

**SCHOOL OF BIOLOGICAL AND LIFE SCIENCES**

**PHD ENTRANCE SYLLABUS WINTER 2023-24**

**MICROBIOLOGY**

**Advanced Microbiology**

Microbial Physiology, Growth Yield and Characteristics, Strategies of Cell Division, Stress Response, Biosensors, Microbial Fermentation and Production of Small and Macromolecules, Molecular Approaches to Diagnosis and Strain Identification, Bioremediation and Phytoremediation, Bioresource and Uses of Biodiversity, Microscopic Techniques: Visualization of Cells and Subcellular Components by Light Microscopy, Resolving Powers of Different Microscopes, Microscopy of Living Cells, Scanning and Transmission Microscopes, Different Fixation and Staining Techniques for EM, Freeze-Etch and Freeze-Fracture Methods for EM, Image Processing Methods in Microscopy, Microbial Genetics: Methods of Genetic Transfers.

**Molecular Biology:** DNA Replication - evidence of semiconservative mode of DNA replication. Prokaryotic and Eukaryotic replication, Transcription - transcription factors, mechanism of transcription in Prokaryotes and eukaryotes, Translation - translation factors, mechanism and process of protein synthesis in Prokaryotes and eukaryotes.

**Immunology:** Immunity, types of immunity, immune responsiveness, humoral immune response, specific and non-specific cell mediated immune response, effector- molecules and cells of immune response. Split-gene concept of immunoglobulin genes, MHC and its significance in immune response.

**Biochemical & Biophysical Techniques:** Principles of biophysical chemistry (pH, buffer, Reaction kinetics, thermodynamics, colligative properties). Animal Tissue Culture, Plant Tissue Culture, rDNA Technology, Genomics and Proteomics, Genetic Engineering, Fluorescence and Absorbance Spectroscopy, Microscopy.

**Biostatistics & Ecological Principles:** Hypothesis testing, T -test, Anova, Correlation and regression, Distribution, Mean, median, mode, standard deviation, error, Probability. Species interactions, population ecology, community ecology, conservation biology, biodiversity management.

**Chemical bonding and stereochemistry:** Structure of atoms, molecules and chemical bonds Chirality and stereoisomerism

**Biomolecules and enzymology:** Classification, composition, structure, properties, functions and uses of carbohydrates, proteins, lipids, nucleic acids and Vitamins and Minerals, enzymes classification, and nomenclature of enzymes. Enzyme assay techniques, enzyme catalysis and enzyme kinetics. Study of Michaelis Manton equation, LB plot and their significance. Enzyme inhibition. Active site conformation and active site investigation. Activity mechanisms of RNase, chymotrypsin and carboxypeptidase.