

SRI VENKATESWARA UNIVERSITY::TIRUPATI

S.V.U.COLLEGE OF SCIENCES

CHOICE BASED CREDIT SYSTEM

(Revised syllabus for regular students those who study in S.V.U.College (Campus), Tirupati)

(with effect from the batch of students who admitted during the academic year 2015-16)

M.Sc. BIO-INFORMATICS

(SELF SUPPORTING COURSE)

SCHEME OF INSTRUCTION AND EXAMINATION

Semester	Course Code	Title of the Course	Core/ Elective	No. of Credits	Internal Assessment	Semester End Exam	Total Marks
I		Theory:					
	BI-101	Unix & C	Core	4	30	70	100
	BI-102	Molecular Biology	Core	4	30	70	100
	BI-103	Introduction to Bioinformatics & Computer Applications	Core	4	30	70	100
	BI-104	Tools & Techniques and Biostatistics	Core	4	30	70	100
		Practicals					
	BI-105	Practicals for 101 & 102	Core	4	--	100	100
BI-106	Practicals for 103 & 104	Core	4	--	100	100	
II		Theory:					
	BI-201	Physiological Chemistry	Core	4	30	70	100
	BI-202	Cell biology and Immunology	Core	4	30	70	100
	BI-203	Genetics and Genetic Engineering	Core	4	30	70	100
	BI-204	Enzymology	Core	4	30	70	100
		Practicals:					
	BI-205	Practical-III: 201 & 202	Core	4	--	100	100
BI-206	Practical-IV: 203 & 204	Core	4	--	100	100	
	207	Human Values and Professional Ethics-I	Core	4	30	70	100
III		Theory:					
	BI-301	Genomics and Proteomics	Core	4	30	70	100
	BI-302	Molecular Modeling and Drug designing	Core	4	30	70	100
		Any one of the following					
	BI-303(1)	PERL	IE	4	30	70	100
	BI-303(2)	OOPs with C++	IE	4	30	70	100
		Any one of the following					
	BI-304(1)	ORACLE	IE	4	30	70	100
	BI-304(2)	JAVA	IE	4	30	70	100
		Practicals:					
BI-305	Practical -V: BI-301 & BI-302	Core	4	--	100	100	
BI-306	Practical -VI: BI-304 & BI-304	IE	4	--	100	100	

IV	BI-401	Project work		8	---	--	200
		Self Study Course (Any one of the Following)					
	BI-402(a)	Web designing	SSC	4	--	100	100
	BI-402(b)	J2EE	SSC	4	--	100	100
	BI-402(c)	Data Structures and Algorithms.	SSC	4	--	100	100
	BI-402(d)	Recent trends in Bioinformatics	SSC	4	--	100	100
	BI-403	Introduction to Bioinformatics	EE	4	--	100	100
	404	Human Values and Professional Ethics-II	Core	4	30	70	100
Total Marks excluding Self Study Course							2000
IE : Internal Elective		SSC: Self Study Course		EE: External Elective			

Number of Hours allotted Theory : 4 hours/ week Practicals : 9 hours/ week

SEMESTER-I

BI-101: UNIX AND C PROGRAMMING (Core)

UNIT- I: INTRODUCTION TO UNIX OPERATING SYSTEM AND SHELL PROGRAMMING

- 1.1: History: Features and Benefits of Version and Structure of Unix
- 1.2: File System: Text processing and VI editor
- 1.3: Usernames: User groups and UNIX (File access permissions)
- 1.4: Shell: Introduction, features (Shell commands and Shell programming in C)

UNIT-II: PROGRAMING IN C

- 2.1 Introduction: The origin and development of C and Features of C
- 2.2 Basic datatypes in C: Constants, Variables, Operators (Arithmetic, Relational, Logical, increment and decrement operators), Precedence and order of evaluation of expressions
- 2.3 Control flow: if, if-else, Switch-case, loops, break, continue, goto and labels
- 2.4 I/O statements: printf , scanf, getchar, putchar, gets and puts

UNIT-III: FUNCTIONS, ARRAYS, STRUCTURES AND UNIONS, POINTERS

- 3.1 Functions: Definition and declaration, Argument list, Returning values from a function and Recursive function
- 3.2 Arrays: What is an array, Arrays declaration, Array initialization, and Accessing individual elements of an array
- 3.3 Structures and Unions: Structure declaration, Type of statement, Addressing the members of the structure
- 3.4 Pointer declarations: Passing of pointers to functions, Pointers and one dimensional arrays and Operations on pointers

UNIT-IV: STORAGE CLASSES AND FILE MANAGEMENT

- 4.1 Storage classes: Automatic, Register, external, and Static
- 4.2 Strings: What are strings, String I/O, and String manipulation functions
- 4.3 File handling: Creation and reading of files
- 4.4 fopen, fclose, fputs, fgets, fread, fwrite statements

REFERENCE BOOKS:

- 'Programming in C' by Balaguruswamy
- 'let us C' by Yaswanth Kanetkar

BI-102: MOLECULAR BIOLOGY

UNIT-I: Molecular nature of Genome:

- 1.1: Watson and Crick Model: Types of DNA; Properties of DNA(C-value paradox, Cot value)
- 1.2: Nuclear and mitochondrial genome
- 1.3: Structure of gene (Cistron, Muton, Recon, Cis-trans test), Gene families: Simple multi gene families, Complex multi gene families.
- 1.4: DNA damage and repair: Biological indication of repair, photo reactivation, Excision repair, Recombination repair, SOS repair, and Mismatch repair.

UNIT-II: Replication:

- 2.1 Replication in Prokaryotes: Geometry of DNA replication, semi conservative replication.
- 2.2 Enzymology of DNA replication: DNA polymerase I, II and III; Replication of Eukaryotic Chromosomes; Eukaryotic DNA polymerases; Multiple fork; Replication of Chromatin.
- 2.3 Discontinuous Replication: Fragments in Replication fork and detection of fragments; Events in the Replication fork; De novo initiation and covalent extension.
- 2.4 Bidirectional replication, Termination of replication

Unit-III : Transcription and Translation:

- 3.1 Synthesis of RNA: RNA polymerase. Site selection I- The promoter, Siteselection II- Auxiliary proteins, RNA chain initiation, elongation, termination and release of newly synthesized RNA.
- 3.2 Classes of RNA molecules: Types, structure and processing of mRNA, rRNA and tRNA in E.coli. Transcription in eukaryotes, inhibitors of Transcription.
- 3.3 Outlines of Translation: the Genetic code; Types of codons, Basic composition of the codons.
- 3.4 Identification of the stop codons; Universality of the code, exception to Genetic code, Redundancy of the code, the decoding system; the codon and Anticodon. Interactions wobble Hypothesis, the Genetic code in mitochondria.

