

Course Name: Recent Trend Microbiology**Course Code:**

L	T	P	Cr
3	1	0	4

COURSE OBJECTIVES

The objective of the course is to acquaint research student with scientific research methods and approaches.

UNITS	CONTENTS	Contact Hrs.
I	Microscopy: Principles of Microscopy, Confocal microscopy, Fluorescence Microscopy, Electron Microscopy, Phase Contrast microscopy; Atomic Force Microscopy, Camera Lucida. Microtomy: Microtomy/Microtome & its types: dehydration, clearing and embedding of material, section cutting, dewaxing. Different types of stains, their preparation and uses: Safranin, fast green, hematoxylin, iodine, cotton blue, crystal violet, ruthenium red, Janus green, Gram's stains, Acetocarmine.	
II	Recombinant DNA techniques- Use of restriction enzymes in cloning; Plasmid, Vector, Transformation and Plasmid isolation, PCR, Southern Blotting, Northern Blotting, RFLP, RAPD, Western Blotting, DNA Fingerprint, Sequencing Methods (Sanger Chain termination Method and automated DNA sequencing), Real time PCR and Microarrays and their applications, RNAi and genome editing.	
III	Microbial and cellular techniques- Microbial techniques: Microbial growth and kinetics (Synchronous culture , continuous batch and fed-batch culture chemostat and turbidostat) Method for identifying microbes (Polyphasic approach) :cell description and fraction of organelles : Isolation and Purification of membrane proteins	
IV	Biostatistics- Type and source of data , Data collection methods, primary data, secondary data, analysis for specific type of data tabulation and geographical representation, central tendency, dispersion, skewness, correlation regression , Chi-square test, t- test and F test , ANOVA- one way and two way, important non parametric tests like sign , Run , coefficient	
V	Bioinformatics 12 hours Computational biology Techniques and Tools: Techniques and tools for Sequences Alignment (Pairwise and multiple alignment), Phylogenetic analysis- Methods and Tools, gene prediction, ORF finding. Homology: Orthology & paralogy. Databases: NCBI, EMBL, DDBJ, Gene bank, Pubmed; Ensembl, Phytozome etc Online tools – BLAST, ORF finder, Primer3, protein motif and structure prediction tools. Generation and analysis of whole genome data, Whole genome annotation taking examples of major plant genomes.	

REFERENCE BOOKS :

1.	Experimental Microbiology and Plant Pathology	K.R Aneja 5 th edition
2.	Laboratory Manual for Biotechnology	Ashish S./ Das Surajit & Singh Anchal Verma
3.	How to Use a Spectrophotometer	Richard A. Neuhaus

4	Bioinformatics: Experiments, Tools, Databases, and Algorithms	Orpita Bosu (Author), Simminder Kaur Thukral (Author)
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