



MANGALORE UNIVERSITY

DEPARTMENT OF MICROBIOLOGY

MSc Microbiology

MBS- 557: Genetic Engineering

40h

OBJECTIVES

1. To understand basic concepts and importance of genetic engineering.
2. To understand the structure and function of gene.
3. To learn properties and role of plasmids in genetic engineering.
4. To learn Different methods and techniques in genetic engineering.
5. Different methods and protocols to transfer genes into host.
6. Importance of genetic engineering in production of desired products.

COURSE OUTCOME

CO1: Understanding of gene expression concept.

CO2: Learning of construction of recombinant vectors and insertion methods.

CO3: Selection of successful recombinants for industrial applications.

CO4: Development of new recombinant vectors.

CO5: Understanding of basic concepts for future research and higher studies.

UNIT- I

Genetic Engineering- Definition, concepts and scope of Genetic Engineering. Historical perspectives and milestones in Recombinant DNA Technology (rDNA technology). Importance of gene cloning and future perspectives. Tools in Genetic Engineering- Enzymes in genetic engineering. Cloning vectors and their properties- Ti Plasmid, pBR322, pUC, Lambda, M13 Phage vector, Cosmids- Phasmids, Phagemids, Shuttle vectors, YAC and BAC vectors, Mammalian expression vectors. Isolation and construction of vectors.

UNIT- II

rDNA Technology- the basic principles of gene cloning strategies: Preparation, Manipulation and Insertion of desired DNA into vector. Introduction of DNA into host cells – Transformation, Transduction, Transfection, Microinjection, Biolistics, Electroporation, Liposome fusion, Shotgun cloning. Genomic and c-DNA Libraries. Cloning and expression in bacteria, yeasts. Identification and selection of recombinants

UNIT- III

Analysis of products, Nucleic acids staining, Molecular markers in genome analysis:

RFLP, RAPD, AFLP and ISSR. Blotting techniques- Southern, Northern and Western blotting techniques. PCR- Principles, types and applications. Synthetic genes of microbes. Microbial genome sequencing projects- DOE microbial genome programme, TIGR microbial database. Analysis of genome sequences, DNA chips: studying gene expression using DNA microarrays. Next Generation sequence.

UNIT- IV

Application of gene cloning in Biotechnology, Medicine, Agriculture, Forensic Science, Antisense technology. Restriction and regulation for the release of GMOs into Environment, Ethical, Legal, Social and Environmental Issues related to rDNA technology.

Note: Each unit is for 10h

