

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science & Information Technology, VIII-Semester

Departmental Elective CSIT-802(B) Bio Informatics

Objective:

The course has been designed to be an entry level in Bioinformatics. It is introductory in nature and will provide an overview of the concepts and practices in Bioinformatics. The course structure has been designed such that students will acquire skills required to become Assistant Programmer/Technical Assistant in Bioinformatics. It would also help students to acquire a good foundation to take up further studies.

Course Outcomes: After Completing the course student should be able to:

1. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
2. Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
3. Explain about the methods to characterize and manage the different types of Biological data.
4. Classify different types of Biological Databases.
5. Introduction to the basics of sequence alignment and analysis.

Unit-I

Introduction: Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA & RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

Unit-II

Bioinformatics Databases & Image Processing: Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

Unit-III

Sequence Alignment and database searching: Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequences Alignment

Unit-IV

Gene Finding and Expression: Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, mining the Gene Expression Data

Proteomics & Problem solving in Bioinformatics: Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences , Strategies and options for similarity search , flowcharts for protein structure prediction

Recommended Books:

1. Gopal & Jones, BIOINFORMATICS with fundamentals of Genomics & Proteomics ,TMH Pub
2. Rastogi , Bioinformatics –Concepts , skills & Applications , CBS Pub
3. Claverie , Bioinformatics , Wiley pub
4. Stekel , Microarray BioInformatics , Cambridge

List of Experiments:

1. To find information in online databases.
2. To retrieve the sequence of the Human keratin protein from UniProt database and to interpret the results.
3. To retrieve the sequence of the Human keratin protein from Genbank database and to interpret the results.
4. To find the similarity between sequences using BLAST.
5. To find the similarity between sequences using FASTA
6. To align more than two sequences and find out the similarity between those sequences using ClustalW.