Unit-IV Translation:

- 4.1 Ribosomes: Physical structure and chemical composition of prokaryotic and eukaryotic Ribosomes.
- 4.2 Protein synthesis: Directions of polypeptide chain growth and of mRNA; Initiation, Elongation and Termination of polypeptide chain; Role of GTP and antibiotics in protein Synthesis. Inhibitors of Translation, post translational modification of proteins, protein targeting and/targeting.
- 4.3 Gene regulation and its products: General aspects of the gene regulation in prokaryotes; Induction, Repression of Lactose Operons, Galactose Operon and Tryptophan Operon.
- 4.4 Gene regulation in Eukaryotes.

SUGGESTED READING MATERIAL

1. Molecular Biology by David Freifelder, 1993
2. Molecular Biology of Gene-by ID.Watson, 1988
3. Harper's review of Biochemistry by D.W. Martin et al 1990
4. Biochemistry by A.L. Lehninger
5. Cell and Molecular Biology-E.D.P. De Robertis and E.M.F.
6. Concepts in Molecular Biology-S.C. Rastogi, VN. Sharma and Ananda Tandon (1993)
7. Genes VII by Benjamin Lewin.

BI-103: INTRODUCTION TO BIOINFORMATICS & COMPUTER APPLICATIONS

UNIT-I Introduction to Bioinformatics, Genomics and Proteomics

- 1.1. Scope, importance and status of Bioinformatics
- 1.2. Tools for web search, Data retrieval tools; Database types; Sources of Web sites
- 1.3. Proteomics; Prediction of Protein structure and protein folding; Protein sequence databases; Submission of sequence to the database
- 1.4. Phylogenetic analysis and evolutionary trees

UNIT-II Biological Databases and Emerging areas of Bioinformatics

- 2.1 DNA micro arrays: Homology-BLAST- types of BLAST
- 2.2 Mapping of genome; Prediction of gene structure Functional genomics.
- 2.3 DNA micro arrays.
- 2.4 Human genome project

UNIT-III Introduction to Computers

- 3.1 History of Computers, classification of computers, computer generations
- 3.2 Input, output processing and storage devices - Floppy disk, hard disk, CD-ROM, DVD, Digital devices etc.,
- 3.3 Operating system – Introduction – types of operating systems – MS DOS, WINDOWS, LYNEX
- 3.4 MS – ACCESS, FOXPRO

UNIT-IV Applications

- 4.1 Computer Graphics – graphic generation methods, uses of computer graphics, graphic forms
- 4.2 Internet concepts: Internet access tools, Web searching, e-mail, File transfer Protocol (FTP).
- 4.3 Word processing and presentation software MS – WORD and MS –POWER POINT, MS – EXCEL
- 4.4 Use of commonly available statistical packages, such as SPSS, etc.

SUGGESTED READING BOOKS

1. Bioinformatics. Murthy, C.S.V. Himalaya Publishing House, Hyderabad.
2. Bioinformatics by Andreas D. Baxevanis and B.P. Francis Ouellette, 2nd Ed., 2002.
3. Basic Bioinformatics by S. Ignaeimuthi, SJ. Narosa publications, 2005
4. Introduction to Bioinformatics, S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003.
5. Bioinformatics, Methods and Applications, Genomics proteomics and drug discovery, S.C. Rastogi, N.
6. Mendiratla and P. Rastogi, prentice-Hall ofIndia, 2004.
7. Computers to-day by Suresh K.Basandra (1999), Published by Galagotia publications, Pvt.Ltd., New Delhi.
8. Microsoft Office, by Setultz, 1997.
9. Database processing by D.M. Kroenke, Galgotia publications, 1990.

BI-104: TOOLS & TECHNIQUES AND BIO-STATISTICS

UNIT-I Instrumentation

- 1.1 Chromatography: Adsorption material – Paper, silica gel, cellulose acetate. Merits and limitations. Molecular sieve chromatography: Principle, Determination of void volume and molecular mass of native molecules. Ion exchange chromatography: Ion exchange materials – Cation and anion exchange materials. Principle and separation of charged molecules. Principle and application of TLC and HPLC.
- 1.2 Spectroscopy, Centrifugation and X-ray Refraction MALDI.
- 1.3 Electrophoresis: principle, Matrices and used in electrophoresis – starch, cellulose acetate, agarose and acrylamide.use of PAGE for separation of proteins, molecular mass determination. Separation of nucleic acids using agarose gel electrophoresis. Pulse field electrophoresis and isoelectric focusing.
- 1.4 Blotting techniques: western, southern and northern blotting techniques.

UNIT-II Tissue Culture

- 2.1 Introduction to cell and tissue culture: Preparatory techniques – cleaning, sterilization, sterile handling tissue culture laboratory requirements, Design of tissue culture laboratory: Equipments and purpose.
- 2.2 Cell types (Primary and secondary) and cell lines, Cell proliferation measurements, Cell viability testing: Dye inclusion and dye exclusion tests.
- 2.3 Culture media : composition, preparation and sterilization, macro and micro nutrients, Importance of serum and limitation with serum media, cell harvesting methods.
- 2.4 The biology of stem cell : overview; different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells, stem cell nuclear transfer ; somatic cell nuclear transfer, Animal cloning.

UNIT-III Introduction and Scope of Biostatistics

- 3.1 Definition of statistics: Biostatistics, classification, variables and attributes, Diagrammatic distribution of biological data.
- 3.2 Measures of location and dispersion: Arithmetic mean, median and mode. Mean deviation, quartile deviation, Standard deviation and co-efficient of variation.
- 3.3 Curve fitting: Fitting straight line, parabola exponential curve and geometric curve to the data. Fitting of straight line using Ms-Excel.
- 3.4 Correlation and regression: Scatter diagram, types of relationship . Positive and negative correlation, computation of correlation coefficient, Interpretation of correlation coefficient. Simple regression lines and its interpretation.

UNIT-IV Statistical Tests

- 4.1 Normal probability distribution & its applications.
- 4.2 Tests of significance: level of significance, null and alternative hypothesis, power of test and p-value of a test.
- 4.3 Student t- test for one a sample and two samples means-paired t-tests.
- 4.4 F-test, chi square test and their application, concept of ANOVA.

