Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCSD512	**ALGORITHMS FOR BIOINFORMATICS**	3	0	0	3

Course Objective
To provide knowledge of applications of computational methods in biological problems. This course will provide a scope for research in many areas of computer science to apply them in biology.

Learning Outcomes
Upon successful completion of this course, students will: • Have a broad understanding of Basics and understanding of various tasks of bioinformatics that uses computational methods.   • Helps students to do interdisciplinary work and in biology with the help of computational tools and techniques, approaches.   • Students will learn advanced algorithms especially suited for bioinformatics research.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction to bioinformatics, biological sequence/structure, Central dogma of Molecular Biology, Genome Projects, Pattern recognition and prediction, Folding problem, Sequence Analysis, Homology and analogy	6	All basics of the subjects will be known and also learn the scope of the bioinformatics course.
2	Classical algorithms, exact matching problem, suffix trees, dynamic programming, fundamental preprocessing, Naive method, Boyer-Moore and Knuth-Morris-Pratt, keyword trees, linear-time construction of suffix trees,	8	Able to know all the classical approaches in various methods of bioinformatics
3	Pairwise alignment, scoring model, dynamic programming algorithms, Hidden Markov Models, Multiple sequence alignment	8	Understand Alignment methods and its applications.
4	Motif finding, Secondary database searching, Advanced topics in phylogenetic tree	8	Able to understand Motif finding in the sequence and its applications
5	Biological databases, Primary sequence databases, Protein classification databases. DNA databases, Specialized Genomic Resources, Importance of DNA analysis, Gene structure and DNA sequences, protein sequence and structure	8	Able to know Preparation Specialized Genomic Resources.
6	Gene expression analysis using microarray data, Application of Computational techniques on gene expression data, EST searches, Case Studies.	4	Able to understand the Microarray data preparation and processing for its analysis and EST process, case studies of some real time examples in the field
	Total	42	

Text Books:
1. Essential Bioinformatics 1st Edition, Jin Xiong
2. Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology (28 May 1997) by Dan Gusfield
3. Introduction to Bioinformatics By T. K. Attwood, Pearson education.

Reference Books:
1. An Introduction to Bioinformatics Algorithms By Neil C. Jones, Pavel A. Pevzner, Pavel Pevzner