

CC – II - BIOINFORMATICS RESOURCES AND APPLICATIONS

UNIT - I

Overview of Bioinformatics – Literature databases – NCBI – PubMed – Sequence and Structure databases – Genomics and Proteomics – Biodiversity - Systems Biology

UNIT – II

Protein and Nucleic Acid Sequence Databases – PIR, Swiss-prot, GenBank – pattern and motif searches – PROSITE, BLOCKS, PRINTS, PFAM – structure databases – PDB – structural classification – SCOP, CATH - Protein structure visualization tools – RasMol, Swiss PDB Viewer

UNIT - III

Sequence alignment: Scoring matrices - Substitution matrices (PAM and BLOSUM) - Local and Global alignment concepts – Dotplot - Dynamic programming methods - Statistics of alignment score - Databases searching - FASTA and BLAST searches - Multiple sequence alignment – CLUSTALW - TCOFFEE- Structure based sequence alignments - Profile methods – Gribskov profile – PSI-BLAST - HMMER

UNIT - IV

Genome Mapping, Sequencing, Assembly and Annotation – Genome projects – Genomic variations – Genome expression – Computational approaches in comparative Genomics – MUMMER -Genomic identification – Biomedical Genome Research – Proteomics – Computer gel analysis and protein identification software - Informatics solutions for proteomics – Interactomics- Systems biology (basic concepts)

UNIT - V

Evolutionary analysis - sequence level - distances - clustering methods - construction of dendrograms - rooted and un-rooted tree representation - Phylogenetic trees – PHYLIP

Reference Books:

1. Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003.
2. D. Higgins and W. Taylor (Eds), Bioinformatics- Sequence, structure and databanks, Oxford University Press, New Delhi, 2000.
3. R. Durbin, S.R. Eddy, A. Krogh and G. Mitchison, Biological Sequence Analysis, Cambridge Univ. Press, Cambridge, UK, 1998.
4. G. Gibson & S.V.Muse, A Primer of Genome Science, Sinauer Associates, Inc. Publishers, 2002.
5. A. Baxevanis and B.F. Ouellette. Bioinformatics: A practical Guide to the Analysis of Genes and Proteins, Wiley- Interscience, Hoboken, NJ, 2005.
6. A. M.Campbell & L. J. Heyer, Discovering Genomics, Proteomics & Bioinformatics, CSHL Press, 2003.
7. C.S. Tsai, An Introduction to Computational Biochemistry, Wiley-Liss, New York, 2002.
8. T.E. Creighton, Protein Function A Practical Approach, Oxford university press, 2004.
9. S.R. Pennington & M.J. Dunn, Proteomics – from protein sequence to function, BIOS Scientific Publishers, 2002.