GUJARAT TECHNOLOGICAL UNIVERSITY
BIO-TECHNOLOGY
B. E. SEMESTER: VII

Subject Name: **Bio Informatics (Department Elective - I)**
Subject Code: **170406**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	**Fundamentals:** Introduction, Branches, Aims and Applications of Bioinformatics, Scope of Bioinformatics,Internet basics, Electronic mail, File transfer Protocol,Concept of World Wide Web	3
	Biological Databases 1) Generalized Nucleotide Databases: GenBank, EMBL, DDBJ 2) Specialized Nucleotide Databases: SGD, UniGene, TDB, EcoCyc, AceDB 3) Primary Protein Databases: SWISS- PROT + TrEMBL, UniProt, PIR, MIPS 4) Secondary Protein Databases: PROSITE, PRINTS, BLOCKS, Profile, Pfam 5) Protein Tertiary Structure Databases: MMDB, PDB 6) Genomics- Definition, History, Branches, applications and techniques of Genome Sequencing 7) Gene Prediction method and Tools 8) DNA Microarray and SAGE Technique	10
2.	**Sequence Retrieval and Analysis** 1) Sequence Retrieval by SRS, Entrez,DBGET 2) Pairwise alignment: Global and Local alignment and algorithms-theories 3) Sequence Similarity search: BLAST & FASTA 4) Multiple Sequence Alignment and Phylogenetic Analysis	7
3.	**Protein Structure Prediction ,Visualization and Concept of proteomics** 1) Protein Secondary Structure Prediction 2) Protein Tertiary Structure Prediction 3) Prediction of Protein Function	9

	4) Evaluation of Predicted Structure 5) Visualization Tools: Rasmol, RasTop, spdbv 6) Proteomics- Definition, History, Branches, 2D- PAGE and MS 7) Proteomics analysis and protein microarray	
4.	**Protein Modeling & Drug Design** 1) Protein Structure and Modeling 2) Bioinformatics in Computer Aided and Drug Design ,Concept of Docking	6
	Modeling of Bimolecular Systems 1) Simulation and Statistical protocols 2) Biochemical Networks	5
5.	**Commercial Bio softwares and Useful Concepts in Molecular Modeling** An Introduction to Computational Quantum Mechanics, overview of various methods, Four Challenges in Molecular Modeling : Free Energies, Salvation, Reactions and Solid-state Defects. The Use of Molecular Modeling and Cheminformatics to Discover and Design New Molecules	8

List of Practicals:

Practicals based on the following topics and introducing the concerned tools is as under:

1. Introduction of Home Page NCBI& Sequence Retrieval System DDBJ,PDB.
2. Sequence Retrieval System-Entrenz
3. Sequence Analysis
4. Multiple Sequence Alignment-CLUSTALW
5. Sequence Analysis Software
6. Post Translational Modification
7. Secondary Structure Prediction
8. Visualization Software
9. Generating Drug Molecule
10. Primer Design
11. Introduction to simulation softwares

Text Book:

1. Zumul Ghosh, Bibekand Mallick, Bioinformatics: Principles and Applications, Oxford University Press, Second Edition

Reference Books:

1. A.R. Leach, Molecular Modeling- Principles And Applications, Second Edition, Pearson.
2. David W. Mount. 2003. **Bioinformatics: Sequence & Genome Analysis**.CBS Publishers and Distributors. New Delhi.
3. Teresa K. Attwood and David J. Parry – Smith. 2005. **Introduction to Bioinformatics.** Pearson education, Singapore.

4. Westhead. D. R, Parish. J. H and Twyman. R. M, 2003**. Bioinformatics**. Viva Books Private Limited, New Delhi.
5. Rastogi. S. C, Mendiratta. N and Rastogi. P. 2003. **Bioinformatics: Concepts, Skills and Applications.** CBS Publishers and Distributors. New Delhi.