2BM605: Bioinformatics **[3 2 0 3 1]**

Learning Outcomes:

The educational objectives of the course are to educate students to attain the following:

- Understand the Bioinformatics and its area of applications
- Become familiar with Biological Databases and database mining tools
- Tools and techniques for Sequence analysis of Biological Data
- Develop PERL programming skills for Bioinformatics

SYLLABUS

Unit No.	Topics	Lectures (Hours)
1	**INTRODUCTION** Objectives of Bioinformatics, Overview of Bioinformatics applications, Scope of Bioinformatics and Careers in Bioinformatics.	2
2	**MOLECULAR BIOLOGY AND FLOW OF INFORMATION** Central dogma of molecular biology, Basics of nucleic acids, DNA, RNA, genes, genome, genomics, gene expression, gene regulation, protein, proteome and proteomics. DNA sequencing and Polymeric chain reaction, Cloning methodology.	8
3	**PROTEINS** Introduction, amino acids, protein structures: primary, secondary, tertiary and quaternary, protein folding, Protein functions.	4
4	**BIOLOGICAL DATABASES** Biological database organization: Database content and management, Growth of public database, data retrieval, Tools and database of National Center of Biotechnology Information (NCBI).	7
5	**SEQUENCE ALIGNMENT** Evolutionary Basis, Sequence Homology versus Sequence Similarity, Sequence Similarity versus Sequence Identity, Methods, Scoring Matrices, Statistical Significance of Sequence Alignment, Tools of Sequence alignment: BLAST and FASTA, Multiple sequence alignment(MSA).	8
6	**GENOMICS AND PROTEMICS** Approach from the Genome to proteome, Genomics versus proteomics, Overview of general functional genomics, Steps involve in proteome analysis.	5
7	**PERL FOR BIOINFORMATICS** Perl's benefits, Installing and running Perl on computer: Unix & Linux, Macintosh, Windows, programming techniques, Variables and Data types, Basic operators, Arrays and hashes, Control structures, Subroutines, Patterns and regular expressions, Working with data files.	10

Term Work and Practical shall be based on the above syllabus.

Text Books:

1. Bioinformatics: Concepts, Skills and Applications
   By: S.C. Rastogi, Namita Mendiratta, Parag Rastogi
   Pub: CBS publication.
2. Beginning Perl for Bioinformatics
   By: James Tisdall
   Pub: O'Reilly publications

Reference Books:

1. Bioinformatics Basics Applications in Biological Science and Medicine
   By: Rashidi, Hooman and Lukas K.Buehler
   Pub: CRC Press
2. Bioinformatics Sequence and Genome Analysis
   By: Mount David
   Pub: Cold Spring Harbor Laboratory Press
3. Bioinformatics, Biocomputing and Perl
   By: Michael Moorhouse and Paul Berry
   Pub: John Wiley & Sons publications
4. Perl programming for Bioinformatics and Biologists
   By: D. Curtis Jamison
   Pub: John Wiley & Sons, Inc. publications