Course No.	Title of the Course	Course Structure	Pre-requisite
BTBTC15	**Recombinant DNA Technology**	**3L - 0T - 2P**	**None**

COURSE OUTCOMES (COs):

After completion of course, the students will be able to:

1. Understand the basic concepts and Technical know-how on versatile techniques used in recombinant DNA technology.
2. Explain how the polymerase chain reaction can be used to amplify DNA segments, and how it may be used to analyze DNA.
3. Analyze the events involved in generating recombinant DNA molecules, to include cDNA generation, expression vectors and the choice of host cell.
4. Evaluate how manipulation of nucleic acids alters functions of proteins and subsequent cellular processes.
5. Assess and review cases wherein genetic disorders in humans have been treated using recombinant DNA technology.

COURSE CONTENT:

MODULE-I

Tools used in r-DNA technology: Restriction endonucleases, Methytransferases, Ligases, Polymerases, Kinase, Phosphatase, Nucleases, DNA and RNA markers

MODULE-II

Vectors: Plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome; mammalian and plant expression vectors

MODULE-III

cDNA synthesis and cloning – mRNA enrichment, reverse transcription, DNA primers, linkers, adaptors and their chemical synthesis, Construction of cDNA and Genomic libraries

MODULE-IV

Transposons and gene targeting, DNA labeling; DNA sequencing; Polymerase chain reactions; DNA fingerprinting; Southern and northern blotting; In-situ hybridization; RAPD, RFLP; Site directed mutagenesis;

MODULE-V

Gene transfer technologies: Gene therapy and advance technologies

PRACTICAL:

1. Preparation and Transformation of Competent Cells
2. Isolation of Plasmid
3. Construction of restriction map of plasmid DNA.
4. Cloning of GOI in plasmid vector.
5. Gene expression in E.coli
6. Analysis of gene product.
7. Optimization of cloned-gene expression.
8. PCR amplification.

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SUGGESTED READINGS:

1. S.L. Berger and A.R. Kimmel, "*A guide to Molecular cloning techniques in Methods in Enzymology – Vol 152*", Academic Press Inc.
2. D.M. Glover and B.D. Hames, "*DNA Cloning: A Practical Approach*", IRL Press. 3. D. Micklos, "*DNA Science: A First Course in Recombinant DNA Technology*", Carolina Biological supply Company
4. D.V. Goeddel, "*Gene expression Technology in Methods in Enzymology Vol. 185*", Academic Press Inc.
5. M.V. Bloom, "*Laboratory DNA Science: An Introduction to Recombinant DNA Techniques and Methods of Genome Analysis*", Addison-Wesley Publication Company
6. J.A. Davies and W.S. Reznikoff, "*Milestones in Biotechnolgy: Classic Papers on Genetic Engineering*", Butterworth Heinemann.
7. P.B. Kaufman, W. Wu, D. Kim and C.J. Cseke, "*Molecular and Cellular methods in Biology and Medicine*", CRC Press.
8. B.R. Glick and J.J. Pasternak, "*Molecular Biotechnology: Principles and Applications of Recombinant DNA*", ASM Press
9.https://ocw.mit.edu/courses/biology/7-01sc-fundamentals-of-biology-fall-2011/recombinant dna/development-of-recombinant-dna/
10. https://nptel.ac.in/courses/102/103/102103013/
11. https://www.coursera.org/lecture/synbioethics/a-brief-history-of-rdna-duKSG

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