DEPARTMENT OF MICROBIOLOGY, SHAHEED BENAZIR BHUTTO UNIVERSITY SHAHEED BENAZIRABAD

COURSES & COURSE CONTENTS

BS- PART – I **FIRST SEMESTER**

MICB – 310 GENERAL MICROBIOLOGY – I (THEORY)

1- The Microbial World, Microorganisms and their respective position in living world.
2- The history and scope of Microbiology.
3- The study of microbial structure (Morphology and arrangements of Bacteria, anatomy of bacterial, Fungal and Protozoal cell)
4- Comparative study of Prokaryotic and Eukaryotic cell.
5- Microbial Physiology (Bacterial growth, nutrition & reproduction.
6- Effect of various environmental factors (Chemical & Physical) on the survival of microorganisms (Temperature, pH, Oxygen, Osmotic Pressure, Hydrostatic pressure and various chemicals).
7- General methods of study used in microbiology.
8- Division and classes in Prokaryotic and Single-celled Eukaryotes.

MICB – 311 GENERAL MICROBIOLOGY – I (PRACTICAL)

1- Laboratory safety: Containment and decontamination.
2- An introduction to microscopy.
3- Principles of Staining Procedures: Simple staining, Gram's Staining, Acid-fast staining, cell wall staining, flagellar staining, capsule staining, spore staining and spirochete staining.
4- Study of cell motility by hanging drop preparation.
5- Preparation and sterilization of bacteriological media and glassware.
6- Inoculation techniques. Study of colonial characteristics of microorganisms.
7- Enumeration of bacteria from milk, water, food and soil by standard plate count technique (SPC) and / or most probable number technique (MPN).
8- Microbiological analysis of air. Microscopic study of fungi isolated from air.

BS- PART – I **SECOND SEMESTER**

MICB – 312 GENERAL MICROBIOLOGY – II (THEORY)

1- Basic Genetics: Structure, chemical composition and replication of genetic material. (DNA)
2- DNA-RNA and protein synthesis.
3- Bacterial Metabolism (in brief)
4- Cell division*: Mitosis and Meiosis*
5- Genetic Recombination: *Transformation, Conjugation and Transduction*.

6- Biogeochemical cycles (Carbon, Nitrogen, Phosphorus, Sulfur)
7- Aeromicrobiology
8- Aquatic Microbiology: Microflora of water, water pollution, water as a source of infection, water and sewage treatment.
9- Microbiology of food: Microflora of food, food spoilage, food preservation techniques
9- Microflora of milk: Their normal and abnormal activities, milk borne infections, Pasteurization process and their importance and applications.
10- Bacterial variations and mutations
11- Glycolysis and TCA cycle

MICB– 313 GENERAL MICROBIOLOGY – II (PRACTICAL)

1- Isolation of Chromosomal DNA from E. coli
2- Electophoresis of Microbial DNA
3- Effect of UV light on phenotype and genotype of bacteria.
4- Enumeration of bacteria in drinking water, milk, soil, air
8- Pure culture study of (on the basis of morphological, cultural and biochemical characteristics): *E. coli, Salmonella sp, Shigella sp, Staphyloccus aureus, S. epidermidis* and *S. fecalis, Corynebacterium sp.*
9- Microscopic study of Leishmania, Entamoeba, Plasmodium and Giardia.
10- Antibacterial activity of serum
11- Aggltination test (Widal test), Precipitation tests.
12- Urine analysis (physical, chemical and microbiological)
13- MPN test.

BS- PART – II FIRST SEMESTER

MICB– 410 GENERAL IMMUNOLOGY (THEORY)

1- Introduction: and Science of Immunology.
2- Historical Background of Immunology.
3- Integrated lines of defense.
4- Scope of Immunology.
5- Cellular and Humoral Immunity.
6- Non-specific host defense mechanism.
7- Determinants of Innate Immunity.
8- Antigen: Properties of Ag., antigens of Microbial origin, blood group antigens.
9- Types of organs involved in immune system.
10- Lymphatic system: immunocompetent cells, their sub sets & their immunological characterization & Functions, Specific host defense mechanism.

11- Family of Immunoglobulin: Introduction, Structure and basis of classification of Igs., Classes and subclasses of Igs, Complement system, Hypersensitivity: Type I, II, III, & IV.
12- Introduction to antigen-antibody reactions
13- Immunization

MICB – 411 GENERAL IMMUNOLOGY (PRACTICAL)

1- Different Leukocyte count.
2- Blood grouping (ABO & Rh).
3- Agglutination Test (Widal Test)
4- Precipitation Tests.
5- Complement fixation test and Gel diffusion test.
6- ICT Test

BS- PART – II SECOND SEMESTER

MICB-412 MICROBIAL TAXONOMY (THEORY)

1- System of scientific nomenclature and basis of classification of microorganisms.
2- General concepts of microbial classification.
3- System of scientific nomenclature and basis of classification of microorganisms.
4- Contemporary classification of bacteria with special emphasis on Eubacterials, Pseudomonadales, Spirochetales, Actinomycetales.
5- Introduction to classification of Virus, Fungi, Protozoa and Algae
6- A brief introduction to Rikettsia, Chlamydia and Mycoplasma
7- An introduction to prions and viroids

MICB- 413 MICROBIAL TAXONOMY (PRACTICAL)

1- Characterization of bacteria and fungi on the basis of different biochemical and cultural characteristics.
2- Study of phylogenetic relationship using appropriate computer software.