Faculty of Science and Humanities
B.Sc. (Microbiology) (Semester - 5)
In Effect from Academic Year 2023-24

Branch Name:	B.Sc. Microbiology
Program Code:	SC102
Course Name:	Recombinant DNA Technology
Course Code:	**2SC1020502**
Pre-requisite Course:	Basics of cell

Course Objectives:

1. This course is designed to acquire basic knowledge Recombinant DNA technology.
2. The course will also provide the knowledge of various vectors of gene transfer and there importance.
3. It will also provide the knowledge of steps and methods of transferring DNA in prokaryotes and Eukaryotes.
4. The advance techniques like genome mapping , Polymerase chain reaction etc.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (Marks)
3	--	--	3	70	30	--	--	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	• Historical perspectives of genetic engineering • Methods of nucleic acid Isolation (DNA & RNA), Quality and Quantity determination of isolated nucleic acid • Basics of methods of DNA manipulation – Digestion, Ligation, labelling, etc. • Bloting: Southern blotting, Western blotting, Northern blotting, Colony blotting, Dot blotting. • Hybridization and detection of probe using autoradiography (FISH). • Colony hybridization technique • Sequencing of DNA: Sanger's method for DNA sequencing, automated DNA sequencings, pyro-sequencing and microarray based sequencing. • Chemical and automated DNA Synthesis, Next Generation Sequencing. • Gene library construction (Genomic & c-DNA library)	15	33%
2	• Enzymes: restriction endonucleases, RNA polymerase, DNA ligase, alkaline phosphatase, reverse transcriptase. • Cloning and expression vectors: Plasmid based vectors, bacteriophage lamda based vectors, cosmids, P1 based vector, PAC, BAC , Phagemids ,High capacity yeast cloning vector:-YAC, specialized yeast vectors: pYES and pPPICZ • Gene cloning in prokaryotes – isolation of DNA to be cloned – insertion of DNA fragments in to vector – use of linkers and adaptors- use of homo polymer tails , transfer of recombinant DNA into bacterial cells. • Cloning in eukaryotes in plant cell, yeast, filamentous fungi	15	33%

3	• Genome mapping: • Molecular markers (RFLP, RAPD, AFLP, SNP, SCAR, SSR, VNTR). • Chromosome walking. • Polymerase chain reaction techniques: Basic PCR technique, • Variation of PCR techniques and Applications of PCR. • Applications of r-DNA technology: Gene therapy, Expression of therapeutic proteins, Forensic science, Food, Agriculture.	15	34%

Text Books:

- Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford,U.K.
- Textbook of Biotechnology by R. C. Dubey, Publisher : S. Chand, and Co
- Biotechnology by S.S.Purohit.
- Genetic Engineering by SandhyaMitra
- Fundamentals of Molecular Biology 2009, Tar ganti K. Pal, Saroj S.
- Cell biology & Genetics: Verma and Agrawal

Reference Books:

- Biotechnology by S.S.Purohit.
- Genetic Engineering by SandhyaMitra
- Fundamentals of Molecular Biology 2009, Tar ganti K. Pal, Saroj S.
- Molecular Cell Biology 5 th edition by Lodish, Berk, Matsudalia
- Clark DP and Pasternik NJ. (2009). Biotechnology: Applying the Genetic Revolution. ElsevierAcademic Press, USA
- Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
- Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold
- Genetics: principles and analysis. 4 th edition 1998, Denial L. Hartl, Elizabeth tones.
  Principles of genetics: E.J. Gardner.
  Genes 9: Benjamin Levi
- Lehninger Principles of Biochemistry, 5th Edition, Nelson DL and Cox MM (2008)., W.H. Freeman and Company,
- Microbiology by Powar and Daginawala, Himalaya Publisher

List of Open Source Software/learning website:

https://archive.nptel.ac.in/courses/102/103/102103013/
https://archive.nptel.ac.in/courses/102/103/102103074/
https://www.youtube.com/watch?v=6ztkp2dqp_I

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain and memorize	2 Understanding
CLO2	Enlist various tools used in r-DNA technology	1 Remembering
CLO3	Understanding and comparing various steps of gene transfer in prokaryotes and eukaryotes.	2 Understanding,
CLO4	Applying basic knowledge of vectors used in prokaryotes and eukaryotes.	3 Applying, 2 Understanding
CLO5	**Discuss** the mechanisms involved in r-DNA technology	3 Applying 4Analyze 5 Evaluate,
CLO6	Modify or develop r-DNA betterment of life.	6 Creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M	M				M		M					M	M	
CLO2	H	H	M		M			L	M				H	H	M
CLO3	M	M	H					M	M		M		M	M	H
CLO4	M				M				H	M			M		
CLO5	M		H		M					H			M		H
CLO6				H		M	H		H		H	M			

H: High, M: Medium, L: Low