

<b>Name of Faculty</b>	:	Faculty of Science
<b>Name of Program</b>	:	Master of Science
<b>Course Code</b>	:	2MSB01
<b>Course</b>	:	Recombinant DNA Technology
<b>Type of Course</b>	:	Professional Core
<b>Year of Introduction</b>	:	2023-24

<b>Prerequisite</b>	:	To obtain enhanced and desired characteristics in living organisms or their products
<b>Course Objective</b>	:	To illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences. Recombinant DNA has become a crucial research tool for molecular biology, biochemistry and the life sciences cluster in general. Recombinant DNA is used to gain deeper knowledge of disease formation and hence the development of cures.
<b>Course Outcomes</b>	:	At the end of this course, students will be able to:
	CO1	A sound knowledge on methodological repertoire using enzymes allows students to innovatively apply these in basic and applied fields of biological research.
	CO2	To expose students to application of recombinant DNA technology in biotechnological research.
	CO3	To illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences.
	CO4	students will be familiarized to annotation of DNA sequences for efficient design, tracking and evaluate cloning experiments in the laboratory

### Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total marks
L	T	P	C	SEE	CIA	SEE	CIA	
4	0	0	4	70	30	0	0	100

*Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P - Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.*

**Course Content**

Unit No.	Topics	Teaching Hours	Weightage	Mapping with Cos
1	Scope of Genetic Engineering Concept and importance of Genetic Engineering; General strategies and Steps involved in gene cloning; Extraction and purification of DNA from bacteria, plant and animal cells. Restriction enzymes, DNA ligase and other enzymes involved in gene cloning; mRNA and cDNA preparation.	10	23%	CO1
2	Chemical synthesis of gene/DNA -bacteriophages, M-13 based vectors, Phagemids. Plasmids, Cosmids, YAC, BAC, HAC/MAC, etc. Expression of cloned gene in heterologous host. Intro duction of DNA into different host systems	10	23%	CO2
3	Pulse Field Gel Electrophoresis, Rotating Gel Electrophoresis (RGE), PAGE, SDS-PAGE, Isoelectric Focusing, Two dimensional and Capillary Gel Electrophoresis. Mapping Activity Assay – Yeast-one hybrid, Yeast-two hybrid and Yeast-three hybrid system, Subtractive hybridization and cloning, HRT/HART. Restriction map, Sl mapping, Denaturation mapping, Heterologous mapping DNA sequencing.	12	25%	CO3
4	PCR- Molecular markers Linkage mapping using meiotic recombination frequencies. Genomic mapping using DNA sequence polymorphism as genetic markers Invitro Mutagenesis, Metagenomics, Metabolic engineering Gene therapy Transgenic plants and Transgenic animals	13	29%	CO4, CO2

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	0	25	25	25	25	0

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Major Equipment / Instruments

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Analytical Balance
2	Autoclave
3	Micropipettes
4	Stains
5	Light Microscope
6	Anaerobic jar
7	UV Chamber
8	Hot Air Oven
9	Centrifuge
10	Electrophoresis
11	SDS PAGE
12	PCR
13	Deep Freezer
14	Autoradiography

### Suggested Learning Websites

Sr. No.	Name of Website
1	<a href="https://www.ncbi.nlm.nih.gov/books/NBK9950">https://www.ncbi.nlm.nih.gov/books/NBK9950</a>

### Reference Books

Sr. No.	Name of Reference Books
1	M. R. Green, J. Sambrook. Molecular Cloning: A Laboratory Manual (Cold Spring Harbor, ed. 4, 2012).
2	M. Wink. An Introduction to Molecular Biotechnology: Molecular Fundamentals, Methods and Applications in Modern Biotechnology (Wiley, ed. 2, 2011)
3	S. B. Primrose, R. Twyman. Principles of Gene Manipulation and Genomics (Wiley-Blackwell, ed. 7, 2006).
4	B. R. Glick., et al. Molecular Biotechnology: Principles & Applications of Recombinant DNA (ASM Press, ed. 4, 2009).
5	M. M. Burell. Enzymes of Molecular Biology (Humana Press, 1993).
6	K. Wilson, J. Walker. Principles and Techniques of Biochemistry and Molecular Biology (Cambridge University Press, ed. 7, 2010).