CP5075 BIO INFORMATICS

DETAILED SYLLABUS

OBJECTIVES

- To get exposed to the fundamentals of bioinformatics.
- To learn bio-informatics algorithm and phylogenetic concept.
- To understand open problems and issues in replication and molecular clocks.
- To learn assemble genomes and corresponding theorem.
- To study and exposed to the domain of human genomics.

UNIT I INTRODUCTION AND FUNDAMENTALS

Fundamentals of genes, genomics, molecular evolution – genomic technologies – beginning of bioinformatics - genetic data –sequence data formats – secondary database –examples – data retrieval systems – genome browsers.

UNIT II BIOINFORMATICS ALGORITHM AND ANALYSIS

Sequence alignment and similarity searching in genomic databases: BLAST and FASTA – additional bioinformatics analysis involving nucleic acid sequences-additional bioinformatics analysis involving protein sequences – Phylogenetic Analysis.

UNIT III DNA REPLICATION AND MOLECULAR CLOCKS

Beginning of DNA replication – open problems – multiple replication and finding replication – computing probabilities of patterns in a string-the frequency array-converting patterns solving problems- finding frequents words-Big-O notation –case study-The Tower of Hanoi problem.

UNIT IV ASSEMBLE GENOMES AND SEQUENCES

Methods of assemble genomes – string reconstruction – De Bruijn graph – Euler's theorem – assembling genomes –DNA sequencing technologies – sequence antibiotics – Brute Force Algorithm – Branch and Bound algorithm – open problems – comparing biological sequences-Case Study –Manhattan tourist Problem.

UNIT V HUMAN GENOME

Human and mouse genomes-random breakage model of chromosome evolution – sorting by reversals – greedy heuristic approach – break points- rearrangements in tumor and breakpoint genomes-break point graps- synteny block construction -open problems and technologies.

REFERENCES

1. Ion Mandoiu and Alexander Zelikovsky , "Computational Methods for Next Generation Sequencing Data Analysis — Wiley series 2016.

2. Istvan Miklos, Renyi Institute, Introduction to algorithms in bioinformatics ‖,Springer 2016

3. Philip Compeau and Pavel pevzner, —Bioinformatics Algorithms: An Active Learning Approach‖ Second edition volume I , Cousera, 2015.

4. Supratim Choudhuri, —Bioinformatics For Beginners‖, Elsevier, 2014.