LSC 502 - GENETIC ENGINEERING

1. Introduction: concept, structure and organization of gene, Transcriptional control regions of eukaryotic and prokaryotic genes.

2. Recombinant DNA technology, restriction and modifying enzymes, cloning and expression vectors, cDNA synthesis and construction of cDNA libraries, genomic libraries and their construction, subtraction library.

3. Competent cells and *Agrobacterium,* transformation by electroporation, *Agrobacterium tumefaciens*-mediated transformation.

4. Identification and analysis of recombinant DNA clones.

5. DNA sequencing methods, genome sequencing and analysis.

6. Methods to study genomics, transcriptomics and proteomics, microassays.

7. PCR, real time-PCR and their applications, *in vitro* mutagenesis, random and site-directed mutagenesis.

8. Transgenic, methods for DNA delivery in system, gene knock-outs.

9. Introduction of bioprocess engineering, upstream and downstream processing, engineering principles.

10. Genetically modified (GM) organisms, food and pharmaceutics, ethical issues.

Suggested Readings

1. Principles of Gene Manipulation and Genomics – by Primrose and Twyman
2. Molecular Biology of the Gene - by Watson et al.
3. Genes X – by B. Lewin
4. Molecular Cloning a Laboratory Manual – by Sambrook and Russell