

BMPC2005 BASIC CLINICAL AND HEALTH SCIENCE (3-0-0)

Course Objectives :

The course in Basic Clinical and Health Science aims to provide students with comprehensive knowledge of microbiological principles, techniques, and applications in clinical and health settings. It seeks to develop a deep understanding of prokaryotic and eukaryotic microorganisms, their cultivation, identification, and control methods. The course will equip students with practical skills in microscopy, sterilization techniques, contamination prevention, and microbiological assays. By integrating theoretical knowledge with laboratory techniques, the objective is to prepare students to understand microbial systems, their interactions, and their significance in biomedical research and healthcare environments.

Module- I (9 Hours)

Introduction to Prokaryotes and Eukaryotes, Study of ultra-structure and morphological classification of bacteria, Nutritional requirements, raw materials used for culture media, Physical parameters for growth, Growth curve, Isolation and preservation methods for pure cultures, Cultivation of anaerobes, Quantitative measurement of bacterial growth (total and viable count). Study of different types of microscopes including bright field microscope, phase contrast microscope, dark field microscope and electron microscope.

Module- II(9 Hours)

Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC). Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods. Equipment employed in large scale sterilization. Sterility indicators.

Module- III (9 Hours)

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Virus. Classification and mode of action of disinfectants. Factors influencing disinfection, antiseptics and their evaluation. Bacteriostatic and bactericidal actions. Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, and sterile products).

Module- IV(9 Hours)

Designing of aseptic area, laminar flow equipment; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Assessment of a new antibiotic and testing of antimicrobial activity of a new substance. General aspects environmental cleanliness.

Module- V (9 Hours)

Types of spoilage, factors affecting the microbial spoilage of biomedical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of biomedical products using antimicrobial agents, evaluation of microbial stability of biomedical products. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in biomedical industry and research.

Course Outcomes:

- CO1: Analyze and classify microorganisms using advanced microscopic techniques, demonstrating proficiency in understanding bacterial morphology, cultivation methods, and growth characteristics
- CO2: Apply sterilization and disinfection principles, critically evaluating different physical, chemical, and mechanical methods for microbial control and determining their efficiency in various contexts
- CO3: Evaluate microbial identification techniques, including staining methods, biochemical tests, and advanced approaches for characterizing bacteria, fungi, and viruses
- CO4: Design and implement aseptic area protocols, understanding contamination sources, prevention strategies, and clean area classification in biomedical and research environments
- CO5: Assess microbial spoilage, preservation techniques, and cell culture methodologies, with a focus on understanding microbial stability and applications in biomedical research and industry

Books:

- Microbiology; Michael Pelczar, Jr.; Publisher: McGraw Hill Education; 5 edition (20 April 2001)
- Microbiology; Gerard J. Tortora, Berdell R. Funke, and Christine L. Case; Publisher: Pearson Education India; Eleventh edition (15 July 2016).