16BT203 MICROBIOLOGY

Source:
www.medipharmlab.com

Hours Per Week :

L	T	P	C
3	-	2	4

Course Description and Objectives:

This course provides the classification of microorganisms, culturing methods and their control. The objective of this course is to impart knowledge on scope and relevance of microbes and microscopic examination. In addition, the course also imparts knowledge on microbial genetics and genetically modified microbes suitable for industries.

Course Outcomes:

Upon completion of the course, the student will be able to

CO1: Ability to understand different characteristic features of microorganisms.

CO2: Maintain sterile conditions by applying knowledge of physical and chemical sterilization techniques.

CO3: Classify the microorganisms by using staining and 16S rDNA analysis.

CO4: Design media for isolation and cultivation of microorganisms.

CO5: Analyze the infectious diseases caused by pathogenic bacteria, viruses and parasites.

SKILLS:

- ✓ *Handle different microscopes.*
- ✓ *Isolate microbes.*
- ✓ *Differentiate between microbial species.*
- ✓ *Aseptic maintenance of lab and hood.*
- ✓ *Maintain stock cultures.*

ACTIVITIES:

- *Isolate microbes from different sources – air, soil and water.*
- *Identify pathogens from local hospitals and dairy farms.*
- *Purify different strains of bacteria and fungi.*
- *Carryout sterilization processes.*

UNIT - 1 **L-9**

INTRODUCTION TO MICROBIOLOGY: Discovery of microorganisms; Theory of spontaneous generation, Germ theory of diseases; Major contribution and events in the field of Microbiology; Scope and relevance of microbiology; Microscopy-types; Fixation of microorganisms; Principle dyes, principles of different staining techniques- simple staining, differential staining, spore staining, flagellar staining, acid fast and capsular staining.

UNIT - 2 **L-9**

MAJOR GROUPS OF MICROORGANISMS: Diversity classification proposed by Woese et al; Three Domains of life; Classification systems- phylogenetic, phenetic, genetic; Taxonomic ranks; Major characteristics used in taxonomy; Molecular approaches to microbial taxonomy.

UNIT - 3 **L-9**

NUTRITION FOR MICROORGANISMS: Nutritional classes of microbes, Macro and micronutrients, their sources and physiological functions of nutrients, growth factors and their functions in metabolism; aerobic and anaerobic metabolism; growth curve and kinetics.

CULTIVATION OF MICROORGANISMS: Culture media-synthetic and complex media; solidifying agents; types of media - selective, differential and enrichment media; Pure culture methods - spread plate, pour plate and streak plate; special techniques for cultivation of anaerobes.

UNIT - 4 **L-9**

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

UNIT - 5 **L- 09**

STERILIZATION AND CONTROL OF MICROORGANISMS: Sterilization processes- autoclaves, UV radiations, filter sterilization, disinfection; Physical agents - moist and dry heat; Chemical agents - characteristics and mode of action of antimicrobial agents; Classes of disinfectants - phenol, phenolics, alcohol, halogens (chlorine, chloramines, bromine, iodine, tinctures of iodine, iodophores), surfactants (soaps and detergents), alkylating agents (formaldehyde, glutaraldehyde, 3-propiolactone and ethylene oxide), heavy metals (mercury, silver and copper containing compounds); Evaluation of effectiveness of antimicrobial agents.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

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

TEXT BOOKS:

1. L.M.Prescott, J.P. Harley and D.A.Klein, "Microbiology", 2nd edition, McGraw Hill, 2005.
2. A.Nigam and A. Ayyagari, "Lab manual in Biochemistry, Immunology and Biotechnology", 1st edition, Tata McGraw Hill, 2007.

REFERENCE BOOKS:

1. J.L.Ingraham and C.A.Ingraham, "Introduction to Microbiology - A Case History Approach" 3rd edition, Thomson Publications, 2004.
2. K.R. Aneja, "Experiments in Microbiology, Plant Pathology and Biotechnology", 4th edition, New Age International Publishers, 2007.
3. M.J.Pelczar, E.C.S.Chan and N.R. Krieg, "Microbiology", 5th edition, Tata McGraw Hill, 2006.