

SYLLUBUS

III SEMESTER

S.No	SUBJECT NAME	L	P	M
THEORY				
01	Biochemistry	4	0	100
02	Fundamentals of Cell Biology	4	0	100
03	Biostatistics	4	0	100
04	RDBMS and HTML	4	0	100
05	Computer Hardware Networking	4	0	100
06	Introduction to Bioinformatics	4	0	100
PRACTICALS				
01	Biochemistry Lab	0	3	100
02	RDBMS and HTML Lab	0	3	100

BIOCHEMISTRY

Objective:

To impart the basic foundation of biological chemistry of macromolecules. Also, to understand the concept of metabolic pathways of macromolecules involved in the biological system.

Unit I

7

hours Carbohydrates, Amino acids and Proteins:

Classification and Haworth's Structure of mono and disaccharides, D&L concept. Structure and function of carbohydrates. Classification of amino acids, zwitterions, optical activity, chelate formation; Stereochemistry of amino acids. Peptides and peptide bond formation and its geometry. Classification, structure and function of proteins, denaturation of proteins.

Unit II

7 hours

Lipids and Nucleic acids:

Structure, Function and Classification. Saturated, Unsaturated and Polyunsaturated Fatty acids, Simple Lipids, Compound Lipids and Derived Lipids. Nitrogen Bases, Sugars, Nucleosides, Nucleotides, DNA & RNA - types.

Unit III

10 hours

Enzymes:

Chemical nature, general purpose, regulatory and allosteric enzymes. Enzyme specificity, factors affecting enzyme action, spectrophotometric measurement of enzymes, Isolation of enzymes from sub - cellular organelles. Important marker

enzymes of diagnostic diseases, ribosomes. Enzymes in ETC & Oxidative phosphorylation, Photosynthesis.

Unit IV

12 hours

Carbohydrate and Protein Metabolism:

Carbohydrate metabolism: Metabolic cycles - glycolysis, TCA, glycogenesis, glucogenolysis, gluconeogenesis, HMP pathway, and their regulations. Metabolic disorder of carbohydrates. Protein metabolism: - Digestion of proteins and utilization - Nitrogen balance, transamination, and oxidative deamination and urea cycle.

Unit V

9 hours

Lipid metabolism:

Digestion, absorption and transport. Fatty acid oxidation and transport, ketone bodies, regulation and fatty acid metabolism, Cholesterol -Biosynthesis and transport, Control of Cholesterol metabolism, Membrane lipids [glycerophospholipid and sphingolipids]

Nucleic Acid Metabolism:

Synthesis of purine & pyrimidine ribonucleotides & their regulation, Formation of deoxy ribonucleotides, Degradation of nucleotides. Intermetabolic relationship - Carbohydrates, Proteins & Lipids.

Prescribed Books:

1. Nelson, Cox, "Lehninger Principles of Biochemistry", Macmillan Worth.
2. D.M.Vasudevan, "Textbook of Biochemistry", Jaypee Publication.
3. Donald Voet, Judith G. Voet, Charlotte W. Pratt, "Fundamentals of Biochemistry", John Wiley & Sons, Inc.
4. J.L.Jain, "Biochemistry", S.Chand & Company Ltd.
5. Murray, Gramner, Mayes, Rodwell, "Harper's Biochemistry", MC Grall Hill.

Reference Book:

1. Stryer, "Biochemistry", Freeman Publication.

Reference Websites:

1. <http://web.indstate.edu/thcme/mwking/carbohydrates.html>
2. <http://biology.clc.uc.edu/Courses/bio104/lipids.htm>
3. <http://web.indstate.edu/thcme/mwking/nucleic-acids.html>
4. <http://www.worthington-biochem.com/introBiochem/introEnzymes.html>
5. <http://www.faqs.org/nutrition/Met-Obe/Metabolism.html>

RDBMS & HTML

Objectives:

To learn to create a website and to store and retrieve data effectively from the database and to study the basic security system to secure the database information.

Unit I

9 hours

Introduction to HTML:

Introduction to WWW, URL. Introduction to HTML, HTTP, Browsers, Microsoft, Internet Explorer, Create and Edit HTML, Web layout, List, Links and frame, Tables, Forms, Image.

Unit II

9 hours

Introduction to Data system:

Introduction to RDBMS, Network model, Hierarchical model, Relational model, Entity Relationship, CF codd's rules, Normalization, Introduction to 12i.

UNIT III

9 hours

Introduction to Oracle:

Introduction & Division of SQL, Data definition Commands, Data types, Data manipulation language Commands, Data control statements.

