Recombinant DNA Technology

Semester No	Code	Credit Hours
5/8	BI-437	3+0

Course description:

The course objectives are to provide information on techniques used to manipulate genetic materials; and to discuss applications of recombinant DNA technology in medicine, agriculture and environment.

Recommended Books:

1. Brown T. A, “Gene Cloning and DNA analysis: An introduction”, Wiley-Blackwell.
2. Desmond S.T. Nicholl, “An Introduction to genetic engineering”, Cambridge University Press.
3. Hodge R and N Rosenthal, “Genetic Engineering: Manipulating the mechanism of life (Genetics and Evolution)” Facts on File.
4. Old R. W. and S. B. Primrose, “Principles of Gene manipulation, an introduction to Genetics engineering”, Blackwell Scientific Publications.

Prerequisite:

Molecular Biology

Course Learning Outcomes:

Students will be able to understand the importance of recombinant DNA technology. Learn isolation of DNA and its separation on an agarose gel. Understand restriction and ligase enzymes and their application in gene cloning. Understand vectors and their application in gene cloning and expression.

Assessment system:

Quizzes	10-15%
Assignments	5-10%
MSE	30-40%
ESE	40-50%

Week wise Lecture Plan:

Week	Lecture Topic	Quizes	Assignment
1	Basic concepts in recombinant DNA technology,	1	
2	Gel electrophoresis,		
3	Hybridization, PCR and gene transformation,		
4	Isolation and purification of DNA,		
5	Cutting of DNA molecules,		1
6	Ligation of DNA molecules, blunt ends and cohesive termini, homopolymer tailing,		
7	Cloning vectors: plasmids (bacteria and yeast), viruses (CMV, SV40, BPV, Lamda, Mu, M13), Cosmids and Phosmids, YAC's, BACs and PACs.	2	
8	Cloning strategies (Prokaryotic and Eukaryotic); selection and characterizations of recombinant molecules, verifications and amplifications of desired genes,		2
9	**MSE**		
10	Construction and analysis of DNA libraries,		3
11	-do-		
12	-do-		
13	Maximizing the cloned expression, site directed mutagenesis	3	
14	-do-		
15	DNA sequencing techniques		
16	-do-	4	
17	Applications of genetic engineering in		

	medicine, agriculture and environment.		
18	**ESE**		

Lab Number	**Equipment**	**Experiment Detail**
1-3	Chemicals, UV trans illuminator	Isolation of plasmid and chromosomal DNA from bacteria and yeast
4-6	Electrophoresis apparatus	Screening of bacteria from plasmid by electrophoresis of total cell lysate
7-8	Electrophoresis apparatus	Gel electrophoresis of plasmid DNA (supercoiled, linear and digested with restriction enzyme) and chromosomal DNA
9-12	Glassware, chemicals	Plasmid transformation of *E. coli*
13-14	Chemicals, Electrophoresis apparatus	Comparing plasmids of different molecular weights using molecular weight markers
15	PCR machine	DNA amplification
		Lab Exam