BIO-INFORMATICS

(ELECTIVE-III)

(Common to CSE & IT)

Course Code :13CT1133

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Course Educational Objectives:

The main objective of the course is to make students understand the concepts of Bio-informatics in the leading applications in engineering field.

- Understand protein information resources.
- Understand the genome information resources.
- Understand the DNA sequence analysis,
- To understand pair wise alignment techniques.
- Understand multiple sequence alignment.

Course Outcomes:

At the end of the course the student will be able to

- Learn about DNA and its Sequences,
- To get idea about DNA Databases.
- Understand pair wise alignment techniques.
- Learn about Biological databases.
- To get idea about multiple sequence alignment

UNIT-I (12 Lectures)

INTRODUCTION:

Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy.

PROTEIN INFORMATION RESOURCES:

Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

UNIT-II (12 Lectures)

GENOME INFORMATION RESOURCES:

DNA sequence databases, specialized genomic resources

DNA SEQUENCE ANALYSIS:

Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.

UNIT-III (12 Lectures)

PAIR WISE ALIGNMENT TECHNIQUES:

Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

UNIT-IV (12 Lectures)

MULTIPLE SEQUENCE ALIGNMENT:

Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching.

SECONDARY DATABASE SEARCHING:

Importance and need of secondary database searches, secondary database structure and building a sequence search protocol.

UNIT-V (12 Lectures)

ANALYSIS PACKAGES:

Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

TEXT BOOKS:

1. T K Attwood & D J Parry Smith Addison, *"Introduction to Bioinformatics"*, 1st Edition, Wesley Longman, 2008.
2. Jean-Michel Claveriw, Cerdric Notredame, *"Bioinformatics-A Beginner's Guide"*, 1st Edition, WILEY dreamtech India Pvt. Ltd, 2003.

REFERENCES:

1. Arthur M.Lesk, *"Introduction to Bioinformatics"*, 1st Edition, OXFORD publishers (Indian Edition), 2002.