AMITY UNIVERSITY
UTTAR PRADESH

Annexure **'CD-01'**

Course Title: Recombinant DNA technology
Course Code: GCMB311
Credit Units: 4
Level: UG

L	T	P/ S	FW/S W	TOTAL CREDIT UNITS
3	0	2	0	4

Course Objectives:

Recombinant DNA Technology is a highly conceptual, technology based paper. It is the foundation of entire genetic engineering concepts, tools and techniques of DNA manipulation and their application in cloning, gene expression and analysis. the theory course in RDT will be complemented with practicals in which student will gain hands-on experience of the basic techniques of DNA manipulation.

Prerequisites:

Genetics and Molecular Biology

Student Learning Outcomes:

- The student will be able to describe the various tools and techniques applied in RDT.
- The student will be able to associate the methods of RDT with their exact purpose/role in genetic engineering.
- The student will be able to relate applications of RDT with science of plant and animal biotechnology.
- The student will be able to design genetic engineering strategies using concepts of RDT.
- The student will be able to justify why particular method of RDT has been applied in a given research experiment/project

Course Contents / Syllabus:	**Weightage**
Module I Tools used in gene cloning	**15%**
• Restriction endonucleases, DNA ligases, DNA polymerase, polynucleotide kinase, alkaline phosphatase, nucleases, reverse transcriptase, • Linkers and adapters	
Module II Hybridization methods	**10%**
• Blotting and hybridization techniques (Southern, Northern and Western), probes	

(radioactive and non-radioactive)	
Module III Cloning vectors	**25%**
• Plasmids and plasmid vectors, phage vectors (M13 and Lambda phage; insertional and replacement vectors). Brief overview of high cloning capacity vectors.	
Module IV Genomic DNA and cDNA libraries	**25%**
• Rationale behind and construction of genomic and cDNA libraries. • Selection of clones using α- complementation, colony and plaque hybridization, immunoscreening, PCR based and restriction based screening.	
Module V Polymerase Chain Reaction	**10%**
• Introduction to PCR, components of PCR, PCR kinetics, primer designing, applications of PCR	
Module VI DNA sequencing	**15%**
• Maxam-Gilbert's chemical method, Sanger's chain termination method and its automation. Introduction to next generation sequencing.	
Pedagogy for Course Delivery: Lectures: 43 Class Test: 02 Total: 45	
List of Experiments: • Quantitation of nucleic acids (Gel based and Spectrophotometric method) • Construction of restriction map of plasmid DNA. • Southern Blotting technique • Gene cloning • PCR amplification • Site directed mutagenesis • Over expression of lacz' in *E.coli*	

Pedagogy for Lab/ Practical :

Practical: 28
Class Test: 01
Viva: 01
Total: 30

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment						
Components (Drop down)	Mid-Term Exam	Project	Viva	Attendance	End Term Examination	**Total**
Weightage (%)	10	10	5	5	70	100

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				**End Term Examination**			
Components (Drop down)	**Class test**	**Lab record**	**Viva**	**Attendance**	**Performance**	**Lab Record**	**Viva**	Total
Weightage (%)	15	5	5	5	40	10	20	100

Text:

- Gene Cloning and DNA analysis: An Introduction, 6th Edition. T. A. Brown,2010 Wiley- Blackwell.
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, 6th Edition. R.W. Old and S. B Primrose, 2001. Blackwell Science Inc.
- Molecular Cloning: A Laboratory Manual, 4 th Edition J. Sambrook, E.F. Fritsch and T. Maniatis, 2012. Cold Spring Harbor Laboratory Press.