INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (MICROBIOLOGY)**
SEMESTER	**5**
COURSE TITLE	**BIOINFORMATICS**
COURSE CODE	**02MB0305**
COURSE CREDITS	**4**

Objective:

1 Students are expected to have the advanced learning of bioinformatics which will enable them to apply these concepts in day to day life.

Course Outcomes: After completion of this course, student will be able to:

1 Comprehend the ways to utilize informatics system to derive useful biological information.
2 Recognise different biological database and their application in life science field
3 Acquire the knowledge of sequence alignments and phylogenetic relationships.
4 Distinguish difference in genome analysis for different organisms genome.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Introduction to Bioinformatics** Terminologies of bioinformatics, Fundamental of bioinformatics; aim, scope and research area, biological file formats; sequence file formats, file format conversation tools.	10
2	**Introduction to Databases** Primary Database- Nucleotide sequence, Protein sequence databases (NCBI, EMBL, DDBJ, UniProt) Secondary Database- Nucleotide sequence-TIGR, Protein sequence-PROSITE Structure Database-PDB, MMDB, SCOPE, CATH Metabolic Pathway Database-KEGG, BioCyc Literature Database-PubMed Database retrieval tool-SRS, Entrez	15

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Contents : Unit	Topics	Contact Hours
3	**Basics of Sequence Alignment and Phylogenetic** Pairwise sequence alignment, Tools for pairwise alignment: BLAST and FASTA, Multiple sequence alignment. Basic concepts of phylogenetic analysis, Tools for construction of tree and its analysis. Application of Phylogenetic studies, forms of tree representation, molecular evolution and molecular phylogenetic, bootstrapping strategies	20
4	**Fundaments of Genome organization and analysis** Diversity of genome; prokaryotic and eukaryotic genome, NGS mechanisms and its application, Major features of first microbial genome, Human Genome project.	15
Total Hours		**60**

Textbook :

1 Introduction to Bioinformatics , Lesk M.A., Oxford Publication, 2008

2 Bioinformatics: A practical guide to the analysis of genes and proteins, Baxevanis AD and Ouellette BFF, Wiley & Sons, 2001

3 Foundations of Computing, Pradeep and Sinha Preeti , BPB Publications, 2008

References:

1 Bioinformatics: Sequence and Genome Analysis, Bioinformatics: Sequence and Genome Analysis, David W. Mount, Cold Spring Harbor Laboratory Press, 2001

2 Bioinformatics: methods and applications, genomics, proteomics and drug discovery, Bioinformatics: methods and applications, genomics, proteomics and drug discovery, Rastogi S.C., Mendiratta N. and Rastogi P, Prentice Hall India Publication, 2007

3 Principles of Genome Analysis & Genomics, Principles of Genome Analysis & Genomics, Primrose and Twyman , Blackwell, 2003

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	20.00	5.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.

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Instructional Method:

2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.

3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 https://www.youtube.com/watch?v=p01s2mmsk3o

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