INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM
INTRODUCTION OF NEW COURSE

Course Title	**Genomics and Proteomics**	Course Code				
Dept./ Specialization	Science and Humanities	Structure (LTPC)	3	1	0	4
To be offered for	UG and PG	Status	Core ☐		Elective ▪	
Faculty Proposing the course	Dr. M.Monisha	Type	New ▪		Modification ☐	
Recommendation from the DAC		Date of DAC				
External Expert(s)	1) Dr. R.Prasad, Professor, Department of Biotechnology, IIT Roorkee 2) Dr. Srinivas Kiran Ambatipudi, Associate Professor, Department of Biotechnology, IIT Roorkee					
Pre-requisite		Submitted for approval		48th Senate		
Learning Objectives	The objective of the course is to provide students with a comprehensive and concise overview of technologies pertinent to Genomics and Proteomics, their applications and demonstrate skills to apply the knowledge in scientific queries. This course will help the engineering students to appreciate the surplus value of combining data from different omics-applications as a systems approach.					
Learning Outcomes	On successful completion of the course, the student will be able to: • Explain the current genomics and proteomics technologies and exploit the same in the growing field of omics. • Interpret data obtained through high throughput expression studies. • Apply the computational skills to plan and execute a biomedical 'omics' project.					
Contents of the course *(With approximate break-up of hours for L/T/P)*	**Introduction to Genomics**: Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes, computational analysis of sequences, gene annotation, alignment statistics, genetic variation polymorphism, phylogenetics, tools for genome analysis– PCR, RFLP, DNA fingerprinting, RAPD, automated DNA sequencing, linkage and pedigree analysis, construction of genetic maps, FISH to identify chromosome landmarks. (10L+4T) **Introduction to Proteomics**: Identification and analysis of proteins by 2D analysis, tryptic digestion of protein and peptide fingerprinting, mass spectrometry, clinical proteomics and disease biomarkers, protein-protein interactions. (8L+2T) **Gene identification and expression:** Genome annotation, identifying the function of a new gene, gene ontology, comparative genomics, protein structural genomics, determining gene function by sequence comparison and through conserved protein, global expression profiling, analysis of RNA expression, microarray techniques. (10L+4T) **Analysis of proteomes:** Two-dimensional polyacrylamide gel electrophoresis, mass spectrometry based methods for protein identification, *de novo* sequencing using mass spectrometric data, correlative mass spectrometric based identification, strategies, 2-D gel electrophoresis coupled with mass spectrometry, case study on proteomic analysis of patient samples. (7L+2T) **Applications of Genomics and Proteomics**: Analysis of human genome, application of proteome analysis- drug development and toxicology, pharmaceutical applications, proteomics in drug discovery in humans, phage antibodies as tools, capstone project on genomics and proteomicss (7L+2T)					

Textbook	1. Wilson and Walker, Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press, 8th edition, 2018. 2. S. B. Primrose and R.M. Twyman - Principles of Genome Analysis and Genomics, 7th Edition, Blackwell Publishing, 2006. 3. S. Sahai - Genomics and Proteomics, Functional and Computational Aspects, Springer Publication, 2009.
Reference Books	1. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition, 2007. 2. Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.