

Course	Discipline Specific Core
Semester	VI
Paper Number	MBTCR6141T
Paper Title	GENOMICS AND PROTEOMICS
No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	5 Theory + 1Tutorial
Course description/objective	<p>The course aims to</p> <ol style="list-style-type: none"> 1. impart theoretical knowledge and information about computational tools of genomics. 2. impart theoretical knowledge and provide information about computational tools of proteomics. 3. introduce students to structural and functional genomics and DNA sequencing methods. 4. introduce students to proteomics and techniques for analysis of proteomes. 5. to provide knowledge about computational tools for high throughput handling of gene and protein sequences 6. provide students with information about web based servers and softwares for genome analysis by means of projects/ tutorials.
Syllabus	<p>Module A: (40 Marks)</p> <p>UNIT I: Introduction to Genomics: DNA sequencing methods – manual & automated: Maxam & Gilbert and Sangers method; Pyrosequencing; Genome Sequencing: Shotgun & Hierarchical (clone contig) methods; structural and functional genomics; libraries; RNA interference and micro RNA</p> <p>No. of Classes: 2.5 Classes per week including tutorial.</p> <p>Module B: (40 Marks)</p> <p>UNIT III: Proteomics: Chemical properties of proteins. Physical interactions that determine the property of proteins, Short-range interactions, electrostatic forces, van der waal interactions, hydrogen bonds, Hydrophobic interactions. Determination of sizes (Sedimentation analysis, gel filtration, Introduction to Proteomics, Analysis of proteomes. 2D-PAGE. Sample preparation, solubilization, reduction, resolution, 2D-DIGE, Reproducibility of 2D-PAGE, Mass spectrometry based methods for protein identification: MALDI, ESI-MS, <i>Denovo</i> sequencing using mass spectrometric data.</p> <p>No. of Classes: 3.5 Classes per week including tutorial.</p> <p>Tutorial: Genomics Project Managing and Distributing Genome Data: Web based servers and softwares for genome analysis: ENSEMBL, VISTA, UCSC Genome Browser, NCBI genome. Selected Model Organisms' Genomes and Databases.</p>

Readings	<ol style="list-style-type: none"> 1. Genes IX by Benjamin Lewin, Johns and Bartlett Publisher, 2006. 2. Modern Biotechnology, 2nd Edition, S.B. Primrose, Blackwell Publishing, 1987. 3. Molecular Cloning: A Laboratory Manual (3rd Edition) Sambrook and Russell Vol. I to III, 1989. 4. Principles of Gene Manipulation 6th Edition, S.B.Primrose, R.M.Twyman and R.W. Old. Blackwell Science, 2001. 5. Pevsner, J. (2009). Bioinformatics and Functional Genomics.II Edition.John Wiley & Sons.
Evaluation	<p>Continuous Internal Assessment (Genomics Project): 20 marks End-Semester Theory Examination: 80 marks</p>
Paper Structure for End Sem Theory	<p>Module A (40 Marks) Q.1. Five objective type questions each of 2 Marks, i.e. 5 x 2 =10 marks. Q.2, Q.3 and Q.4 are compulsory, each of 10 marks, i.e. 3 x 10 = 30 marks Module B (40 Marks) Q.5.: compulsory question of 10 marks containing objective questions Any 3 questions of 10 marks each from Q.6-Q.9. No part will be more than 5 marks.</p>