FACULTY OF SCIENCE AND HUMANITIES

M.Sc. (Biotechnology/Microbiology) (Semester-2)

In Effect from Academic Year 2021-22

Subject Code: 2SC2000203	**Subject Title:** Recombinant DNA Technology
COURSE TYPE: CORE COURSE	

Course Objective:

Recombinant DNA Technology is the science dealing with modification of genes to bring about the best of any biological system. Students will learn about the basic tools and techniques involved in the processes of rDNA Technology as well as the potential products and applications of rDNA Technology.

Teaching scheme (hours) per week		**Credit**			**Theory Marks**		**Practical Marks**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**Total**	**Uni. Assessment**	**Cont. Assessment**	**Uni. Assessment**	**Cont. Assessment**	
4	**-**	**4**	**-**	**4**	**60**	**40**	**-**	**-**	**100**

Unit	**Content**	**Lectures**	**Weightage**
1	**Basic concepts of rDNA technology** Vectors for gene transfer, **Bacterial Plasmids**: General Nature & Characteristics of Plasmids; F-Factor, Resistance Factor Plasmids, Col Plasmids, Ti Plasmids Various Enzymes used for DNA cutting and modification, various cloning and gene transfer strategies (Bacteria, Yeast and other microbial eukaryotes), Gene Editing Screening and selection of recombinant clones (Direct and Indirect , various reporter genes and their applications in expression kinetics)	**15**	**25%**
2	**Basic tools used in rDNA technology** DNA markers including RFLP, Micro/mini satellites, SNPS, RAPDs and AELP, SCAR, etc. and their applications in genetic mapping, linkage analysis, genotyping and DNA fingerprinting, Microarray techniques, Chromosome walking Polymerase chain reactions**:** Primer design, heat stable polymerases, and application in medicine plant and animal genotyping and PCR cloning of prokaryotic and eukaryotic genes. Nucleic acid synthesis: Chemical and automated methods, fluorescence tag coupling to oligonucleotides.	**15**	**25%**
3	**Advance tools for rDNA technology** DNA sequencing**:** Chemical and sanger's method, automated methods and applications. Advance methods of DNA sequencing: 454 sequencing, NGS (various	**15**	**25%**

	approaches), single Cell sequencing Peptide sequencing**:** principles and strategies for protein sequencing. Design of primers from ammo acids sequences, Peptide synthesis: Chemical and automated methods		
4	**Microbial Gene transfer** **Definition of Vertical and Horizontal gene transfer, Significance of gene transfer.** **Transformation:** Discovery, mechanisms of transformation, competence factor. Mapping using transformation. **Conjugation:** Discovery, mechanism of conjugation, Types of crosses, mapping using conjugation (interrupted mating experiment) **Transduction:** Discovery, Generalized transduction, and Specialized transduction (Lambda phage as example), Mapping. **rDNA technology for Health and Industry** Nucleic acid sequences as diagnostic tools, Gene microbial production of therapeutic agents, Vaccine, Synthesis of Commercial products by recombinant microorganisms	**15**	**25%**

Learning Outcome: This course will educate the students to acquire knowledge of basic processes involved in rDNA Technology such as tools and techniques involved, Isolation of gene of interest, cloning, selection and expression of clones and Different potentially useful applications of rDNA technology & its products.

LIST OF TEXTBOOKS:

1. Waston, *Recombinant DNA*
2. **Old & Primrose,** *Principles of gene manipulation:*
3. **T.A. Brown** *Gene Cloning*
4. **Glick,** *Molecular Biotechnology*
5. **Pathak,** *Recombinant DNA Technology*
6. Genetic Engneering by Sandhya Mitra