SUGGESTED READING MATERIAL:

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Animal Cell Culture – A practical approach, Ed.John. R. W.Masters IRL Press.
3. Bio-Statistics- An introductory text-Goldstein, A The Macmillan Co., New York, 1971.
4. Biostatistics by Lewis Alvin (1971) Affiliated East West Press pvt., Ltd., New Delhi.
5. Bio-Statistics- By Lewis Alvin E. Affiliated East-West press (P) Ltd., 1971.
6. General Zoological Microtechniques - P.M. Weesner.
7. Interpretation and uses of Medical Statistics – G.J. Bourke & J.Mc.Gilvaray, Blovkwel Science Publication,London, 1969.
8. Introduction to Biostatistics – By Sokal – Rohlf (2nd Edn) Freeman International Editor (1973).
9. Introduction to Biostatistics by Holdan Bancroft (1962) Pual B.Hoebar Inc., New York.
10. Introduction to Instrumental analysis, Ronert Braun. McGraw Hill Intemational edition.
11. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VII volume, Cambridge press Edition.
12. Probit Analysis by Finney, D.J.S. Chand & Co., Ltd., New Delhi.
13. Statistical analysis in Biology by Mather, K Chapman and Hall, London, 1972.
14. Statistical methods in Biology by Bailey Norman T.J.(1965) The English Language Book Society & The English University press Ltd.,

SEMESTER-II

BI-201: PHYSIOLOGICAL CHEMISTRY (Core)

UNIT-I : Metabolism of carbohydrates

- 1.1 Thermodynamic principles in biology.
- 1.2 Carbohydrate : structure and classification – Properties of monosaccharides, oligo and poly saccharides.
- 1.3 Major pathways of carbohydrate metabolism: Glycolysis – TCA cycle and their biomedical importance.
- 1.4 Gluconeogenesis - HMP Shunt - Metabolism of galactose and fructose.

UNIT-II : Metabolism of proteins

- 2.1 Classification of proteins, structure and properties of proteins
- 2.2 Bio synthesis of nutritionally non essential amino acids and their biomedical importance
- 2.3 Catabolism of proteins, and amino acid - Bio Synthesis of urea – Detoxification of Ammonia
- 2.4 Catabolism of carbon skeletons of amino acids- metabolic disease of phenylalanine - Catabolism - Conversion of amino acids to specialized products

UNIT-III : Metabolism of lipids

- 3.1 General structure of lipids and classification.
- 3.2 Biomedical importance of lipids – Beta-oxidation of Palmitic acid - Biosynthesis of long Chain fattyacids.
- 3.3 Metabolism of unsaturated fatty acids and Eicosanoids – Biomedical importance – Clinical Aspects.
- 3.4 Lipid transportation and storage - Cholesterol synthesis - Excretion.

UNIT-IV : Metabolism of nucleotides

- 4.1 Nucleotides Structure – types – Nomenclature –properties.
- 4.2 Metabolism of purine and pyrimidine nucleotides.
- 4.3 Degradation of nucleotides – clinical disorders of nucleotide metabolism.
- 4.4 Regulation of pyrimidine nucleotide biosynthesis – Disorders of nucleotide catabolism – drugs and orotic aciduria.

SUGGESTED READING MATERIAL

- 1.Robert K.Murrey, D.K. Granner, P.A. Mayes and V.W. Rodwell; Harper's Biochemistry, Lange Medical
- 2.D. Voet and J.G Voet, Biochemistry, 1. Wiley & Sons.
- 3.David L. Nelson and Michael M. Cox, Lehninger; Principles of Biochemistry, McMillan Worth Publishers.

BI-202: CELL BIOLOGY AND IMMUNOLOGY

UNIT-I : Internal organization of the cell

- 1.1 Organization of Prokaryotic and Eukaryotic cell.
- 1.2 Membrane structure – Lipid bi layer and two dimensional structure – Fluidity of lipid bilayer – Assembly of lipid bi layer – Membrane proteins.
- 1.3. Membrane transport: Active transport – Passive transport – Diffusion – Osmosis – Ion channels – Membrane pumps.
- 1.4 Vesicular traffic and Protein sorting: Translocation of proteins in to mitochondria – Endoplasmic reticulum and Golgi - Endocytosis – exocytosis.

UNIT-II : Cell signaling

- 2.1 Models of cell-cell signaling (steroid receptors, Nitric oxide and Carbon monoxide).
- 2.2 Functions of cell surface receptors (G-protein coupled receptors, Tyrosine kinases, cytokine receptors, receptors linked to other enzymatic activities).
- 2.3. Pathways of intracellular signaling transduction (c-AMP pathways, cyclic c-GMP, phospholipids and Ca²⁺, Ras, Raf and MAP kinases).
- 2.4 Signaling in development and differentiation (the receptors tyrosine kinase, Ras, MAP kinase pathway in Drosophila, notch signaling).

UNIT-III : Cells and organs of the immune system

- 3.1 Cells of the immune system: Lymphoid cells, Mononuclear cells, granulocytic cells, Mast Cells
- 3.2 Organs of the immune system- primary and secondary lymphoid organs, lymphatic system
- 3.3 Antigens: Antigenic determinants or Epitopes, Immunogenicity, Haptens, Adjuvants
- 3.4 Innate (Non-specific): Anatomical barriers, Phagocytosis, Physiological barriers, Inflammatory barriers.

UNIT-IV : Acquired immunity

- 4.1 Humoral immunity: Immunoglobulins (fine structure of immunoglobulins and Classes); the complement system, Classical and alternate pathway, Inflammation.
- 4.2 Cell mediated immunity: Mechanism of cell mediated immunity; brief account on Antigen Presentation, Major Histocompatibility complex
- 4.3 Antigen-antibody interactions: Affinity, Avidity, Cross-reactivity, precipitation reactions and Agglutination reactions and ELISA.
- 4.4 Brief account on immunological disorders:
 - a) Tolerance to autoimmunity
 - b) Transplantation
 - c) Immunodeficiency diseases
 - d) Immunization (active and passive immunity)

SUGGESTED READING MATERIAL

1. An introduction to Immunology by C.Y. Rao, Narosa publishing house, 2002.
2. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr, Indian Edition, B.I. Publications, Pvt. Ltd.
3. Cell Biology (Fundamentals and Applications) By Gupta/ Jangir, 2001; Agrobios, India.
4. Harpers Review of Biochemistry, Murray, Granier, Mayes and Rodwell, Lange Medical Publications, 25th Ed.
5. Human Physiology by Stuart Era Fox, W.M.C. Brown Publishers, USA 1984 or Recent Edition.
6. Immunology introductory textbook by Nandini Shetty, Wiley Eastern Ltd.
7. Kuby, J. (1998) Immunology, W.H. Freeman and Company, New York.
8. Roitt, I., Brostoff, J. Male, D. (1999/2000) Immunology, 4th Edition. Harcourt Brace and Company Asia, Pvt. Ltd., Singapore.
9. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2nd Edn. 2000, ISBN.