UNIT IV

9 hours

Set operation, SQL function, and Constraints:

Operator in SQL ,set operation ,EQUI joins,non EQUI joins ,outer ,self sub queries, group functions, Character functions, number functions, data function, miscellaneous functions, conversion function & Constraints -data constraints, primary key, unique key, foreign key, check and column constraints.

UNIT V

9 hours

Other Database Object & Enhancement of Oracle:

View, sequence, synonyms, types of lock, abstract data type, and Nested table. Introduction to MySQL

Prescribed Books:

- 1) James R.Graff and Paul N Weinberg, "The Complete Reference", Tata McGraw- Hill.
- 2) Jose' A Ramalho, "Oracle 8i", World Ware Publish, Inc, USA.
- 3) Steven Holzer, "HTML Black book", Dreamtech Press.
- 4) Thomas A. Powell, "Complete reference HTML & XHTML", Tata Mc Graw Hill, Second Edition.

Reference Books:

- 1) Michael obey and Michael J correy, A Beginners guide.
- 2) Mathews leon, Database Management systems, Vikas publishing house Pvt.

Reference Websites:

1. <http://www.geocities.com/SiliconValley/Vista/2207/sql1.html>

2. <http://portal.acm.org/results.cfm?query=CCS%3A%22H%2E2%22&coll=portal&dl=ACM&CFID=22258060&CFTOKEN=26116913>
3. <http://www.acrobatfiles.com/databases/139-1148-pdf.html>
4. <http://www.databasejournal.com/features/oracle/print.php/3108301>

BIOSTATISTICS

Objectives:

To correlate the principles of statistics to biological data and also to study the methods of analysis and make inferences.

Unit I

7 hours

Introduction to Biostatistics:

Statistics – Definition, scope, Limitation. Collection of data- primary & Secondary Data; Classification & tabulation of data- Type of classification & tabulation Difference between classification & tabulation. Diagrammatic and Graphical representation of data – type & significance.

Unit II

9 hours

Sampling:

Sampling: - method of sampling – random and non – random sampling - merits and demerits, limitation of sampling.

Measure of central value-Average – Type of average – arithmetic; mean median, mode – Limitations. Measures of Dispersion –Range.

Unit III

9 hours

Skewness, moments & kurtosis:

Measures of skewness and Kurtosis –measure of skewness based on moments. Correlation analysis- Definition significant, type, methods of correlation. Regression analysis - Regression equation – difference between regression and correlation.

Unit IV

8 hours

Probability:

Definition –measurement & law of probability – Condition probability - Bayes theorem – Probability Distributions – Application of probability.

Unit V

12 hours

Test of significance:

Chi -square test: Definition, Conditions, Uses, Limitation and Chi - square test for goodness of fit. f -test: Definition, Assumptions in f-test, Test of Hypotheses about the variance in two populations. t- test: Definition, Assumptions properties applications, Examples on test of significance of a mean sample, Paired t- test for difference of means. ANOVA - types.

Prescribed Books:

1. P.N.Arora, P.K.Malhan, "Biostatistics", Himalaya Publishing House.
2. P.S.S.Sundar Rao, J. Richard, "An Introduction to Biostatistics: A Manual for students in health sciences", Prentice-Hall of India Private Limited.
3. S.P.Gupta, "Statistical Methods", Sultan Chan & Sons Publishers.

Reference Books:

1. Ronald H. Forthofer, "Introduction to Biostatistics", Elsevier
2. Milton.J.S, "Statistical Methods in Biological & Health Sciences", M.C.Graw Hill.

Reference Websites:

1. http://www.centerforhealthstudies.org/research/studies/biostats_studies.html
2. <http://www.amstat.org/Careers/copss/index.cfm?fuseaction=biostatistics>
3. <http://www.wisegeek.com/what-is-biostatistics.htm>

COMPUTER HARDWARE NETWORKING

Objectives:

To have the thorough knowledge about various hardware parts in computer, process concepts and processor, operating systems and security & networking layers and types

UNIT I

9 hours

Introducing Hardware:

Electricity and Power Supplies - Understanding the POST, SETUP, BIOS, BOOT Process -Motherboard Architecture & Memory - Secondary Storage Devices - Supporting Peripheral Devices - PCI, USB, AGP, ISA, EIDE, SCSI. Understanding & Troubleshooting Windows 2000

UNIT II

9 hours

Hardware software and firmware:

Process concepts - CISC and RISC processor -OS: Types - LINUX, MAC, SOLARIS, IRIX, WINDOWS. Components - Kernel, Shell, File system. File Systems - fat, ntfs, netware, udf, unix. Operating system security.

