

Branch Name:	M.Sc. Biotechnology / Microbiology
Program Code:	SC201 / SC202
Course Name:	Practical Module -I
Course Code:	3SC2000105
Pre-requisite Course:	Basic communication skill, computer and biology

Course Objectives:

- To develop understanding of IPR, biosafety regulations, and scientific communication in microbiology and biotechnology.
- To provide hands-on training in biochemical analysis, microbial isolation, and characterization techniques.
- To introduce bioinformatics tools and computational approaches for biological data analysis and molecular studies.
- To enhance awareness of environmental sustainability, ecological assessment, and conservation practices.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
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List of Experiments:

- Learning the core objectives of IPR
- To Access and Downloads the Patents online
- To Understand the basic concepts related to patenting
- To understand the Biosafety guideline with laboratory and industry perspective
- Knowledge through seminar , workshop etc.
- Estimation of Non reducing Sugars by Anthrone Method.
- Estimation of Glucose by Nelson-Somogyi's Method
- Quantitative analysis of Amino acids
- Isolation and characterization of Symbiotic nitrogen fixers
- Isolation and characterization of non-symbiotic nitrogen fixers
- Nitrate Reduction Test
- Hydrogen Sulfide (H₂S) Production Test
- Regulation of Enzyme Activity (Induction Study – β -galactosidase)
- Comparative Study of Carbon Source Utilization other than Glucose with Glucose.
- Study of basic computer components and operating systems.
- Introduction to Linux/Unix operating system and basic commands.
- Number system conversion and binary arithmetic.
- Basic scripting/programming for biological data analysis.
- Retrieval of nucleotide sequences from biological databases.
- Retrieval and analysis of protein sequences from UniProt database.
- Retrieval of protein structure from Protein Data Bank (PDB).
- Exploration of metabolic pathway databases (KEGG) and chemical databases.
- Sequence similarity search using BLAST.

- Multiple sequence alignment using ClustalW.
- Visualization of protein structures using PyMOL/RasMol.
- Prediction of protein secondary structure using computational tools.
- Homology modeling of protein structures.
- Molecular docking analysis using AutoDock.
- Soil Analysis for Conservation
- Composting Experiment
- Rainwater Harvesting Model (Demonstration)
- Quadrat Method for Vegetation Analysis
- Carbon Footprint Estimation (Basic) with examples only
- Visit to protected area and its case study.

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain fundamental concepts of IPR, patenting, biosafety guidelines, and basic bioinformatics tools.	1 Remember 2 Understand
CLO2	Perform biochemical estimations, microbial isolation, and standard biochemical tests using appropriate laboratory techniques.	2 Understand 3 Apply 4 Analyze
CLO3	Interpret results of enzyme activity, metabolic tests, and microbial characterization experiments.	2 Understand 3 Apply 4 Analyze 5 Evaluate
CLO4	Retrieve, analyze, and interpret biological data from databases using tools such as BLAST, ClustalW, and PDB resources.	2 Understand 3 Apply 4 Analyze
CLO5	Assess environmental parameters and sustainability practices including soil analysis, composting, and carbon footprint estimation.	2 Understand 3 Apply 4 Analyze 5 Evaluate
CLO6	Design and present scientific reports, computational analyses, or case studies integrating laboratory, bioinformatics, and field data.	3 Apply 4 Analyze 5 Evaluate 6 Create

Mapping of CLO s with POs & PSOs

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3
CLO1	2	3	1	2	3	2			2	1		3	1						1
CLO2	3	2		1	3	3	1		2	2		1	3				3	3	1
CLO3	3	3	1	1	3	2			2	1		1	2					1	
CLO4	3	3	1	1	3	3			2	3		2	2						
CLO5	3	3	2	1	3	2			2	1	1	3	2	3	1	1			
CLO6	2	3	3	3	2	3	2	1	3	2	1	2	3	1	1	1	1	1	2

3: High, 2: Medium, 1: Low