BI-203: GENETICS AND GENETIC ENGINEERING

UNIT-I : GENETICS

- 1.1. Concept of gene: Alleles, Multiple alleles and Pseudoalleles (ABO blood grouping, Bombay phenotype and Rh factor).
- 1.2. Extensions of Mendelian Principles: Pleiotropy, genomic imprinting, Penetrance and expressivity, phenocopy, sex linked, sex limited and sex influenced characters.
- 1.3. Linkage and Crossing over; Complete and incomplete linkage; lod score for linkage testing, somatic or mitotic crossing over, germinal or meiotic crossing over.
- 1.4. Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping with somatic cell hybrids.

UNIT-II : GENETICS

- 2.1. Mutation: Types (Spontaneous, Induced, lethal, conditional, biochemical) causes, loss of function, gain of function, insertional mutagenesis.
- 2.2. Microbial genetics: Methods of genetic transfers – transformation, conjugation, Transduction and sex-duction, mapping genes by interrupted mating.
- 2.3. Human genetics: Pedigree analysis, genetic disorders (Brachydactyly, Huntington's chorea, Sickle cell anemia).
- 2.4. Quantitative genetics: Polygenic inheritance, Types of quantitative traits (continuous, meristic and threshold); examples (skin color and height in humans), Mapping of Quantitative trait loci (QTL mapping).

UNIT-III: COMPONENTS FOR GENETIC ENGINEERING

- 3.1. Molecular vectors: Cloning, Shuttle, Expression and Binary vectors.
- 3.2. Plasmids (PBR322, PUC18/19, Blue script), Viruses (λ gt 10, 11, λ ZAP).
- 3.3. Restriction endonucleases: Types, Properties and applications.
- 3.4. DNA and RNA Polymerases, Nucleases, Kinases, Phosphatases and Methylases.

UNIT-IV: MOLECULAR CLONING STRATEGIES AND TECHNIQUES IN GENETIC ENGINEERING

- 4.1. Generation of DNA fragments, RF digestion, Mechanical shearing, Duplex cDNA synthesis and chemical synthesis.
- 4.2. Joining of DNA fragments to vectors: Homopolymer tailing, Cohesive and blunt end ligation, linkers and adapters.
- 4.3. Introduction of recombinant DNA molecules into selected host cells: Biological and Non- biological methods. Screening Techniques: Immunological and genetic hybridization. Ethics, IPR, GMO
- 4.4. Polymerase Chain Reaction (PCR) and its applications. RFLP and RAPD profiles in identification of DNA. Sequencing of nucleic acids: Maxam and Gilbert chemical degradation and Sanger's dideoxy chain termination method and site-directed mutagenesis for changing genes.

SUGGESTED READING MATERIAL

1. Genetics - Monrve W. Strickberger. 3rd Ed., May, 2000.
2. Genetics-K.B.Alluwallia-1985.
3. Principles of Genetics - E.J. Gardner. M.J. Simmons & D.P. Snustad.
4. Molecular Biology of genes- Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz & A.M. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
5. Basic Human Genetics- E.J. Mange, Arthur P. Mange. Indian Print, 1997.
6. Genetic disorders of Man by M.R. Goodman.
7. An introduction to modern genetics by Ch. Waddington
8. DNA cloning : Mammalian systems - A Practical Approach by D.M. Glover, B. D. Hames.
9. Genome Analysis - A laboratory Manual Volume-2 Detecting Genes by Bruce. Birren; Eric D. Green; Sue. Klapholz; Richard M. Myers Jane Roskam.
10. Genome analysis - A laboratory manual volume-3 cloning systems by Bruce. Birren; Eric D. Green; Sue. Klapholz; Richard M. Myers & Harold Riethman Jane Roskams.
11. Genome Analysis - A laboratory manual Volume-4 Mapping Genomes by Bruce. Birren; Eric

- D. Green; Philip Hiltner Richard M. Myers Sue. Klapholz; Harold Riethman Jane Roskams.
13. Genetic Engineering and its Applications by P. Joshi
14. Biotech's Dictionary of Genetic Engineering by Dinesh Arora.
15. From Genes to clones Introduction to Gene technology by Ernst-L- Winnacker.
16. Molecular cloning by Sambrook.

BI-204: ENZYMOLOGY

UNIT-I : General Properties of Enzymes

- 1.1 Introduction to enzymes- Introduction , Classification, Isolation & Purification of enzymes
- 1.2 Properties of enzymes-specificity of enzymes.
- 1.3 Enzyme Assays
- 1.4 Enzyme catalysis-General principles of catalysis.

UNIT-II : Kinetic properties of Enzymes

- 2.1 Kinetic theory and Collision theory
- 2.2 Effect of reactant concentrations (Rate constant, First order, Second order & Zero order reactions; Ramachandran plot; slope)
- 2.3 Effect of enzyme concentration, pH and Temperature.
- 2.4 Effect of substrate concentration, Determination of Kinetic constants (K_m and V_{max} ; Michaelis and Menten hypothesis).

UNIT-III : Regulation of Enzyme activity

- 3.1 Inhibition of enzyme activity (competitive, non-competitive, uncompetitive and mixed inhibition)
- 3.2 Kinetics of allosteric enzymes
- 3.3 Regulation of enzyme activity (Metabolic regulation), Catalytic efficiency of enzymes (Feed back inhibition, covalent modification)
- 3.4 Mechanism of enzyme action (Lock and Key; Induced fit model), catalytic site, Role of metal ions.

UNIT-IV : Industrial Application of enzymes

- 4.1 Enzymes in clinical diagnosis, Therapeutic enzymes
- 4.2 Immobilized enzymes and their applications
- 4.3 Isozymes, Ribozymes, Hybrid enzymes
- 4.4 Enzyme engineering, Economic Importance of industrial enzymes.

SUGGESTED READING MATERIAL

1. Harper's Biochemistry by Robert K. Murray, Peter A. Mayer, D.K. Granner, V.W. Rodwell, Lange Medical
2. Enzyme kinetics by D.V Roberties, Cambridge University Press.
3. Enzyme Kinetics by I. W. Segil.
4. Biochemical calculations by I.H. Segel 2nd Ed. John Wiley & Sons.
5. Biochemistry by D. Voet and J.G. Voet, J.Wiley & Sons.

SEMESTER – II
207-HUMAN VALUES AND PROFESSIONAL ETHICS – I

Syllabus

(With effect from 2014-15)

(effective from the batch of students admitted from the academic year 2014-15)

- I. Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics- Goals – Ethical Values in various Professions.
- II. Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders, Character and Conduct.
- III. Individual and society:
Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues)- Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).
- IV. Bhagavad Gita – (a) Niskama karma. (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.
- V. Crime and Theories of punishment – (a) Reformatory, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics – integrity at work” by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.

