Biology Syllabus for BS / BSC / Masters / MPhil

BOTANY

- Algae, Fungi and Bryophytes
- Pteridophyta and Gymnosperms
- Anatomy and Embryology
- Taxonomy of Angiosperms
- Plant Physiology
- Plant Pathology
- Biofuels
- Biofertilizers
- Biocides
- Important Indigenous Medicinal Plants, Multipurpose Trees
- Industrial Botany

ZOOLOGY

- Human Diseases
- Applied Entomology.
- Structure and Functions of Non-chordates
- Ecological theories and applications
- Parasites and Immunity
- Structure and Functions of Chordates
- Endocrinology and Neuroscience
- Comparative Animal Physiology
- Cell and Receptor Biology
- Biochemistry and Molecular biology
- Taxonomy and Biodiversity
- Evolution and Animal Behaviour
- Taxonomy and Invertebrate Studies

MICROBIOLOGY

- General Microbiology
- Microbial Physiology
- Immunology
- Microbial Genetics
- Genetic Engineering
- Bioinformatics & Bio-Statistics
- Microbial Growth and Reproduction
- Tissue Culture
- Virology
- Medical Microbiology
- Industrial Microbiology
- Biodegradation & Bioremediation
- Gene Therapy
- Environmental microbiology

CELL AND MOLECULAR BIOLOGY & GENETICS

- Membrane dynamics and cell surfaces
- Organelles: structure, function, synthesis, and targeting
- Cytoskeleton: motility and shape
- Cell cycle: growth, division, and regulation (including signal transduction)
- Methods & Techniques used in Biology
- Genetic foundations
- Chromatin and chromosomes
- Genome sequence organization

- Genome maintenance
- Gene expression and regulation in prokaryotes and eukaryotes: mechanisms
- Gene expression and regulation: effects
- Bacteriophages, animal viruses, and plant viruses
- Recombinant DNA methodology

ORGANISMAL BIOLOGY

- Internal transport and exchange (Circulatory, respiratory, excretory, and digestive systems)
- Support and movement
- Integration and control mechanisms
- Behaviour (communication, orientation, learning, and instinct)
- Metabolic rates (temperature, body size, and activity)
- Reproductive structures
- Meiosis, gametogenesis, and fertilization
- Early development (e.g., polarity, cleavage, and gastrulation)
- Developmental processes (e.g., induction, determination, differentiation, morphogenesis, and metamorphosis)
- External control mechanisms (e.g., photoperiod)
- Plant Structure, Function, and Organization, with Emphasis on Flowering Plants
- Plant Reproduction, Growth, and Development, with Emphasis on Flowering Plants

DIVERSITY OF LIFE

- Archaea (Morphology, physiology, and identification)

- Bacteria (Morphology, physiology, pathology, and identification)
- Protista
- Fungi
- Animalia with emphasis on major phyla
- Plantae with emphasis on major phyla

ECOLOGY AND EVOLUTION

- Environment/organism interaction
- Behavioural ecology
- Population ecology
- Community ecology
- Ecosystems
- Genetic variability
- Macroevolutionary and microevolutionary processes
    - Gene flow and genetic drift
    - Natural selection and its dynamics
    - Levels of selection (e.g., individual and group)
    - Trade-offs and genetic correlations
    - Natural selection and genome evolution
    - Synonymous vs. nonsynonymous nucleotide ratios
- Evolutionary consequences

ENVIRONMENTAL SCIENCE

- Air pollution and Climate Change
- Biodiversity & Conservation
- Environmental Toxicology, Health and Safety
- Environmental Analysis: Techniques and Instrumentation

- Environment and Energy Management
- Industrial & Biomedical Waste Management
- Environmental Technology
- Environmental Biotechnology
- Public awareness of Environment issues

BIOTECHNOLOGY

- Types of restriction enzymes
- Methylation, cloning vectors
- Selection of recombinants
- Optimization of heterologous protein expression
- Application of recombinant DNA technology
- Resistance, metabolic engineering
- Production of vaccines

BIOCHEMISTRY

- Biological molecules
- Enzyme activity, receptor binding, and regulation
- Major metabolic pathways and regulation
- Bioanalytical Techniques
- Nutritional Biochemistry
- Bioenergetics and Metabolism
- Plant Biochemistry
- Clinical Biochemistry