UNIT III

9 hours

Networks:

Introduction - uses - Network hardware and software - reference model - example network - N/W standardization - physical layer - data link layer.

UNIT IV

9 hours

N/W layer:

Design issue - routing algorithm - congestion control algorithm - internet working - N/W layer in the internet. Transport Layer: Transport service - elements of transport protocol.

UNIT V

9 hours

Application Layer:

N/W security. Internet, TCP/IP, DNS, WWW, HTTP, E-mail, FTP, URL, Switching and Routing. APACHE basics. Multimedia, Applications in Biological data.

Prescribed Books:

1. Forouzan, Data Communication and Networking, Tata McGraw Hill.
2. Stallings, Data and Computer Communications PHI 5th edition.

Reference Books:

1. Tanenbaum, Computer Networks, PHI 3rd edition and 4th edition.
2. HM Deitel, Operating System, Pearson education, 2nd edition.

Reference Websites:

- 1) http://en.wikipedia.org/wiki/Computer_virus#Virus_removal
- 2) <http://www.faqs.org/faqs/computer-virus/new-users/>

FUNDAMENTALS OF CELL BIOLOGY

Objectives:

To understand the basics of cell structure and their functions concerned with studies on the molecules which compose a cell or its environment, as it is with the intact cell or organism. Also the concepts of transport & signaling mechanisms within the cell are made to understand.

Unit I

5 hours

Cell structure and Function of Organelles:

Definition, Types – Plant & Animal Eukaryotic and prokaryotic cells, Cell division - Mitosis and Meiosis, Cell cycle - Regulation of cell cycle.

Unit II

15 hours

Structure and Function of sub cellular organelles:

Cytoplasmic matrix, Plasma membrane and Cell wall, ER, Golgi apparatus, Lysosomes, Microbodies, Mitochondria, Plastids, Mitroplasids, Nucleus, Chromosomes, Ribosomes, Cytoskeleton, Centriole and Basal bodies, Cilia and Flagella.

Unit III

7 hours

Biological membranes:

Membrane protein, membrane structure and assembly, lipoprotein and receptor mediated endocytosis.

Unit IV

9 hours

Transport Across cell membrane:

Passive and active transport, permeases, sodium potassium pump, Ca²⁺ ATPase pumps, lysosomal and vacuolar membrane ATP dependent protein pumps, Co-transport into prokaryotic cells, endocytosis and exocytosis.

Unit V

9 hours

Cell signaling and Signal Transduction:

Cytosolic, nuclear and membrane bound receptors, autocrine, paracrine and endocrine model of action . Signal transduction- Signal amplification ,Different models of signal amplifications, cyclic AMP , Role of inositol phosphates as messengers, cyclic AMP, cyclic GMP and co-protein's role in signal transduction ,calcium ion flux and it's role in cell signaling, phosphorylation of protein kinase.

Prescribed Books:

1. H. Lodish et al., "Molecular Cell Biology", 5th Edition, W.H. Freeman & Co., 2004.
2. Albert, "Essential Cell Biology", Garland Publishers, 1998.
3. P.S. Verma & V.K.Agarwal, "Cytology", S.Chand & Company Ltd.

4. P.S. Verma & V.K. Agarwal, "Cell Biology, Genetics, Molecular Biology, Evolution & Ecology", S.Chand & Company Ltd.

Reference Book:

1. Kimball T.W. "Cell Biology". Wesley Publishers, 1989.
2. Benjamin Lewin, "Gene VIII", Pearson - Printice Hall.

Reference Websites:

1. http://www.brown.edu/Courses/BI0105_Miller/journals.html
2. <http://www.jcb.org/>
3. <http://www.sciencedirect.com/science/journal/09550674>
4. <http://www.sciencedirect.com/science/journal/09628924>
5. <http://library.brown.edu/search/j>

INTRODUCTION TO BIOINFORMATICS

Objectives:

To impart knowledge on the basis of Bioinformatics for biologists detailing about the various databases, in biology, sequence alignment, phylogeny and evolution of the genomes and the various software involved in learning Bioinformatics.

Unit I

5 hours

Information in Cybo:

Historical introduction & Overview of Bioinformatics. Network in Cybo.

Computers & programs, programming Languages, Internet basics - www, web pages & web sites, Virtual library.

Unit II

11 hours

Biological Databases:

Generalized Databases, Nucleic acid sequence databases - GenBank, EMBL, DDBJ. Protein Sequence Databases - SwissProt, PIR. Structure Databases - PDB, CATH. Specialized Sequence Databases of TIGR, Yeast , Mouse, Rice , Enzyme,RNA, Model Organism Databases, Specific protein family Databases, Specialized protein Databases, Protein classification Databases, Pathway Databases and Microarray Databases.

