

MLD - BASIC MICROBIOLOGY

(Credits: Theory-3)
(Teaching Hours – 4)

Course objective:

To understand the basics of microbiology and to know the role in environment. To provide fundamental understanding of the microbial world, basic structure and functions of microbes, metabolism, nutrition, their diversity, physiology and relationship to environment and human health. To impart practical skills of isolation and manipulating conditions for their propagation. To ensure the students to understand about the structure and function of microorganisms.

UNIT - I (10 hours)

Microbial Diversity: Basics of microbiology, History and Scope of microbiology, General features and Classification of Archaea, Bacteria, Fungi, Algae, Protozoa, Viruses and Prions. Differences between prokaryotic and eukaryotic organisms.

UNIT- II (15 hours)

Ultrastructure of Bacteria: Sub-cellular structures - Cell wall of bacteria and its biosynthesis, Cell envelope - capsule and slime layer, Cellular appendages - pili, flagella and fimbriae, Cell membrane, inclusion bodies, Plasmid DNA and chromosomal DNA. **Bacterial genetics** - conjugation, transduction (generalized and specialized), and transformation.

UNIT - III (15 hours)

Microscopy: Staining - Principles and types of staining (simple and differential) **Microscopy** -Instrumentation, principles and applications of light microscopes (bright field, dark field, phase contrast, fluorescent microscopes) and electron microscopes (transmission and scanning electron microscopes)

UNIT - IV – (10 hours)

Microbial Nutrition: Classification of microorganisms based on their nutritional types, Preparation of media, types of media, culturing of microbes, Microbial growth curve, viral replication: lytic and lysogenic cycles, Isolation, preservation and maintenance of microorganisms, Aerobic and Anaerobic culturing of bacteria, Effect of biotic and abiotic factors on the growth of organisms.

UNIT - V (10 hours)

Microbial Control: Sterilization, disinfection, antiseptics, fumigation. Physical control: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), desiccation, osmotic pressure, radiation, UV-light, electricity, ultrasonic sound waves, filtration. Chemical control: Antiseptics and disinfectants (halogens, alcohol, gaseous sterilization)

Course Learning Outcomes (CLO):

Students will be able to

1. Define the science of microbiology, its development and importance in human welfare.
2. Describe historical concept of spontaneous generation and the experiments performed to disprove.
3. Describe some of the general methods used in the study of microorganisms.
4. Recognize and compare structure and function of microbes and factors affecting microbial growth.
5. Demonstrate aseptic microbiological techniques in the laboratory and check sources of microbial contamination and their control.

Text Books:

- M.J. Pelczar Jr. E.C.S. Chan and N.R. Kreig, Microbiology (5th edition), Tata MaCraw-Hill, New Delhi;
- R. Ananthanarayanan. and C.K.Jayaram Panickar, Text book of Microbiology (9th edition), Orient Longman Publications, New Delhi
- Lansing M. Prescott, John. P. Harley, Donald A. Klein, 1999. Microbiology (9th edition) WCB MaCraw-Hill, New York;

Further reading:

- Sundararajan S (2003). College Microbiology, revised edition, Vardhana publications, Banglore.
- R.C. Dubey, D.K.Maheswari, A Text book of Microbiology (2005), S.Chand & C7ompany Ltd. New Delhi