GENETIC ENGINEERING

Semester	Subject code	Category	Lecture		Theory		Practical		Credits
			Total hrs	Hrs/ week	Total hrs	Hrs/ week	Total hrs	Hrs/ week	
II	21CPMB2B	Core-V	60	4	60	4	0	0	4

COURSE OBJECTIVES:

To enable the students to understand the aspects of Genetic Engineering.

COURSE OUTCOMES:

On successful completion of the course students should gained a sound knowledge on the tools, vectors, mechanism and application of genetic engineering

CO Number	Co Statement	Knowledge Level (K1-K4)
CO1	To execute the molecular tools required for genetic engineering	**K2**
CO2	To gain insight in the types of cloning vehicles involved in cloning	**K2**
CO3	To impart knowledge on the mechanism of cloning strategies and gene libraries	**K2**
CO4	To execute the different techniques involved in screening and identification of positive clones	**K3**
CO5	To elucidate the output and application of cloned vector for social benefit	**K2**

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	M	S
CO2	S	S	M	S	S	S
CO3	S	S	S	M	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	M	S	S

S- Strong; M- Medium; L- Low

UNIT- I: Nucleic acid modifying enzymes **9 Hours**

Restriction enzymes – nomenclature – classification- restriction and methylation – Type II restriction endonuclease – uses of restriction endonucleases – Restriction mapping and its application. Nucleases, polymerases – Taq polymerase, reverse transcriptase, DNA ligases, alkaline phosphatase, terminal transferase and polynucleotide kinases.

UNIT – II: Cloning vehicles **9 Hours**

Biology of genetic engineering – Prokaryotic and Eukaryotic hosts – E. coli and Yeasts. Plasmids vectors – pBR322structure and construction, pUC and pSC 101, Ti Plasmids, Vectors based on Bacteriophage – lambda and M-13 phage vector, cosmids, shuttle vectors, phagemids, *in vitro* packaging of Bacteriophage DNA. Expression vectors, screening of recombinants-antibiotic resistance and LacZ. Alternative DNA delivery synthesis – artificial chromosomes – BAC, YAC and HAC.

UNIT – III: Cloning strategies and Gene libraries **9 Hours**

Cloning from mRNA – Synthesis of cDNA – Cloning cDNA in plasmid and Bacteriophage vectors. Cloning from genomic DNA. Genomic libraries, preparations of DNA fragments for cloning ligation, packaging and amplification of libraries. Genetic selection and screening methods.

UNIT IV: Techniques in genetic engineering **9 Hours**

Gene Analysis Techniques- Isolation of DNA and RNA from microbes – Handling and quantification of nucleic acids- Radio labeling of nucleic acids – End labeling- Nick translation – Labelling by primer extension. Pulse Field Gel Electrophoresis- modifications and applications. Nucleic acid hybridization – Southern, Northern, Western, South-Western and Dot-slot blotting. PCR.

UNIT V: Application of r DNA technology **9 Hours**

Application of r DNA technology – Human protein replacements – insulin, Human growth hormone, therapeutic agents for human diseases, TPA, interferons, recombinant vaccines

TEXT BOOKS:

S.No	Authors	Title	Publishers	Year of Publication
1.	Maloy SR, Cronan JR , JE. Friedfelder	Microbial Genetics	Jones & Bartlet	1994
2	Lodish H,Baltimore O,Berk A,Zipursky S L,Matsudaira P, Darnell L	Molecular Cell Biology	Scientific American Books	1995

REFERENCE BOOKS:

S.No	Authors	Title	Publishers	Year of Publication
1.	Lodish,Berk,Zippursky	Molecular cell biology	W.H.Freeman	
2.	William Hayes	The genetics of bacteria and their viruses	Blackwell Scientific Publishers	1995
3.	Benjamin Lewin	Genes VIII	Pearson Prentice Hall, USA	2004
4.	Innis M.A.	PCR Strategies	Academic press	
5.	Brown. T.A	Essentials of Molecular Biology	Freeman Publishing House	2003

TEACHING METHODOLOGY:

- Lectures
- Power point presentation
- Charts
- Models
- Group discussion
- Group assignments
- Seminars

WEB SOURCES:

http://biotech.icmb.utexas.edu/pages/scitools.html
http://biotech.icmb.utexas.edu/pages/resources.html
http://4biotech.4anything.com/
http://bio.com/resedu/educate.html
http://www.accessexellence.org/

SYLLABUS DESIGNER:

- Dr.S. Ramya Assistant Professor
- Dr. A.Vidhya HOD & Assistant Professor