

Course Title: Genetic Engineering

Course Code: 10B11BT513

Course Credits: 3

Course Coordinator Dr. Anil Kant

Objectives: The objective of the course is to familiarize the students with the basic concepts in genetic engineering; to acquaint the students to versatile tools and techniques employed in genetic engineering and recombinant DNA technology; and to appraise them about applications genetic engineering.

Learning Outcome:

CO I: The students will have knowledge of tools and strategies used in genetic engineering.

CO II: Understanding of applications of recombinant DNA technology and genetic engineering. from academic and industrial perspective

COIV Can use and apply the knowledge of genetic engineering in problem solving and in practice

	Topics	Hours Allotted
1	Genetic engineering, Recombinant DNA technology: gene cloning - concept and basic steps - rDNA Glossary	2
2	DNA modifying enzymes: Restriction Endonucleases, DNA Ligation Enzymes and, DNA Modifying Enzymes: Nucleases, Kinases, phosphatases, and Reverse transcriptases other tools used for DNA Modification	5
3	Cloning Vectors and Expression Vectors: Plasmid Vectors, Vectors based on Lambda Bacteriophage, Cosmids, M13 Vectors, Vectors for Cloning Large DNA Molecules, yeast cloning vectors, Expression Vectors, Transcriptional & Translational Fusions, Adding Tags and Signals overproducing Proteins	6
4	Construction & Screening of genomic libraries: Genomic library, cDNA library, Growing & Storing Libraries, Screening Libraries with Gene Probes, Screening Expression Libraries with Antibodies	4
5	Gene Cloning Strategies: Positional Gene Cloning, cDNA Cloning (5' & 3' RACE) ,Heterologous Gene Cloning, Subcloning, Characterization of Cloned Genes	5
6	Sequencing And Mutagenesis: Basic DNA Sequencing, Site-Directed Mutagenesis	4
7	Gene Expression in Microbial and Eukaryotic Systems: Cloning in <i>E. coli</i> , in Gram-positive bacteria, in Streptomyces, in <i>Saccharomyces Cerevisiae</i> and Other Fungi, in Insect Cells, in Mammalian Cells	5
8	Genetic Manipulation Of Plants and Animals: Gene transfer, Application of Genetically Engineered Strains of Plants and Animals	4
9	Advances in transgenic technology	4
10	Biosafety Issues related to recombinant DNA Technology	2
	Total	41

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments will also be given.

Evaluation Scheme:

Exam	% of Marks	Duration of Examination
Mid Tem	30	2Hours
End Term	45	3 Hours
Internal Assessment	25	Entire Semester

Text Books:

1. Principles of Gene Manipulation by S.B. Primrose, RM Twyman and RW Old (6thEdition)
2. Principles of Gene Manipulation and Genomics SEVENTH EDITION S.B. Primrose and R.M. Twyman
3. Biotechnology by BD Singh
4. Recombinant DNA: A Short Course by JD Watson, J. Tooze and DT Kurtz.
5. From Genes to Genomes: Concepts and Applications of DNA Technology by JW Dale and M Schantz
6. Molecular Biotechnology: Principles & Applications of Recombinant DNA Glick BR and Pasternak JJ