

Course	Skill Enhancement Course
Semester	IV
Paper Number	MBTSE4021T
Paper Title	TECHNIQUES IN MOLECULAR AND CELL BIOLOGY
No. of Credits	2
Theory/Composite	Theory
No. of periods assigned	2 Theory
Course description/objective	<p>The course aims to</p> <ol style="list-style-type: none"> 1. give the students an essence of molecular tools and techniques. 2. expose students to cell biological tools and techniques. 3. provide an overview of protein purification, DNA and RNA related methods used in molecular biology and gene transfer in bacteria. 4. provide an overview of histochemical assays, immunotechniques, electrophysiological, biophysical and radioactive methods.
Syllabus	<p>Module A: Molecular Biology Methods (40 Marks)</p> <p>UNIT I: Gene transfer: Gene transfer in bacteria (Conjugation, transformation, transduction)</p> <p>UNIT II: Methods and techniques: DNA (Genomic, cDNA, plasmids and episomes) and RNA related methods; Restriction enzymes; concept of PCR; Gel electrophoresis (agarose and PAGE); Northern and Southern hybridisation; Dot/Slot blots; DNA sequencing; Protein purification methods; Immunoblotting, Enzyme immunoassays after immunoblotting; DNA-protein interaction techniques (South-western blots, EMSA, DNaseI foot printing, immunoprecipitations). Basics of cloning and sub-cloning; Cloning strategies.</p> <p>No. of Classes: 1 Class per week</p> <p>Module B: Cell Biology Methods (40 Marks)</p> <p>UNIT III: Histochemical assays and immunotechniques: Reporter assays - CAT, luciferase, β-galactosidase, GFP and β-glucuronidase; protein localization in organelle; detection of molecules in living cells; histochemical stains; in situ localization by techniques such as FISH and GISH; chromosome painting; chromosome banding; DNA barcoding.</p> <p>UNIT IV: Radioactive and microscopic methods - radioisotopes used in biology; incorporation of radioisotopes in biological tissues; liquid scintillation counter and Geiger counter; molecular imaging of radioactive material.</p>
	No. of Classes: 1 /week

Readings	<p>Module A</p> <ol style="list-style-type: none"> 1) Principles of Genetics- Gardner et al. 2) An Introduction to genetic analysis- David Suzuki 3) Genetics- Strickberger 4) Principles of Gene Manipulation & Genomics-Primrose & Twyman 5) Molecular Cloning- Sambrook et al. <p>Module B</p> <ol style="list-style-type: none"> 6) Biophysical Chemistry - David Friefelder 7) Molecular Cloning: A Laboratory Manual - Sambrook and Russell 8) Cell and Molecular Biology – P. Sheeler, D.E. Bianchi (3rd Edition)
Evaluation	<p>Continuous Internal Assessment: 20 marks End-Semester Theory Examination: 80 marks</p>
Paper Structure for End Sem Theory	<p>Module A (40 marks) 10 questions, 1 mark each; i.e. 1x10=10 marks 3 questions, 10 marks each; i.e. 3x10=30 marks Module B (40 marks) 10 questions, 1 mark each; i.e. 1x10=10 marks 3 questions, 10 marks each; i.e. 3x10=30 marks</p>