COURSE TITLE	**EXPERIMENTAL LABORATORY-II**
COURSE CODE	**02MB0465**
COURSE CREDITS	**6**

Objective:

1 To enable students with practical skills of Metabolism, Biostatistics, Bioinformatics Immunology and Molecular Biology.

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

1 Students will be able to plan and execute experiments in Metabolism, statistics, Bioinformatics, Immunology and Molecular Biology.

2 Select the appropriate methodology and instrumental technique relevant to a particular task.

3 Students will be able to handle analytical instruments independently.

4 Students will be able to analyze and interpret the data using modern biological tools.

Pre-requisite of course: Basic practical exposure for microbiology proacticals

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	**Microbial Metabolism** Effect of Carbon source on growth of E. coli. (Mono, Di, Polysaccharides; Non carbohydrate sources) Effect of Nitrogen source on growth of E. coli. (Organic Nitrogen (Amino acids, peptides & proteins) Inorganic Nitrogen Sources) Growth of E. coli on Lipid sources Comparison of growth and metabolism of E. coli, Pseudomonas sp. and Bacillus sp. Isolation & Characterization of Nitrogen Fixers; Nitrate Reducers; Ammonia oxidizers, Ureolytic Organisms. Cultivation of Facultative and Obligate Anaerobic microorganisms. Amino Acid Producing organisms (Corynebacteriumglutamicum)	20

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DR. KANTHA DEVI ARUNACHALAM
Digitally signed by (Name of Dean/ Principal)

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Bioinformatics and Statistics** To study biological databases with references to NCBI &Expasy. To perform literature search via Pubmed. To retrieve genome sequence information via NCBI genome tool for prokaryotes and eukaryotes. To study sequence submission via NCBI banktool. To solve queries based on biological databases To search sequence similarity using NCBI BLAST. To perform pairwise sequence alignment. To perform multiple sequence alignment and phylogenetic analysis. To study protein sequence analysis using Expasy resources. To study protein structure database – PDB. To perform analysis of alignment of multiple sequences using MEGA. To solve statistical examples for measures of central tendency. ANOVA and Chi square test for different biological data.	20
3	**Immunology** To perform the total count of RBC and WBC using haemocytometer To determine the blood group and blood clotting time using capillary method. To perform Widal test for the diagnosis of typhoid fever in the given sample. To perform the RPR/VDRL test for diagnosing the presence of Tryponema palladium in the given sample. To perform the DOT ELISA for detecting the presence of Hepatitis B antigen in the given sample. To perform ELISA test for the detection of Dengue. To perform the Single Radial Immunodiffusion assay. To perform the Ouchterlony double immunodiffusion assay. To perform Electroimmunodiffusion assay. To perform the Rocket Immunoassay. To perform PCR analysis for the diagnosis bacterial disease. To perform real time-PCR analysis for the diagnosis of viral disease.	20
4	**Molecular Biology** Isolation of Genomic DNA from E. coli. Isolation of Genomic DNA from Fungi. Isolation of Genomic DNA from Blood. Qualitative and Quantitative analysis of DNA. Isolation of Plasmid DNA. Qualitative and Quantitative analysis of Plasmid DNA. Total RNA isolation from Bacterial cells. Qualitative and Quantitative analysis of RNA. Primer designing for a specific gene amplification. Amplification of the specific gene using Polymerase chain reaction.	20
Total Hours		**80**

Textbook :

1 Molecular biology techniques: a classroom laboratory manual., Carson, S., Miller, H. B., Srougi, M. C., & Witherow, D. S. , Academic Press., 2019

2 Practical immunology, Frank C. Hay, Olwyn , Westwood publishers, 2002

3 Bioinformatics: A Practical Guide to the Analysis of Genes & Proteins, Andreas D. Baxevanis and BF Francis, John Wiley & Sons, 2004

References:

1 Fundamentals of bacterial physiology and metabolism, Fundamentals of bacterial physiology and metabolism, Gupta, R., & Gupta, N., Springer publishers, 2021

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**
10.00	20.00	25.00	25.00	10.00	10.00

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://learn.genetics.utah.edu/content/labs/extraction/

2 https://vlab.amrita.edu/?sub=3&brch=77&sim=314&cnt=1

3 http://vlabs.iitkgp.ac.in/pmp/exp3/index.html

4 https://biotech01.vlabs.ac.in/exp/glucose-oxidase-method/theory.html