SEMESTER-III

BI-301: GENOMICS AND PROTEOMICS(Core)

UNIT – I: BASIC GENOMICS

- 1.1. Basic structure of DNA. Genomic organization in Prokaryotes and Eukaryotes.
- 1.2. Gene density, coding and non-coding DNA, DNA denaturation kinetics, forces stabilizing DNA structures.
- 1.3. Genome mapping: Genetic maps, Physical maps, Linkage analysis, Restriction maps. RFLP, RAPD, SSLP. Applications of genome mapping.
- 1.4. DNA markers and probes.

UNIT – II: ADVANCED GENOMICS:

- 2.1. Genome Sequencing: DNA sequencing methods – Automated DNA sequencing.
- 2.2. Genome assembly: Clone contig approach and Shotgun Approach.
- 2.3. Analysis and Understanding of the genome: Prediction methods – locating genes by sequence inspection (GRAIL, GenScan), Coding elements (ORF identification), homology search (BLAST) and Phylogenetic analysis (CLUSTAL-W, PHYLIP). Experimental methods – Hybridization, Precise mapping of ends, RACE, S1 nuclease mapping, Exon trapping.
- 2.4. DNA micro arrays and chips.

UNIT – III: BASIC PROTEOMICS Structural organization of proteins – Primary, secondary, tertiary and quaternary structures. Ramachandran plot and significance.

- 3.1. Protein structural databases – PDB, SCOP, CATH.
- 3.2. Protein Motifs, Prints and Profiles.
- 3.3. Secondary structure prediction methods. Tertiary structure prediction by homology modeling.

UNIT – IV: ADVANCED PROTEOMICS

- 4.1. Transcriptome and expression profiling.
- 4.2. 2D Gel electrophoresis and DIGE system.
- 4.3. Introduction to Mass spectrometry, identification and analysis of peptide by mass spectrometry, peptide finger printing.
- 4.4. NMR and X-Ray crystallographic methods to determine protein structures.

REFERENCE BOOKS

1. Molecular Biology of Cell (1994) by Alberts et al., Garland Publishing Inc.
2. The Molecular Biology of the Gene by J D Watson et al.
3. Molecular Cell Biology (1995) Lodish et al. by Scientific American
4. Genes VI (1996) Lewin by Oxford University Press.
5. Bioinformatics: Methodes and applications, Genomics, Proteomics and Drug discovery by S.CRastogi, N.
6. Mendiratta, P. Rastogi, PHI Learning Private Limited, New Delhi
7. Functional genomics: Practical approach, Ed by Stephan P. Hunt and Frederic J. Livesey, Oxford University Press, New York

BI- 302: MOLECULAR MODELING AND DRUG DESIGNING (Core)

UNIT- I: Introduction to Pharmacology

- 1.1. Pharmacokinetics (ADME properties of a Drug) and Pharmacodynamics (Mechanism of drug action, Relation between drug concentration and effect), Benefits of pharmacogenomics
- 1.2. Drug structure designs, Analysis of active constituents of drugs and drug interactions with various systems
- 1.3. CNS drugs and mechanism of their action, antidepressants, antipsychotic, antiepileptic and drugs to treat Parkinson's disease
- 1.4. Anticancer drugs, Principles and classes of anticancer drugs and mechanism of their action

Unit-II: Molecular docking and docking systems

- 2.1 Introduction to Molecular docking and Protein ligand docking
- 2.2 Automated docking: Autodock and Autogrid
- 2.3 Flexible docking and Evaluation of docking prediction
- 2.4 Molecular dynamics, Scoring functions and kinetic method

Unit-III: Computer aided drug designing

- 3.1. Structure-based drug design and Virtual screening
- 3.2. Basic Lead identification, Optimization, Validation and Identification of Lead compounds from chemical libraries
- 3.3. *De novo* technique and Homology modeling
- 3.4. Pharmacophore design, Force fields and energy minimization

UNIT-IV: QSAR and Medical Informatics

- 4.1 Introduction and evolution of QSAR- Hammett equation, Hansch and Taft equations and Free Wilson analysis
- 4.2 .Molecular descriptors, Steps involved in QSAR study, Types of QSAR methods and Statistical methods in QSAR
- 4.3 Comparative Molecular Field Analysis (COMFA)
- 4.4 Introduction and origin of Medical Informatics, Clinical databases, Tele Medicine, Automated diagnostic system

REFERENCE BOOKS:

1. Molecular Modelling and Drug Design by K.Anand Solomon, MJP Publishers, MJP Publishers, ISBN 978-81-8094-060-6
2. The Organic Chemistry of Drug Design and Drug Action, Richard B. Silverman – Academic Press, ISBN 0-12-643732-7617
3. N. R. Cohen, Editor. *Guidebook on Molecular Modeling in Drug Design* Academic Press, San Diego, 1996, ISBN-10: 0-12-178245-X
4. Structural Bioinformatics, by Philip E. Bourne (Editor), Helge Weissig (Editor), 2003, John Wiley & Sons
5. Molecular Modelling: Principles and Applications by Andrew R. Leach, Prentice Hall (Pearson Education), Harlow; 2001
6. Drug-DNA Interaction protocols by Keith R. Fox, 1998
7. Pharmacogenomics: The Search for Individualized therapies by Licinio.J, Wong.M.L., 2002

BI-303 (1): PERL

(Internal Elective)

UNIT- I: DATA TYPES & EXPRESSIONS

- 1.1. Introduction to PERL
- 1.2. Starting a PERL script and Data types
- 1.3. Scalars
- 1.4. Arrays and Hashes

UNIT-II: SIMPLE PROGRAMMING WITH PERL

- 2.1 Special variables and characters
- 2.2 Operations, Syntax and Flow Control
- 2.3 Compound statements
- 2.4 Subroutines

UNIT-III: BIO - PERL

- 3.1 Using Bio-PERL
- 3.2 Accessing sequence data from local and remote databanks and Accessories remote databases
- 3.3 Transforming sequence files and transforming alignment files
- 3.4 Manipulating sequences

UNIT-IV: PRACTICES OF PERL

- 4.1. Examples- sequence analysis
- 4.2 Structural analysis
- 4.3 Display Diagrams
- 4.4 Utilities

REFERENCE BOOKS:

1. Bio Scientist – SSI – Gemeiosys Research Labs. India Pvt. LTd.
2. Bioinformatics – by C.S.V. Murthy, Himalaya Publishing House.
3. PERL Programming for Bioinformatics – by Harshawardhan P Bal

SEMESTER-III

BI-303 (2) : OOPs WITH C++ (Internal Elective)

UNIT-I: OOPs METHODOLOGY

- 1.1. Introduction to Object Oriented Programming, Characteristics of the Procedure Oriented Programming
- 1.2. Introduction to Object Oriented Development and usefulness of modeling as a developing technique
- 1.3. Objects and Classes, Links and associations, Generalization in inheritance, Grouping constructs Aggregation and Abstract classes
- 1.4. Generalization as extension and Restriction, Multiple Inheritance, Metadata, Candidate keys, and Constraints

