

DEPARTMENT OF MICROBIOLOGY				CLASS: I M.Sc. Microbiology				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours/week	CIA	Ext	Total
II	Major Practical-I	21P2RMP1	Lab in Cell and Molecular Biology and Microbial Genetics	4	4	40	60	100

Nature of Course			
Knowledge and skill			Employability oriented
Skill oriented	✓		Entrepreneurship oriented

Course Objectives

1. To employ methods of DNA isolation and demonstration
2. To illustrate different methods for mutant isolation
3. To demonstrate bacterial conjugation process
4. To evaluate the life cycle of phage
5. To estimate the phage particles

Course Learning Outcomes

On successful completion of the programme, the students will be able to

1. Describe the key concepts in DNA isolation and demonstration
2. Illustrate the significance of bacterial mutants
3. Apply scientific principles in the interpretation of yeast mutants
4. Demonstrate life cycle of phage
5. Demonstrate titration of phage particles

S.No.	Experiments
1.	Isolation of Chromosomal DNA from <i>E. coli</i>
2.	Isolation of plasmid DNA from bacteria
3.	Isolation of spontaneous mutants Drug resistant mutants by replica plate technique and gradient plate technique.
4.	Enrichment of auxotrophic mutant by Ampicillin treatment.
5.	Isolation of mutants using UV and NTG mutagenesis.
6.	Isolation of Petite mutants of Yeast.
7.	T7 phage lysate preparation and titration.
8.	Transformation of <i>E.coli</i> with plasmids (pUC 18/pBR322).
9.	Bacterial conjugation (Hfr X F-).
10.	P1 lysate preparation and P1 transduction.

Books for study:

1. Chaitanya, K.V. (2013). Cell and Molecular Biology: A Lab Manual. PHI Learning, New Delhi.
2. Ausubel, F.M., Roger, B., Kingston, R.E., Moore, D.A., Seidman, J.G., Smith, J.A. and Kelvin, S. (1992). Short Protocols in Molecular Biology. 3rd Edition. John Wiley & Sons Inc., New York.
3. Berger, S.L. and Kimmel, R. (1987). Guide to Molecular Cloning Techniques. Academic Press, Inc., New York.

Books for Reference:

1. Brown, T.A. (1998). Molecular Biology Lab; Gene Analysis. Academic Press, London.
2. Malov, S.R. (1990). Experimental Techniques in Bacterial Genetics. Jones and Bartlett Publishers, Boston.
3. Miller, J.H. (1992). A Short Course in Bacterial Genetics: A Lab Manual & Hand Book for *E. coli* and related Bacteria. Cold spring Harbor Lab press, New York.
4. Rajamanickam, C. (2001). Experimental protocols in basic molecular biology, Osho Scientific Publications, Madurai.
5. Sambrook, I., Fritsch, E.F. and Maniatis, T. (1989). Molecular Cloning 1, 2, 3 - A Laboratory Manual. 2nd Edition. Cold Spring Laboratory Press, USA.

Web Resources

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2581910/>
2. <https://microbiologybook.org/mayer/ab-ag-rx.htm>
3. https://www.ebi.ac.uk/interpro/potm/2005_2/Page2.htm
4. [https://www.nejm.org/medical-research/autoimmune-disease%20Course%20Learning%20Outcomes%20\(CLO\)](https://www.nejm.org/medical-research/autoimmune-disease%20Course%20Learning%20Outcomes%20(CLO))

Rationale for nature of the course

This course introduces the methods of DNA isolation and demonstration. It also introduces methods of mutant isolation. The life cycle of phage and estimation of phage particles can be explored to understand phage genetics. It demonstrates gene transfer through conjugation process.

Activities having direct bearing on skill development/ employability/entrepreneurship

Employ methods of DNA isolation and demonstration
Illustrate different methods for mutant isolation
Demonstrate bacterial conjugation process
Evaluate the life cycle of phage
Estimate the phage particles

Pedagogy

Demonstration and practical session.

Course Learning Outcomes (CLO)

On the completion of the course the student will be able to

CLOs	Course Learning Outcomes	Knowledge Level
CLO1	Describe the key concepts in DNA isolation and demonstration	Up to K1
CLO2	Illustrate the significance of bacterial mutants	Up to K2
CLO3	Apply scientific principles in the interpretation of yeast mutants	Up to K3
CLO4	Demonstrate life cycle of phage	Up to K4
CLO5	Demonstrate titration of phage particles	Up to K4

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

Mapping of Course Learning Outcome with Programme Specific Outcome

	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	2	2	2	1	2
CLO2	3	2	2	1	1
CLO3	1	1	2	2	1
CLO4	1	2	1	1	1
CLO5	2	3	2	1	2

Advance application – 3, Intermediate level – 2, Basic level – 1.

Mapping of course outcome with Programme outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	2	2	1	1	2
CLO2	3	2	1	2	2
CLO3	1	1	2	1	1
CLO4	2	1	1	2	2
CLO5	3	2	3	2	1

Advance application – 3, Intermediate level – 2, Basic level – 1.

Course designers:

1. Dr. A. P. Asha Kannan

2. Mr. P. Sasikumar