

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme			Bachelor of Technology			Branch/Spec.		Biomedical Engineering	
Semester			VI			Version		2.0.0.1	
Effective from Academic Year				2024-25		Effective for the Batch admitted in			July 2022
Course Code			2BM61PE03		Course Name		Bioinformatics		
Teaching Scheme						Examination Scheme (Marks)			
(Per week)		Lecture (DT)		Practical (Lab.)		Total			
	L	TU	P	TW			CE	SEE	Total
Credit	3	-	0	-	3	Theory	40	60	100
Hours	3	-	0	-	3	Practical	-	-	-
Pre-requisites									
Basics of Human Biology and Gene.									
Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	Understand how to retrieve and use information from various Biological Databases.								
CO2	Understand the concepts, algorithm and tools involved in the sequence alignment.								
CO3	Apply the fundamentals of Genomics and Proteomics for the gene and protein structure predictions.								
CO4	Gain knowledge and apply programming for various concepts in Bioinformatics.								
Theory Syllabus									
Unit	Content								Hrs.
1	INTRODUCTION Objectives of Bioinformatics, Overview of Bioinformatics applications, Scope of Bioinformatics and Careers in Bioinformatics.								2
2	MOLECULAR BIOLOGY AND FLOW OF INFORMATION Central dogma of molecular biology, Basics of nucleic acids, DNA, RNA, genes, genome, Genomics, gene expression, gene regulation, protein, proteome and proteomics. DNA sequencing and Polymeric chain reaction, Cloning methodology.								8
3	BIOLOGICAL DATABASES Biological database organization: Database content and management, Growth of public database, data retrieval, Tools and database of National Centre of Biotechnology Information (NCBI).								4
4	SEQUENCE ALIGNMENT Evolutionary Basis, Sequence Homology versus Sequence Similarity, Sequence Similarity versus Sequence Identity, Methods, Scoring Matrices, Statistical Significance of Sequence Alignment, Tools of Sequence alignment: BLAST and FASTA, Multiple sequence Alignment (MSA).								7
5	PROTEIN STRUCTURE PREDICTION Protein Classification, Review of Protein Structure and Terminology, Methods: Protein Structure Classification on Database, Structural Prediction, Evaluating the success of Structural Prediction.								8
6	GENOMICS AND PROTEOMICS Approach from the Genome to proteome, Genomics versus proteomics, Overview of general functional genomics, Steps involve in proteome analysis.								5
7	PERL FOR BIOINFORMATICS Perl's benefits, Installing and running Perl on computer: Unix & Linux, Macintosh, Windows, programming techniques, Variables and Data types, Basic operators, Arrays and hashes, Control structures, Subroutines, Patterns and regular expressions, Working with data.								11
Practical content									
NA									
Text Books									
1	Bioinformatics: Concepts, Skills and Applications by S. C. Rastogi, Namita Mendiratta, Parag Rastogi Pub.: CBS Publication.								
2	Beginning Perl for Bioinformatics by James Tisdall Pub.: O'Reilly Publications								

Reference Books															
1	Bioinformatics Basics Applications in Biological Science and Medicine by Rashidi, Hooman and Lukas K.Buehler Pub.: CRC Press														
2	Bioinformatics Sequence and Genome Analysis by Mount David Pub.: Cold Spring Harbor Laboratory Press														
3	Bioinformatics, Biocomputing and Perl by Michael Moor house and Paul Berry Pub.: John Wiley														
4	Perl programming for Bioinformatics and Biologists by D. Curtis Jamison Pub.: John Wiley														
ICT/MOOCs Reference															
1	https://nptel.ac.in/noc/courses/127/														
2	https://swayam.gov.in/														
Mapping of CO with PO and PSO:															
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
CO1	3	3	2	3	3	0	0	0	0	2	2	2	3	0	2
CO2	3	3	2	3	3	0	0	0	0	2	3	3	3	0	2
CO3	3	2	2	3	3	0	0	0	0	2	2	2	3	0	2
CO4	3	3	2	3	3	0	0	0	0	2	3	3	3	0	2