

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

Subject Name: **Genomics and Proteomics (Department Elective - I)**
Subject Code: **170405**

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

Unit-1 :

Sr. No	Course Content	Total Hrs.
1.	Basic Genomics: <ul style="list-style-type: none"> Definition, historical background and branches of genomics. Eukaryotic genome organization & packing of nuclear DNA in eukaryotes Prokaryotic genome organization, human genomic variations Overview of Organization of genomes in organelles (mitochondria & chloroplast) Various techniques of genome sequencing, Various applications of genome analysis and genomics Overviews of Natural Gene circuits, concept of Synthetic Biology 	12
2.	Advance Genomics <ul style="list-style-type: none"> Nucleotide databases – Generalized and Specialized. Gene Prediction methods and Tools Comparative Genomics of Prokaryotes, eukaryotes and Organelles with view point of evolution and Medicine Definition, construction and applications of Expressed Sequence Tag (EST) Definition, construction and applications of DNA microarray(cancer and Genomic Microarrays, healthcare applications), Biomedical Genome research Serial Analysis of Gene Expression (SAGE) 	12

Unit-2:

3.	Basic Proteomics <ul style="list-style-type: none">• Definition, historical background and branches of proteomics, Concept of proteome in eukaryotes and prokaryotes• Protein expression patterns: proteomics, Protein interaction network• Principle, Procedure, image analysis and application of 2D-PAGE• Principle, procedure, types, data analysis and applications of Mass spectroscopy• Tools and databases used for Proteomics data analysis	12
4.	Advance Proteomics <ul style="list-style-type: none">• Protein Databases- Primary, Secondary and Tertiary.• Principle and procedure involved in automation of proteomics analysis, Databases and tools used in automation of proteomics analysis• Definition, construction and applications of protein microarray (protein chips)• Principle, procedure and applications of Rational Drug Designing (RDD)• Protein structure prediction and Visualization• Protein Modeling, docking and simulation	12

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-Entrez
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 software

Text Book:

1. Discovering Genomics, Proteomics and Bioinformatics , A.Malcolm Campbell and L.J.Heyer, Second Edition, Pearson

Reference Books:

1. Introduction to Protein science: Architecture, Function and Genomics, Arther M. Lesk , OXFORD University Press, Second Edition
2. Primrose and Twyman R.M: Principles of Genome analysis: Blackwell publication
3. Proteomics: from protein sequence to function, Pennington SR, Dunn MJ, Viva Books Private Ltd.
4. Genomics and Proteomics: Functional and Computational Aspects by Sandor Suhai (Editor) (September 2000).
5. Creighton TE, Proteins, Freeman WH, Second Edition 1993.
6. Branden C, Tooze R, “ Introduction of Protein Structure”, Garland, 1993.