SAS Learning Edition.

INDUSTRIAL TRAINING EVALUATION

Course Code: **BTF 750** **Credit Units: 03**

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**

DATA MINING LAB

Course Code: BTF 722 **Credit Units: 01**

Course Contents:

Module I
Using different data samples, practical experimentation with the various stages of data mining.
Use of Meta-Search Engines.
Using different data samples, practical experimentation with the various stages of data mining.

Module II
Use and result interpretation of Pratt, MEME, Miner, and Mast servers.
Demonstration of free data mining Software like WEKA, Yale, TANAGRA, DB2 Intelligent Miner

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

SAS (STATISTICAL ANALYSIS SYSTEM) AND MATLAB LAB

Course Code: BTF 723 **Credit Units: 01**

Course Contents:

Module I
Analysis using SAS

Module II
Analysis using Matlab on Bioinformatics toolkit

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

R AND BIOCONDUCTOR LAB

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

Course Contents:

Module I
Statistical Analysis using R, GPU computing. Regression, SLR (Simple linear regression), MLR (Multiple linear regression), Testing methods (Z Test, F Test, T Test, Chi Square test)

Module II
Analysis using R packages of Bioconductor, Limma, Affy etc. and their application in Bioinformatics.

Examination Scheme:

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

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TERM PAPER

Course Code: BTF 730 **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 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
ccc) 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.

ddd) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
eee) Check for proper spelling, phrasing and sentence construction.
fff) Check for proper form on footnotes, quotes, and punctuation.
ggg) Check to see that quotations serve one of the following purposes:
hhh) Show evidence of what an author has said.
iii) Avoid misrepresentation through restatement.
jjj) Save unnecessary writing when ideas have been well expressed by the original author.
kkk) 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.

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.)

BIOJAVA

Course Code: BTF 731 **Credit Units: 02**

Course Objective:
The objective of this course is to make students well versed with concept and implementation of BIOJAVA.

Course Contents:

Module I
Introduction to BioJava, Installation and getting started

Module II: Basic Sequence Manipulation
Working with sequences SubSequence, Transcribe, Reverse, Change Name, Sequence Edit, Regex, Translation, Translation: Single, Translation: Six Frames, Proteomics, A Aindex
Sequence I/O Reading and writing files, Creative file parsing with RichSeqIOListener
Write in Fasta, Read Fasta, Read GES, Gbto Fasta, ABI to Sequence, SeqIO: Echo
Annotation Annotations and Comments, Annotations: List, Filter
Location & Feature
Locations: Point, Range, Circular, Feature, Filter, Locations: Remove

Module III: Blast & Fasta
Blast: Parser, Fasta: Parser, Blast: Extract, Blast: Echo

Module IV: Counts & Distribution
Count: Residues, Count: Frequency, To Distrib, Random Seqs, Entropy, Emissionf, Custom
BioJava: Cook Book: Distribution: XML, Distribution: Gibbs, Distribution: Bayes, Distribution: Composition
Weight Matrices and Dynamic Programming
DP: Weight Matrix, DP: HMM, DP: Pair Wise, DP: PairWise2
User Interface
ViewAsTree, ViewInGUI, Coordinates, Features, ProteinPeptideFeatures

Module V: Biosql and Database
BioSQL and Hibernate. , BioSQL Setup PostGre, BioSQL: Setup Oracle, BioSQL: Manage
Protein Structure
PDB: read, PDB: mutate

Examination Scheme:

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

Text & References:

Text:
- The Complete Reference JAVA 2: 5th. ed. By Schildt Herbert

References:
- Core Java: Advanced Features, Horstmann
- Java Servlet Programming Hunter J, Crauford
- Java Server Programming J2EE edition Allamaraju, et.al.

OPTIMIZATION ALGORITHM

Course Code: BTF 732 **Credit Units: 02**

Course Objective:
The goals of this course are for students to: Understand basic models of computation and how to use them to analyze the efficiency of algorithms. Understand the fundamentals of how a computer's architecture affects the performance of an algorithms. Understand basic programming paradigms and the tools for implementations using these paradigms.

Module I
Markov chain Monte Carlo methods (MCMC) and their applications in sequence motif search

Module II
Incremental improvement algorithms (hill climbing, simulated annealing, genetic algorithm, gradient descent) and their applications to travel sales person problem. Dynamic programming and its applications in graph theory and sequence alignment

Module III
Linear programming, integer programming and its application to filtering protein contact map, NP-hard optimization problems, computational lower bounds, bigdata algorithms

Module IV
Quadratic programming, Lagrange theory of constrained optimization and its applications in kernel methods 6. Contrastive divergence optimization and its application in deep learning networks

Examination Scheme:

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

Text & References:

- D. Williamson and D. Shmoys, The Design of Approximation Algorithms, Cambridge University Press, New York, 2011.

. Michael R. Garey and David S. Johnson, Computers and Intractability. A Guide to the Theory of NP-Completeness Freeman, 1979.

BIOPERL

Course Code: BTF 733 **Credit Units: 02**

Course Objective:
The objective of this course is to make students well versed with applications of Bioperl.

Course Contents:

Module I
Introduction to BioPerl, Basics of Packages, Modules and Widgets, Internet-related Libraries

Module II
Modules and Utilities, CPAN, Web Programming with Perl Script**.**

Module III
Application of Bioperl in Bioinformatics, Manipulation of BLAST output with BioPerl Programming.

Module IV
Creating User Interface with PERL/Tk, Perl Module Extension

Examination Scheme:

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

Text & References:

Text:
- Mastering Perl for Bioinformatics, James D. Tisdall

References:
- Beginning Perl for Bioinformatics, James Tisdall

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. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles : expressions
9. Le subjonctif : volonté, obligation

Examination Scheme:

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

C – Project + Presentation
I – Interaction/Conversation Practice

Text & Références:

- **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

SEMESTER VIII

MAJOR PROJECT

Course Code: BTF 860 **Credit Units: 20**

GUIDELINES FOR PROJECT/DISSERTATION FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

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

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

In general, the File should be comprehensive and include:

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

Report Layout

The report should contain the following components:

- **Title or Cover Page**

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

- **Acknowledgements** (optional)

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

- **Abstract**

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

- **Table of Contents**

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

- **Introduction**

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

- **Materials and Methods**

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

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.
Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

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

- **Future prospects**

- **Appendices**

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

- **References / Bibliography**

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

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

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

ASSESSMENT OF THE PROJECT /DISSERTATION 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	50
Viva Voce	50
Total	**100**