UNIT-II: INTRODUCTION TO C++

- 2.1. History of C++, Applications of C++, Preprocessor Directives the characteristic, Data types and Expressions
- 2.2. Operators, Assignment Statement and Control Structures
- 2.3. Recursion, Inline function, Static type checking Returning a value and The function argument list
- 2.4. Argument processing, Program scope, Local scope, Free store allocation

UNIT-III: OVER LOAD AND TEMPLATE FUNCTIONS

- 3.1. Overload function names, Template functions, Pointers to functions and Type safe linkage.
- 3.2. The class Definition, Class, Objects, Class member functions, Friend class and Static class members
- 3.3. Class member pointer, Class scope, Unions and A space saving class
- 3.4. Class utilization, Member wise utilization operator overloading, Constructors and Destructors

UNIT-IV: INHERITENCE – POLYMORPHISM

- 4.1. Inheritance, Types of Inheritance, Virtual base classes and Abstract classes
- 4.2. Polymorphism, Early binding and late binding polymorphism with pointers
- 4.3. Virtual functions
- 4.4. Templates Exception handling

REFERENCE BOOKS:

1. Object-oriented programming with turbo C++ by Kamthane A.N.
2. The C++ programming language by Stroustrup .B
3. Programming with C++ by D. Ravi Chandran
4. Programming with ANSI C++ by E. Balaguruswamy

BI-304(1): ORACLE(SQL)

Internal elective

UNIT- I: SQL

- 1.1. Introduction to DBMS and RDBMS: Codd Rules and Normalization
- 1.2. Introduction to SQL: Data types, Definition, Manipulation, Control language statements, SQL * Plus and Constraint's
- 1.3. Querying database tables: Order By and Group By commands
- 1.4. Querying multiple tables: Joins and its types, Set Operators, Nested Query's, Special operators in sub queries and Functions on Tables Information

UNIT- II: PL/SQL

- 2.1 Introduction: PL/SQL structure, Architecture, Variables, Constants, Data types and Design PL/SQL code
- 2.2 Conditional and Iterative statements with Examples
- 2.3 What is a Cursor, Explicit and Implicit cursors, Cursor attributes, Composite data types, PL/SQL Records
- 2.4 Exception handling: Scope rules and Re-raising Examples

UNIT - III ADVANCED PL/SQL

- 3.1 Sub programs in PL/SQL: Functions, Sub Procedures and Arguments Modes
- 3.2 Database Triggers: Utilization, Part of a trigger, Creating a database triggers and Options
- 3.3 Packages: Advantages and Stored Packages
- 3.4 Packages with procedures and Functions, Structure of a Package and Parameters used Package

UNIT – IV DEVELOPER – 2000 FORMS

- 4.1 Introduction to Forms, Form Designers, Generate, Run Form and Form Application Connecting to Oracle
- 4.2 MDI windows, Document windows, Dialog Windows, Model and modeless window, Toolbars and Windows Events
- 4.3 Master/Detail Relationship and Create relation
- 4.4 Define Report, Generate and Execute a Report

REFERENCE BOOKS:

- 1. SQL – PL/SQL by Ivan Bayross
- 2. Complete reference by Oracle Corporation.
- 3. Data Base Management systems by Kroth

B1–304 (2): JAVA (Internal Elective)

UNIT-I: JAVA PROGRAMMING FUNDAMENTALS

- 1.1. Introduction to Java : Overview of Java language
- 1.2. Constants, variables and data types
- 1.3. Operators and expressions
- 1.4. Decision making and branching; Decision making and looping

UNIT-II: JAVA CLASSES AND METHODS

- 2.1. Classes
- 2.2. Objects
- 2.3. Methods and Arrays
- 2.4. Strings and Vectors

UNIT-III: JAVA – INHERITANCE

- 3.1. Interaction multiple inheritance
- 3.2. Packages putting classes together
- 3.3. Multithreaded programming
- 3.4. Managing errors and Exceptions

UNIT-IV : JAVA – APPLET

- 4.1. Applet programming
- 4.2. Graphics programming
- 4.3. Managing Input/Output files in Java
- 4.4. Comparison of Java with C and C++

REFERENCE BOOKS

- 1. An Introduction to Object-Oriented Programming – Second Edition by Timothy Budd, Addison Wesley Publication.
- 2. Programming with Java by John R. Hubbard, Schaum’s Outlines, McGraw Hill 1999.
- 3. Java 2, The Complete Reference by Patric Naughton and Herbert Schildt, TMH 1999
- 4. Using Java 2 platform by Joseph L. Weber, PHI-2000.

SEMESTER-IV

BI-401 Project work

BI-402(A): WEB DESIGNING(HTTP:) (Self Study Course)

UNIT-I: FUNDAMENTALS OF E-MAIL

- 1.1. Introduction of E-mail and Advantages and Disadvantages
- 1.2. User-Id's, Passwords and e-mail Addresses, Message components and Composition
- 1.3. Mail Features, E-mail Inner working and E-mail management.
- 1.4. Jumps browsing and publishing, Browser backbones, Coast and Coast surfing

UNIT-II: INTERNET TECHNOLOGIES

- 2.1 The Internet, Way internet works and Internet Congestion
- 2.2 Internet Culture and Business Culture
- 2.3 World wide web, Web browsers Details and web writing styles
- 2.4 Web presentations outline, Design and management and Registering web pages

UNIT-III: SEARCH ENGINES

- 3.1 Search Engines and World Wide Web directories
- 3.2 Search engine and Meta search engines
- 3.3 Search engine fundamentals, Telnet and FTP and Remote login
- 3.4 Computer viruses

UNIT-IV: HTML

- 4.1 HTML fundamentals, Hyper linking and Basic HTML
- 4.2 Web graphics, GIF features, Image tags and Image maps
- 4.3 Forms, Frames and Tables
- 4.4 Newsgroups, Mailing lists and Chat rooms

REFERENCE BOOKS:

1. World Wide Web HTML by ST. Xavier
2. Web programming by Dietal and Dietal

SEMESTER-IV

BI-402 (B): J2EE (Self Study Course)

UNIT-I: INTRODUCTION TO J2EE

- 1.1 What is J2EE, Why J2EE, J2EE multi-tier Architecture, Web Tier Implementation and Enterprise Java Beans Tier
- 1.2 Enterprise Application, Session Management, URL Rewriting, Hidden Field, Cookies, Session-Side and Session State
- 1.3 Model-View, Controller (MVC), J2EE Design Patterns and Frameworks, Pattern Concept and Pattern Catalog
- 1.4 Pattern Definition, Translator Pattern, Distributor Pattern and Broadcaster Pattern etc

