

4 th Semester	RBT4D001	Bioinformatics	L-T-P 3-0-0	3 CREDITS
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Module-I INTRODUCTION (10 Hours)

Searching Biological Data From databases: Finding the information stored and its retrieval methods at NCBI, EMBL and DDBJ, Protein Data Bank, CSD, Uniprot, PIR, SwissProt, TrEMBL, SNP, Metabolic pathways databases KEGG, MetaCyc, Domain classification databases: SCOP, CATH, Pfam Retrieving microbial and viral genome information.

Module -II BASICS (10 Hours)

Introduction to Operating systems, Linux commands, File transfer protocols ftp and telnet, Introduction to Bioinformatics and Computational Biology, Biological sequences, Biological databases, Genome specific databases, Data file formats, Data life cycle, Database management system models, Basics of Structured Query Language (SQL).

Module-III SEQUENCE ALIGNMENT (10 Hours)

Sequence Analysis, Pair wise alignment, Dynamic programming algorithms for computing edit distance, string similarity, shotgun DNA sequencing, end space free alignment. Multiple sequence alignment, Algorithms for Multiple sequence alignment, Generating motifs and profiles, Local and Global alignment, Needleman and Wunsch algorithm, Smith Waterman algorithm, BLAST, PSIBLAST and PHIBLAST algorithms.

Module-IV PHYLOGENETICS METHODS (08 Hours)

Introduction to phylogenetics, Distance based trees UPGMA trees, Molecular clock theory, Ultrametric trees, Parsimonious trees, Neighbour joining trees, trees based on morphological traits, Bootstrapping. Protein Secondary structure and tertiary structure prediction methods, Homology modeling, abinitio approaches, Threading, Critical Assessment of Structure Prediction, Structural genomics.

Module-V MODELLING (07 Hours)

Molecular modelling and drug design: Homology modelling, Molecular mechanics and force fields, molecular dynamics simulation, Drug design Process, drug like Property of a molecule, target identification, Docking methods, Basic idea about Molecular descriptors and QSAR analysis.

Books:

- Mount DW, Bioinformatics: Sequence and Genome Analysis, Spring Harbor Press
- Arthur Lesk, Introduction to Bioinformatics, Oxford University Press.
- Baxevanis AS and Ouellette BF, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley International Science.
- Bryan Bergeron, Bioinformatics computing, Prentice Hall Inc

- Bernhard Houbold, Thomas Wiehe, Introduction to computational biology : an evolutionary approach Birkhauser verlag press
- Tao Jiang, Ying Xu, Michael Q. Zhang, Current Topics in Computational Molecular Biology, MIT press.
- Thomas Lengauer, Bioinformatics from genome to drug .WILEY-VCH press.