

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN MICROBIOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
236C31	Molecular Biology and Microbial Genetics	Core Course –VI – Practical III	-	-	Y	-	5	5	40	60	100

**Learning Objectives**

CO1	Provide knowledge on structure and replication of DNA.
CO2	Elucidate the methods of Genomic and Plasmid DNA isolation.
CO3	Explain methods of protein separation.
CO4	Explain artificial transformation method.
CO5	Outline the role of phages in genetics.

Unit	Details	No. of Hours	Course Objectives
I	Study of different types of DNA and RNA using micrographs and model / schematic representations.  Study of semi-conservative replication of DNA through micrographs / schematic representations.	15	CO1
II	Isolation of Genomic and Plasmid DNA from <i>E. coli</i> and Analysis by Agarose gel electrophoresis.  Estimation of DNA using colorimeter (Diphenylamine reagent), UV spectrophotometer (A260 measurement).	15	CO2
III	Resolution and visualization of proteins by polyacrylamide gel electrophoresis (SDS-PAGE) – Demonstration.  UV induced auxotrophic mutant production and isolation of mutants by replica plating technique – Demonstration.	15	CO3
IV	Perform artificial Transformation in <i>E. coli</i> .  Isolation of antibiotic resistant mutants by gradient plate method. - Demonstration	15	CO4
V	Screening and isolation of phages from sewage.  Isolation of RNA from yeast.  Estimation of RNA using colorimeter (Orcinol)	15	CO5
	Total	75	

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<b>Course Outcomes</b>		
<b>Course Outcomes</b>	On completion of this course, students will;	
CO1	Illustrate different types of DNA and RNA.	PO4, PO7, PO9, PO11
CO2	Utilize hands-on training in isolation of genomic and plasmid DNA.	PO4, PO7, PO9, PO11
CO3	Analyze importance of experimental microbial genetics.	PO4, PO7, PO9, PO11
CO4	Apply the knowledge of molecular techniques in various fields.	PO4, PO7, PO9, PO11
CO5	Investigate the significance of Phages.	PO4, PO7, PO9, PO11
<b>Text Books</b>		
1.	Crichton. M. (2014). Essentials of Biotechnology. Scientific International Pvt Ltd. New Delhi.	
2.	Sambrook J. and Russell D.W. (2001). Molecular Cloning - A Laboratory Manual – 7 <sup>th</sup> Edition. Cold Spring Harbor, N.Y: Cold Spring Harbor Laboratory Press.	
3.	Dale J. W., Schantz M. V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 <sup>rd</sup> Edition). John Wiley and Sons Ltd.	
4.	Gunasekaran P. (2007). Laboratory Manual in Microbiology. New Age International.	
5.	James G Cappuccino. and Natalie Sherman. (2016). Microbiology – A laboratory manual. (5 <sup>th</sup> Edition). The Benjamin publishing company. New York.	
<b>References Books</b>		
1	Glick B. R. and Patten C.L. Molecular Biotechnology – Principles and Applications of Recombinant DNA. 5 <sup>th</sup> Edition. ASM Press. 2018.	
2	Russell P.J. (2010). iGenetics - A Molecular Approach, 3 <sup>rd</sup> Edition., Pearson New International edn.	
3	Nelson, D.L. and Cox, M.M. Lehninger(2017). Principles of Biochemistry. 7 <sup>th</sup> Edition, W.H. Freeman.	
4	Synder L., Peters J. E., Henkin T.M. and Champness W. (2013). Molecular Genetics of Bacteria, 4 <sup>th</sup> edition, ASM Press Washington-D.C. ASM Press.	
5	Brown T.A. (2016). Gene Cloning and DNA Analysis. (7 <sup>th</sup> Edition). John Wiley and Jones, Ltd.	
<b>Web Resources</b>		
1	<a href="https://www.molbiotools.com/usefullinks.html">https://www.molbiotools.com/usefullinks.html</a>	
2	<a href="#">(PDF) Molecular Biology Laboratory manual (researchgate.net)</a>	
3	<a href="https://www.molbiotools.com/usefullinks.html">https://www.molbiotools.com/usefullinks.html</a>	
4	<a href="https://geneticgenie.org3">https://geneticgenie.org3</a>	
5	<a href="https://currentprotocols.onlinelibrary.wiley.com/doi/pdf/10.1002/cpet.5">https://currentprotocols.onlinelibrary.wiley.com/doi/pdf/10.1002/cpet.5</a>	

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<b>Methods of Evaluation</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	75 Marks
	Total	100 Marks

<b>Methods of Assessment</b>	
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions
<b>Understand/ Comprehend (K2)</b>	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
<b>Application (K3)</b>	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
<b>Analyze (K4)</b>	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
<b>Evaluate (K5)</b>	Longer essay/ Evaluation essay, Critique or justify with pros and cons
<b>Create (K6)</b>	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

**Mapping with Programme Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	L	M	S	M	S	M	S
CO2				S	L	M	S	M	S	M	S
CO3				S	L	M	S	M	S	M	S
CO4				S	L	M	S	M	S	M	S
CO5				S	L	M	S	M	S	M	S