UNIT-II: JDBC

- 2.1. J2EE Databases : Databases, Tables, Database Schemes, Normalizing Data, JDBC Objects
- 2.2. JDBC Driver Types, JDBC Packages, Connection Pool, Statement Objects, Prepared Statement object, Callable Statement and Result set
- 2.3. Transaction Processing and Exceptions
- 2.4. JDBC and Embedded SQL and J2EE Foundation

UNIT-III: SERVLETS

- 3.1 Servlets: Servlets and CGI Programming, Benefits of using Servlet and Deployment Descriptor Reading
- 3.2. HTTP Request headers, Sending data to a client and writing HTTP Response Header and Working with Cookies
- 3.3 JSP : Introduction to JSP, JSP tags, Variables and Objects, Methods, Control statements and Loops
- 3.4. Web Server Tomcat, Request String, Parsing other Information, User Sessions, Cookies and Session Objects

UNIT-IV : EJB

- 4.1 EJB: Enterprise Java Beans, EJB Container, EJB Classes, EJB Interfaces, Deployment Descriptors and Referencing EJB
- 4.2 Method Permissions, Transaction Elements and EJB Transaction Attributes
- 4.3 Session Java Bean: Creating a Session Java Bean and Stateless and Stateful Session Beans
- 4.4 Container Managed Persistence Bean (CMPB) Home, Remote Interfaces Entity Beans, Accessing the CMP Bean, Bean and Managed Persistence Bean (BMPB)

REFERENCE BOOKS:

1. Complete Reference J2EE
2. Sun Micro Systems Java & J2EE
3. Web enabled and internal technologies by Ivan Bayross

B1 402 (C): DATA STRUCTURES AND ALGORITHMS

(Self Study Course)

UNIT- I: ELEMENTARY DATA STRUCTURES

- 1.1 Concept of ADT, primitive and non primitive, linear and nonlinear data structures Arrays, Stacks quinces, de quinces
- 1.2 Lists, Generalized list, Linear linked list
- 1.3 Circular linked list, Doubly linked list, Infinite lists
- 1.4 Hash tables, Hash functions, Recursive functions

UNIT- II: COMPUTING ALGOLITHMS

- 2.1 Algorithms in computing, analyzing algorithm, designing algorithms, asymptotic notations standard notation Big 'O' notations.
- 2.2 Time and space complexity of algorithms and common functions
- 2.3 Sets union and intersection, differences Disjoint sets counting elements, relations
- 2.4 Matrices Adding, multiplying, Extracting a sub-matrix combining and Inverting

UNIT-III: SORTING AND SEARCHIG

- 3.1 Sorting, Bubble sort, Insertion sort
- 3.2 Selection sort, Quick sort
- 3.3 Radix sort, Merge sort, Shell sort, Heap sort
- 3.4 Searching sequential and Binary searching

UNIT-IV: GRAPHS AND TREES

- 4.1. Representation Graphs, Breadth first search, Depth first search
- 4.2. Topological sort, connected components, minimum spanning tree
- 4.3. Short path , Dijkstra's Algorithm all and Pairs shortest path (Floyd-warshall Algorithm)
- 4.4. Binary tree, Binary search tree Querying Binary search tree insertion and deletion traversals (Preorders, postorders, in orders)

REFERENCE BOOKS:

- Fundamentals of Data structures by E. Horowitz and S. Sahani, Galgotia Book source Pvt. Ltd.
Introduction to Algorithms by T.H. Coreman, C.E.Leisson, R.L. Rivert, PHI
Classic Data structures by Samantha DPHI 2001
Data structures through C++ by Kanctkar Y.P. BPB Publications 2003

BI-402 (D): RECENT TRENDS IN BIOINFORMATICS (Self Study Course)

Unit-I : Environmental Genomics

- 1.1 Fundamentals , Challenges, Environmental genome survey and environmental monitoring
- 1.2 Microbial Biodiversity, Metagenomic analyses, Phylotyping
- 1.3 Environmental Genomic Data, Genomics and Population dynamics
- 1.4 Synthetic Biology and Genomics, Gene Synthesis, Technology, Genome Reboot and Interventional genomics

Unit-II : Immunoinformatics

- 2.1 Introduction, Modeling & Prediction systems in immunology
- 2.2 Prediction of allergenic and immunogenic components
- 2.3 Immunoproteomics, Vaccine Development, QSAR and Bioadjuvant, IMGT, HLA databases, Viral Bioinformatics
- 2.4 Immunotoxicogenomics, Glycomics and its applications

Unit-III: Nanotechnology and Biomedical applications

- 3.1 Fundamentals of Nanotechnology, Nanostructure and Nanoengine and Bionano particles
- 3.2 Computational Methods and Applications
- 3.3 Enzyme Inhibitors, Drugs, Drug Delivery and Protein Engineering
- 3.4 Nanotechnology for Cancer, BioMolecular Motors, Societal and Economic Development

Unit- IV: Supercomputing

- 4.1 Supercomputer architecture, Special-purpose supercomputers, parallel computing,
- 4.2 The fastest supercomputers today, Measuring supercomputer speed, Quasi-supercomputing,
- 4.3 Supercomputer Companies / Manufacturer, Supercomputing centers and organizations
- 4.4 Grid computing: Definition of a grid, grid vs cluster, components of a grid, grid computing architecture, grid applications in bioinformatics

Reference books:

1. Environmental Genomics: Environmental Genomics by C. Cristofre Martin, Publisher: Humana press (Totowa, N.J.: Humana), 2007.
2. Immunoinformatics: Bioinformatic strategies for Better Understanding of Immune Function by Bock Gregory, Publisher: John Wiley & Sons, Novartis Foundation (Novartis Foundation Symposium, and Novartis), 2003.
3. Nanotechnology and Biomedical applications: Biomedical Applications of Nanotechnology by Dr. Vinod Labhasetwar, Dr. Diandra L. Lesile-Pelecky, (Copyright © 2007 John Wiley & Sons,Inc).
4. Nanotechnology: A Gentle Introduction to the Next Big Idea by Mark Ratner, Daniel Ratner, Publisher: Prentice Hall Professional Technical Reference, 2002.
5. SuperComputing: Understanding Parallel SuperComputing (IEEE Press Understanding Science & Technology) by R.Michael Hord, Publisher: IEEE Computer Society Press, 1998.
6. Distributed Systems: Principles and Paradigms by andre S.Tanenbaum and Maarten Van Steen, Prentice-Hall, 2002.
7. Grid Computing: A Practical Guide to Technology and Applications by Ahmar Abbas, published by Charles River Media, 2004.

