19BT203 MICROBIOLOGY

Source: https://www.wur.nl/en/Research-Results/Chair-groups/Agrotechnology-and-Food-Sciences/Laboratory-of-Microbiology.htm

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	50	-	8	3	3

COURSE DESCRIPTION AND OBJECTIVES:

To familiarize the student to understand about classification, diversity and physiology of microorganisms. Also to acquaint about the methods of microbe cultivation and sterilization techniques as well as microbial diseases, host pathogen interactions and their control.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand different characteristic features of microorganisms.	2
2	Apply the control agents against pathogens.	1,2,3
3	Analyze new strains for industrial production of bioproducts.	2,3
4	Identify microorganisms using 16S rDNA and staining methods.	3,4
5	Design media for enhanced growth of microorganisms.	3

SKILLS:

- ✓ *Handle different microscopes.*
- ✓ *Isolation of microbes from various sources.*
- ✓ *Microbial species differentiation.*
- ✓ *Aseptic maintenance of lab and hood.*
- ✓ *Maintenance of stock cultures.*

UNIT - I **L-9**

INTRODUCTION TO MICROBIOLOGY: Discovery of microorganisms; Spontaneous generation theory, Germ theory of diseases; Major contribution and events in the field of Microbiology; Scope and relevance of Microbiology; Microscopy-types; Fixation of microorganisms; Principles of different staining techniques.

UNIT - II **L-9**

MAJOR GROUPS OF MICROORGANISMS: Diversity and classification; Characteristics used in taxonomy; Molecular approaches to microbial taxonomy; Characteristic features of viruses, bacteria, fungi, yeasts, algae and their biological importance.

UNIT - III **L-9**

NUTRITION AND CULTIVATION OF MICROORGANISMS: Macro and micronutrients their sources and physiological functions of nutrients, Growth factors and their functions in metabolism; Classification of microorganisms based on nutritional requirements, Culture media and types; Pure culture techniques and preservation of pure cultures, Special techniques for cultivation of anaerobes; Microbial growth and measurement.

UNIT - IV **L-9**

MICROBIAL DISEASES AND HOST PATHOGEN INTERACTION: Classification of infectious diseases; Emerging infectious diseases; Molecular basis of pathogenicity; Human diseases caused by viruses, bacteria and fungi.

UNIT - V **L-9**

STERILIZATION AND CONTROL OF MICROORGANISMS: Sterilization processes, physical agents - moist and dry heat; Chemical agents - classes of disinfectants, characteristics and mode of action; Evaluation of effectiveness of antimicrobial agents; Biosafety levels.

LABORATORY EXPERIMENTS

LIST OF LAB ACTIVITIES **TOTAL HOURS: 30**

1. Media preparation for microbial culture.
2. Preparation of nutrient broth and agar for culturing *E. coli*.
3. Sterilization techniques in microbiology: wet method, dry method and filter sterilization methods.
4. Study of Microscopes- dark field, bright field, phase contrast and fluorescence microscopy.
5. Microscopical identification of cells in permanent fixed slides.
6. Different inoculation methods of microorganisms in culture media.
7. Isolation of pure culture by streak plate and pour plate technique.
8. Gram staining of bacteria and observation under microscope.
9. Hanging drop method to observe bacterial motility.
10. Biochemical tests.
11. Replication of bacteriophage.
12. Phage titration assay.

TEXT BOOKS:

1. Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton: “Prescott’s Microbiology”, 10th edition, McGraw Hill Higher Education, 2017.

REFERENCE BOOKS:

1. J.L.Ingraham and C.A.Ingraham, “Introduction to Microbiology - A Case History Approach” 3rd edition, Thomson Publications, 2004.
2. M.J.Pelczar, E.C.S.Chan and N.R. Krieg, “Microbiology”, 5th edition, Tata McGraw Hill, 2006.
3. Michael T. Madigan, John M. Martinko, David A. Stahl and David P. Clark, “Brock Biology of Microorganisms”, 13th edition, Pearson Publications, 2011
4. A.Nigam and A. Ayyagari, “Lab manual in Biochemistry, Immunology and Biotechnology”, 1st edition, Tata McGraw Hill, 2007.
5. K.R. Aneja, “Experiments in Microbiology, Plant Pathology and Biotechnology”, 4th edition, New Age International Publishers, 2007.