INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (MICROBIOLOGY)**
SEMESTER	**5**
COURSE TITLE	**EXPERIMENTAL LABORATORY -V**
COURSE CODE	**02MB0309**
COURSE CREDITS	**6**

Objective:

1 To develop practical skills in applied microbiology, molecular biology, bioanalytical techniques, and bioinformatics for analyzing and solving biological problems.

Course Outcomes: After completion of this course, student will be able to:

1 Utilize bioinformatics tools for sequence analysis, molecular modelling, and data interpretation.

2 Apply molecular biology methods for DNA extraction, purification and gene expression analysis.

3 Perform microbiological techniques for industrial, environmental, and clinical applications.

4 Perform biochemical techniques and operate analytical instruments for biomolecule characterization and quantification.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	12	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Bioinformatics & Biostatistics** 1 Nucleic acid databases. 2 Protein Databases. 3 Sequence retrieval from databases. 4 Sequence alignment using BLAST. 5 Study of PDB for retrieval of 3D structure of Protein. 6 Construction of phylogenetic tree. 7 Protein structure visualization using RasMol.	35

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Molecular Biology & Genetics** 1. Isolation of genomic DNA. 2. To perform agarose gel electrophoresis of given DNA sample. 3. To quantify the amount and purity of given DNA sample using UV-Visible Spectrophotometer. 4. To perform plasmid isolation of from given bacterial sample. 5. To perform Polyacrylamide gel electrophoresis of proteins from given bacterial sample. 6. Isolation of DNA isolation from plants. 7. Isolation of DNA from the fungi.	35
3	**Biochemical Techniques & Instrumentation** 1. Preparation of Buffers 2. Acetate Buffer 3. Phosphate Buffer 4. Carbonate Buffer 5. Density gradient centrifugation 6. Estimation of absorption maxima of given solution. 7. Separation of Chlorophyll by solvent-solvent extraction chromatography 8. Paper Chromatography 9. Thin Layer Chromatography 10. Precipitation of enzyme by ammonium sulphate method 11. Partial purification of enzyme by dialysis	45
4	**Microbial Biotechnology** 1. Production and analysis of Enzymes from Fungi/Yeast a. Amylase b. Pectinase c. Proteases 2. Production and analysis of secondary metabolites from Fungi. 3. Lipid production from yeast. 4. Isolation of yeast cells from yogurt and their quantitative/qualitative analysis. 5. Isolation of Bioactive compounds from algae. 6. Production of organic acids from bacteria/yeasts/fungi.	25
Total Hours		**140**

Textbook :

1 Laboratory Manual in Biochemistry, J. Jayaraman, New Age International, 2011

2 Molecular Cloning: A Laboratory Manual, Joseph Sambrook & David W. Russell , COLD SPRING HARBOR LABORATORY PRESS, 2012

References:

1 Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Andreas D. Baxevanis & B. F. Francis Ouellette, Willey, 2004

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	20.00	5.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.
3. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. https://www.youtube.com/playlist?list=PL6i0QvM8pDC9adcGGHytLYyjNq6t0FX35

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