Unit III

11 hours

Sequence Alignment:

Algorithm, Goals and Types of Alignment, Study of Similarities, Scoring Mutations, Deletions and Substitutions, Sequence Alignment Methods, Pairwise Alignment, Multiple Sequence Alignment, Algorithms for Identifying Domains with in a Protein Structure, Algorithms for Structural Comparison, Carrying Out a Sequence Search.

Unit IV

10 hours

Homology, Phylogeny & Evolutionary Trees, Alignment:

Homology & Similarity, Ontogeny & Phylogeny, Phenetics & Cladistics, Phylogeny & Relationships, Approaches used in phylogenetic Analysis, Uses of tree building, Phylogenetic trees, Alignment, the substitution model, Tree - building methods - Distance based, Character based, Molecular approaches to phylogeny, Phylogenetic Software.

Unit V

8 hours

Molecular Visualization tools & Analysis Packages:

The protein conformation, Visualization tools, RasMol, Command line window, CHIME, MOL MOL, Commercial databases, Commercial Software, Comprehensive Packages, Packages Specialization in DNA analysis, Internet & Intranet packages.

Prescribed Books:

1. Arthur M.Lesk, "Introduction to Bioinformatics", Oxford University Press.
2. D.R.Westhead, J.H.Parish & R.M.Twyman, "Instant Notes: Bioinformatics", Viva Books Private Limited.
3. P.Narayanan, "Bioinformatics: A Primer", New Age International Publishers.
4. T.K.Attwood & D.J.Parry - Smith, "Introduction to Bioinformatics", Pearson Education.

Reference Books:

1. Andreas D.Baxevanis, B.F.Francis Ouellette, "Bioinformatics: A Practical Guide to the Analysis of Genes & Proteins", A John Wiley & Sons, Inc., Publication.
2. Jonese Pevzhe, "An Introduction to Bioinformatics", Ane Books Publications.

Reference websites:

1. <http://www-biology.ucsd.edu/others/dsmith/bioinformatics.html>
2. <http://www.bioinformaticscourses.com/bioinform/>
3. http://www.brc.dcs.gla.ac.uk/~drg/courses/bioinformatics_mscIT/

BIOCHEMISTRY LAB

(I) Qualitative Analysis:

- a) Carbohydrates - Glucose, Fructose, Maltose & Starch.
- b) Amino acids - Arginine, Tryptophan & Cysteine.
- c) Lipids - Saturated & Unsaturated.

(II) Measurement of p^H & Buffer Solutions:

- a) p^H Indicators.
- b) p^H Meters.
- c) Titration curves for weak acid & strong base.
- d) Buffers used in biochemical experiments.

(III) Colorimetric Estimations: Principle:

- a) Estimation of Glucose by OT method.
- b) Estimation of protein by Lowry & Bradford method.
- c) Quantitative analysis of amino acids by Ninhydrin method.

(IV) Spectrophotometric Estimations: Principle

- a) UV & Visible spectrophotometric analysis of normal & denatured DNA.

(V) Chromatography: Principle

- a) Paper Chromatography for amino acids.
- b) Thin layer Chromatography for identification for sugars in fruit juices.
- c) Demonstration of Ion exchange, Gel filtration & Affinity Chromatography.

(VI) Preparation of Biological samples:

- a) Starch from potato.
- b) Caesin from milk.
- c) Lactalbumin from egg.

(VII) Enzyme assay:

- a) Assay of any one enzyme for its effect on p^H, temperature, activity and substrate concentration.

References Books:

1. "An introduction to Practical Biochemistry" 3rd edition by David T. Plummer.
2. "Introductory Practical Biochemistry" by S.K.Shawney & Randhir Singh
3. "Manuals in Biochemistry" by J.Jayaraman.

RDBMS & HTML Lab

Objectives:

To train the students the basics of HTML, creating WebPages and store the Databases using appropriate program.

1. DDL, DML and TCL commands
2. Function
3. Operators
4. Joins
5. Abstract data type
6. Vary data type
7. Nested table
8. Create general Web page through HTML
9. Create a web page and insert any appropriate image
10. Divide the Browser window into column included suitable file inside the frames.
11. Create web page which connect varies biological database.

Reference Books:

1. Jose' A Ramalho, oracle 8i world ware Publish, Inc, USA
2. Steven holzer, HTML Black book, Dreamtech Press
3. Thomas A. Powell, Complete reference HTML & XHTML, Tata Mc Graw Hill
4. <http://www.geocities.com/SiliconValley/Vista/2207/sql1.html>