

ADVANCES IN MOLECULAR BIOLOGY AND MICROBIAL GENETICS

Semester	Subject code	Category	Lecture		Theory		Practical		Credits
			Total hrs	Hrs/ week	Total hrs	Hrs/ week	Total hrs	Hrs/ week	
I	21CPMB1D	Elective-I	75	5	75	5	0	0	3

COURSE OBJECTIVES

To enable the students to understand the Molecular biology and Microbial Genetics

COURSE OUTCOMES

On the successful completion of the course, students will be able to understand the basics of Molecular biology & Microbial Genetics and acquire a sound knowledge about generating, processing and understanding biological genetic information.

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To expertise the transformation experiments and other gene transfer techniques	K2
CO2	To categorize the characteristics and structure of natural and artificial plasmids and transposons used in gene transfer mechanism.	K2
CO3	To analyze the mechanism of Gene Regulation & Expression and Gene as a unit of mutation and recombination.	K2
CO4	To understand the DNA sequencing, Site-directed mutagenesis and gene mapping of prokaryotes.	K2
CO5	To gain knowledge about Epigenetics and transposons	K2

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	M	S	S	S	S
CO3	S	S	S	M	S	S
CO4	S	M	S	S	S	S
CO5	S	S	S	M	S	S

S- Strong; M- Medium; L- Low

Unit-I: Genetic material**15 Hours**

Nucleic Acids – Definition – Structure, Composition & Properties of Nucleic Acids (DNA & RNA). Transformation: Competence, Preparation of Competent cells, Mechanism of transformation, Conjugation: Hfr, F⁺ and F⁻ transfer; Transduction: General Transduction, Abortive Transduction and Specialized Transduction.

Unit-II: Plasmids**15 Hours**

Plasmids: Introduction, Classification of Plasmids, Isolation and Purification of Plasmids, Characteristics of ideal plasmid vector, Structure of Plasmids F1, Col E1, pSC 101 and Ti Plasmids- Structure of T-DNA, Ti plasmid as an ideal cloning vector, Ti Plasmid derived vectors – Disarmed and Binary vectors.

Unit –III: Regulation of genes**15 Hours**

Gene Regulation : Regulation of gene expression – Regulation of Enzymes (Induction, Repression & Inhibition), Regulation of Transcription (Negative, Positive, Auto & Co-ordinate regulation); Operon Concept – Lac Operon, Tryptopan Operon, Arabinose operon; DNA methylation ; Translational control – Translation regulation, role of AntiSense RNA in Translational control; Post - Translational Modification.

Unit –IV: DNA sequencing**15 Hours**

DNA sequence analysis : Maxam – Gilbert (Chemical) sequencing, Sanger – Coulson (dideoxy/enzymatic) sequencing, Automated DNA sequencing, Next generation sequencing. Site-directed mutagenesis.

Unit –V: Epigenetics and Transposons**15 Hours**

Epigenetics; Transposable elements - Classes of Transposable elements – Nomenclature of Transposable elements; Insertion sequences (IS elements); Transposons: Composite transposons and complex transposons - Transposition :Mechanism of Transposition.

TEXT BOOKS:

S.No	Authors	Title	Publishers	Year of Publication
1.	Maloy SR, Cronan JR , JE. Friedfelder	Microbial Genetics	Jones & Bartlet	1994
2	Lodish H,Baltimore O,Berk A,Zipursky S L,Matsudaira P, Darnell L	Molecular Cell Biology	Scientific American Books	1995

REFERENCE BOOKS:

S.No	Authors	Title	Publishers	Year of Publication
1.	William Hayes	The genetics of bacteria and their viruses	Blackwell Scientific Publishers	1995
2.	Benjamin Lewin	Genes VIII	Pearson Prentice Hall, USA	2004
3.	Innis M.A.	PCR Strategies	Academic press	
4.	Brown. T.A	Essentials of Molecular Biology	Freeman Publishing House	2003

TEACHING METHODOLOGY:

- Lectures
- Power point presentation
- Charts
- Models
- Group discussion
- Group assignments
- Seminars

WEB SOURCES:

<http://www.molgen.mpg.de/>

<http://www.cellbio.com/>

<http://restools.sdsc.edu/>

<http://www.mcb.harvard.edu/biolinks.html>

<http://www.horizonpress.com/gateway>

SYLLABUS DESIGNER:

- Dr.J. Hemapriya Assistant Professor
- Dr. A.Vidhya HOD & Assistant Professor