

## **Course contents for Genetic Engineering**

- 1. Faculty:** FLSB
- 2. Course Code:** LSB508
- 3. Course Title:** Genetic Engineering
- 4. Number of Credits:** 5 (2L, 1T, 2P)

### **5. Course objectives:**

This course will cover the basics of restriction enzymes use, PCR, different kinds of bacterial/mammalian vectors available, various cloning strategies including construction and screening of genomic and cDNA libraries. The course will also focus on applications of Genetic Engineering in Research, Medicine, Biotechnology and Forensic Sciences.

### **6. Minimum prerequisites for taking this course, if any:**

The students must have completed a course in Molecular Biology and should be well versed with general molecular biology terminology

### **7. Course structure with units, if applicable: N/A**

- a) Isolation, Handling, quantification of DNA, RNA
- b) Introduction of DNA into living cells.
- c) Restriction and Modifying Enzymes
- d) The Polymerase chain reaction and its variants
- e) Vectors for Gene cloning.
- f) Basic principles of Gene cloning.
- g) Cloning strategies: Construction of Libraries
- h) Selection, screening and analysis of recombinant DNA clones
- i) Labeling DNA
- j) DNA sequencing
- k) Studying DNA-Protein, Protein-Protein interactions
- l) Applications of recombinant DNA technology in Medicine, Research and Forensic Sciences.
- m) Gene editing technologies

### **8. Practicals:**

- a. Competent cell preparation and transformation
- b. PCR amplification of a given DNA using gene specific primers
- c. Agarose gel analysis of PCR amplification product
- d. Purification of PCR product using a Gel extraction kit
- e. Ligation of PCR product into pGEM-T vector
- f. Transformation of ligated pGEM-T DNA into competent cells.
- g. Analysis and inoculation of transformed colonies in LB media
- h. Isolation of DNA using miniprep DNA isolation kit.
- i. Screening of positive clones by Restriction digestion of Plasmid DNA
- j. Glycerol stock preparation of positive clones.

### **9. Reading suggestions:**

- a. **Principles of gene manipulation and Genomics:** Primrose and Twyman
- b. **Molecular cloning- A laboratory Manual:** Sambrook and Russell

- c. **Gene Cloning and Manipulation:** Christower Howe
- d. **Genetic Engineering:** Walter Hill
- e. **An Introduction to Genetic Engineering:** Desmond ST Nicholl
- f. **Gene Cloning and DNA Analysis:** TA Brown
- g. **Biotechnology, Applying the Genetic Revolution:** David Clark

**10. Evaluation:**

Theory:	Mid-semester Written Examination	: 40% Marks
	End-semester Written Examination	: 40% Marks
	Quiz / Assignment/Presentation (oral / poster)/other	: 20% Marks