Subject Code : P8BC13

CORE COURSE XIII – BIOINFORMATICS

Unit 1 Introduction

Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. The internet, the world wide web, useful search engines- Boolean searching, search engine algorithms. Finding scientific articles- Pubmed.
Running computer software, computer operating systems. Software downloading and installation.

Unit 2 Workstation

The bioinformatics workstation, Unix system, files and directories in Unix, working on a Unix system. Scripting languages- Perl and Python, markup languages- HTML, XML.

Unit 3 Databases

Database concepts- Database, database system, database management systems- Hierarchical, Rational and Network, Database security. Biological databases, Types- sequence and structure databases. Genome and organism specific databases. Miscellaneous databases. Data submission, data retrieval with Entrez, DBGET / Link DB and SRS.

Unit 4 Database searches and sequence alignment

Searching sequence database sequence similarity searches, amino acid substitution matrices, Database searches: FASTA and BLAST, sequence filters, Iterative database searches and PSIBLAST. Multiple sequence alignment- gene and protein families. Phylogenetics- building phylogenetic trees, Evolution of macromolecular sequences, Sequence annotation.

Unit 5 Applications

Prediction and visualization of protein structure. Drug discovery and development, combinatorial chemistry and docking. Pharmacogenomics. Pharmacogenetics. Toxicogenomics. Functional genomics, metabolomics. E-cell.
Metabolic pathways- Kegg and Wit, primer design, Microfluidics. Nanotechnology.

Books recommended

1. Lesk, A.M. Introduction to Bioinformatics. Oxford, 2002.
2. Campbell and Heyer. Discovering Genomics, Proteomics and Bioinformatics. Cold Spring Harbour Laboratory. Press & Benjamin Cummings, 2002.
3. Gibas and Per Jambeck. Developing Bioinformatics Computer Skills. O'Reilly & Associates, 2001.
4. Krane et al. Fundamental concepts of bioinformatics. Benjamin Cummings, 2002.
5. Bioinformatics computing Bergeron BP. 1st ed. Printice Hall, 2002.
6. Baxevanis & Ouellette. Bioinformatics: A practical guide to analysis of genes and proteins.2nd ed. Wiley-Inter Sci. 2001.

Web sites

http: //www.ensembl.org
http://www.ncbi.nlm.nih.gov/genbank
http://www.123genomics.com
http://www.expasy.ch