



TECHNO INDIA UNIVERSITY
WEST BENGAL

Syllabus for 2-year M.Sc in Microbiology

Department of Microbiology

**Techno India University, West Bengal
EM-4, EM Block, Sector V, Bidhannagar,
Kolkata, West Bengal 700091**



Course Curriculum For All Semester :

M.Sc in Microbiology

Semester IV

Sl. No.	Course Code	Course Title	Contact Hrs. / Week			Credit	Page No.
			L	T	P		
Theory							
1	TIU-PMB-T212	Prokaryotic Genetics	2	1	0	3	
2	TIU-PMB-T214	Eukaryotic Genetics	2	1	0	3	
3	TIU-PMB-P202	Project	3	0	0	3	
4	TIU-PMB-G298	Seminar presentation Grand viva	0	0	2	2	
5	TIU-PMB-L200	CASD (Review paper presentation)	0	0	3	3	
6	TIU-PES-S298	Entrepreneurship Skill Development (ESD)	0	0	2	2	
Total Credit						16	



Syllabus for M.Sc in Microbiology
Department of Microbiology
Techno India University, West Bengal

Semester IV

Course Name: Prokaryotic genetics (Theory)

Course Code: TIU-PMB-T212

Course Objectives:

- Develop an understanding of the molecular basis of life and its implications for the diagnosis,
- treatment and prevention of disease.
- Recognize, analyze and interpret the structure and function of macromolecules and their roles in normal and diseased states.
- Utilize a variety of laboratory techniques and technologies to investigate and manipulate macromolecules.
- Design, analyze and interpret experiments to investigate the role of macromolecules in a variety of biological processes.
- Demonstrate an understanding of the principles of recombinant DNA technology and the potential applications of gene manipulation.
- Explain current research in the field of molecular biology and its implications for biotechnology and biomedicine.
- Communicate effectively in both written and oral formats about molecular biology concepts and research findings.

Course Contents:

- Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.
- Mutation : Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.
- Recombination : Homologous and non-homologous recombination including transposition.
- Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons

Reference Books:

- Klug WS, Cummings MR, Spencer, C, Palladino, M (2011). Concepts of Genetics, 10th Ed.,
- Benjamin Cummings



- Pierce BA (2011) Genetics: A Conceptual Approach, 4th Ed., Macmillan Higher Education Learning
- Watson JD, Baker TA, Bell SP et al. (2008) Molecular Biology of the Gene, 6th Ed., Benjamin Cummings
- Gardner EJ, Simmons MJ, Snustad DP (2008). Principles of Genetics. 8th Ed. Wiley-India
- Russell PJ. (2009). i Genetics- A Molecular Approach. 3rd Ed, Benjamin Cummings
- Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press.
- Maloy SR, Cronan JE and FriefelderD(2004) Microbial Genetics 2nd EDITION., Jones and Barlett Publishers.

Course Name: Eukaryotic genetics (Theory)

Course Code: TIU-PMB-T214

Course Objectives:

- To understand the Mendelian Principles and its deviation.
- To acquire knowledge about allele, linkage and epistasis..
- To understand the molecular Basis of crossing over.
- To gain knowledge about some disease due to change in chromosome number.
- To understand about pedigree analysis.
- Communicate effectively in both written and oral formats about molecular biology concepts and research findings.

Course Contents:

- Mendelian principles : Dominance, segregation, independent assortment.
- Concept of gene : Allele, multiple alleles, pseudoallele, complementation tests
- Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.
- Gene mapping methods : Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.
- Extra chromosomal inheritance : Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.
- Human genetics : Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.
- Quantitative genetics : Polygenic inheritance, heritability and its measurements, QTL mapping.
- Structural and numerical alterations of chromosomes : Deletion, duplication, inversion, translocation, ploidy and their genetic implications.



Reference Books:

- Genes VIII: Benjamin Lewin
- Molecular Biology of Gene: Watson et al. Cell & Molecular Biology: Lodish et al.
- Molecular Biology of cell – Bruce Alberts et al., Garland Publications Sambrook et al (2000) Molecular Cloning Volumes I, II, & III Cold spring Harbor Laboratory Press, New York, USA

Course Name: CASD (Review paper presentation)

Course Code: TIU-PMB-S202

Course outcome:

- Develop effective scientific communication skills
- Master the structure and organization of research and review papers
- Convey complex microbiological concepts clearly and concisely
- Acquire proficiency in proper citation methods
- Understand and apply ethical considerations in scientific writing

Course Name: Project

Course Code: TIU-PMB-P202

Course Name: Seminar presentation and Grand viva

Course Code: TIU-PMB-G298

Course Name: Entrepreneurship Skill Development (ESD)

Course Code: TIU-PES-S298

Course Outcome:

- Recognize and evaluate potential business opportunities within microbiology, understanding market needs and trends. Master the structure and organization of research and review papers
- Develop comprehensive business plans and effective strategies for launching and sustaining microbiology-based ventures.
- Understand and apply financial principles for budgeting, projection, and management specific to microbiology startups.
- Navigate legal and ethical considerations associated with entrepreneurship in microbiology, including intellectual property and safety regulations.
- Develop strong communication, networking, and presentation skills to foster innovation, collaboration, and successful business development within the microbiology sector.