IDC 401 Introductory Bioinformatics   3(3-0)

Objectives: To familiarize students with biological data mining from online databases and the use of various bioinformatics tools for extracting and processing biological data.

Theory

Introduction; bio-computing; biological databases - types and retrieval of nucleic acid (or genomic) or protein sequence information-Introduction to DNA and protein databases, data storage, file formats,
alignment - Sequence alignment, Local alignment, Global alignment, Multiple alignments pairwise; phylogenetics; Genetic distances, Distance based phylogenies, Phylogenetic tree construction; in silico identification of protein motifs and domains; structural bioinformatics of proteins and RNAs including protein modeling and prediction of their interactions with other proteins and small molecules; Consensus sequences, Finding genes and open reading frames in DNA sequence, promoter regions within genomes; networks; strategies for whole genome sequencing and assembly.

Practical

Introduction to NCBI, Data retrieval from NCBI, BLAST, Alignment tools, Primer design CLUSTALW. Introduction to PDB, SWISS-PROT, TIGR. KEGG, Repeatmasker, PHRED, PHRAP, Prosite/BLOCKS/PFAM, Emotif, RasMol, Oligo, Molscript, Treeview, Alscript,
Use of Software like Bioedit, Primer3, MEGA4.0 Genetic Analysis Software, Phylip.

Books Recommended

1. Claverie JM and Notredame C, 2006. Bioinformatics for Dummies. 2 nd Edition; Wiley Publishing.
2. Xiong J, 2006. Essential Bioinformatics. 1st Edition; Cambridge University Press.
3. Xia X, 2007. Bioinformatics and the Cell: Modern Computational Approaches in Genomics, Proteomics and Transcriptomics. 1 st Edition. Springer
4. Mathura V and Kangueane P, 2009. Bioinformatics: A Concept-Based Introduction. Springer 5. Mount DW, 2004. Bioinformatics Sequence and Genome Analysis. 2nd Edition; Cold Spring Harbor Laboratory Press.
6. Sperschneider V, 2008. Bioinformatics: Problem Solving Paradigms. Springer