BI- 403: INTRODUCTION TO BIOINFORMATICS

(External Elective)

UNIT-I: INTRODUCTION TO COMPUTERS

- 1.1 Basics of personal computer and its components, Concept of Programming Languages, Hardware and Software and Operating Systems
- 1.2 Disk Operating Systems (DOS): Simple commands to create directories and handle files and DOS based software for creating biological databases,
- 1.3 Windows Operating System, MS Office (MS Word, MS Excel, MS PowerPoint and MS Access)
- 1.4 Internet explorer, notepad, WordPad, their applications and features of Windows 2000, Windows 8.1

UNIT- II: BIBLIOGRAPHIC DATABASES AND NETWORK JOURNALS

- 2.1 Internet and Biologist: Internet basics, Internet access, E-mail, file transfer protocols, WWW, HTTP, HTML, URLs, EMB net, NCBI net, Browsing and down loading from sites
- 2.2 Networking of Computers, need and advantages, an overview of International and Indian networks-
- 2.3 Virtual Library I: Searching MEDLINE; Pubmed, Science Citation Index and current awareness services
- 2.4 Virtual Library II: Electronic Journal, International and Indian Networks(NICNET, INFLIBNET, and AGRIS)

Unit-III: DATABASES AND TOOLS

- 3.1 Database types and sources of Websites
- 3.2 Genebank sequence databases
- 3.3 Protein sequence databases
- 3.4 Submission of sequences to the databases

UNIT-IV: SEQUENCE AND STRUCTURAL ANALYSIS

- 4.1 Sequence analysis: Wisconsin GCG, DNASIS, DNASTAR, CLONE MANAGER packages for nucleotide sequence analysis and sequence alignment
- 4.2 Structural analysis: Prediction of structure for proteins and genes
- 4.3 Phylogenetic analysis: Phylogenetic models, Multiple alignment procedures (CLUSTAL W & X, ALIGN, PHYLIP) and Software for Phylogenetic analysis
- 4.4. Recent trends in Bioinformatics: DNA Microarrays, Pharmacogenomics, Medical informatics and Human genome project

REFERENCE BOOKS:

1. Bioinformatics. By Murthy, C.S.V. Himalaya Publishing House, Hyderabad
2. Bioinformatics by Andreas D. Baxevanis and B.F. Francis Ouellette, 2nd Ed., 2002
3. Basic Bioinformatics by S. Ignaeimuthi, S.J. Narosa Publications, 2005
4. Introduction to Bioinformatics by S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003
5. Bioinformatics, Methods and Applications, Genomics proteomics and drug discovery by S.C. Rastogi, N. Mendiratla and P. Rastogi, Prentice-Hall of India, 2004
6. Statistics Made simple: Do it yourself on PC by K.V.S. Sarma, Prentice-Hall of India, (2007)
7. Peter Norton's Introduction to Computers, 4th Edition, Tata Mc Graw-Hill Co., Inc., 2001

BI-404 : TOOLS & TECHNIQUES AND BIO-STATISTICS

UNIT-I : Instrumentation

- 1.1 Adsorption chromatography : Adsorption material – paper, silica gel, cellulose acetate, Merits and limitations. Molecular sieve chromatography: Principle, Determination of void volume and molecular mass of native molecules. Ion exchange chromatography: Ion exchange materials – Cation and anion exchange materials, Principle and separation of charged molecules.
- 1.2 Principle and application of TLC and HPLC.
- 1.3 Electrophoresis: principle, Matrices and used in electrophoresis – starch, cellulose acetate, agarose and acrylamide use of PAGE for separation of proteins, molecular mass determination, Separation of nucleic acids using agarose gel electrophoresis. Pulse field electrophoresis and isoelectric focusing.
- 1.4 Blotting techniques: Western, southern and northern blotting techniques.

UNIT-II: Instrumentation

- 2.1 Introduction to cell and tissue culture: Preparatory techniques – cleaning, sterilization, sterile handling tissue culture laboratory requirements, Design of tissue culture laboratory: Equipments and purpose.
- 2.2 Spectroscopy, Centrifugation, X-ray diffraction, Maldi.
- 2.3 Culture media: composition, preparation and sterilization, macro and micro nutrients, Importance of serum and limitation with serum media, cell harvesting methods.
- 2.4 The biology of stem cell: overview; different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells, stem cell nuclear transfer: somatic cell nuclear transfer, Animal cloning.

UNIT-III : INTRODUCTION AND SCOPE OF BIOSTATICS

- 3.1 Definition of statistics; Bio-statistics, classification, variables and attributes, diagrammatic distribution of biological data.
- 3.2 Measures of location and dispersion: Arithmetic mean, media and mode. Mean deviation, quartile deviation, Standard deviation and coefficient of variation.
- 3.3. Curve fitting: Fitting straight line, parabola exponential curve and geometric curve to the data Fitting of straight line using Ms-Excel.
- 3.4. Correlation and regression: Scatter diagram, types of relationship. Positive and negative Correlation, computation of correlation coefficient, Interpretation of correlation coefficient. Simple Regression and its interpretation.

UNIT-IV: STATISTICAL TESTS

- 4.1 Normal probability distribution and its application.
- 4.2 Tests of significance: level of significance and power of test and p-value of a test.
- 4.3 Students t-test for one sample two samples means-paired t test.
- 4.4 F-test, Chi square test and their application, concept of ANOVA.

SUGGESTED READING BOOKS

1. Animal Cell Culture – A practical approach, Ed. John. R.W. Masters IRL Press.
2. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VII volume, Cambridge press Edition.
3. Introduction to Instrumental analysis, Ronert Braun. Mc Graw Hill International edition.
4. Biologists Guide to Principles and Techniques of Practical Biochemistry, K.Wilson & K.W.Goulding, ELBS Edn.
5. General Zoological Microtechniques – P.M.Weesner.
6. Introduction to Biostatistics – By Sokal – Rohlf (2nd En) Freeman International ditor (1973).
7. Bio-Statistics – An introductory text-Golsteing, A The Macmillan Co., New York, 1971.
8. Bio-Statistics – By Lewis Alvin E.Affiliated East-West press (P) Ltd., 1971.

SEMESTER – IV

404- HUMAN VALUES AND PROFESSIONAL ETHICS – II

COMMON SYLLABUS FOR ALL P.G. COURSES (CBCS & NON-CBCS)

Syllabus

(With effect from 2015-16)

(effective from the batch of students admitted from the academic year 2014-15)

- I. Value Education- Definition – relevance to present day - Concept of Human Values – Self introspection – Self esteem. Family values - Components, structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.
- II. Medical ethics- Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.
- III. Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
- IV. Environmental ethics- Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.
- V. Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities Feminist ethics, surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics – integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian system of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Kraran Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.