

Mandsaur University
Ph.D. Entrance Test Syllabus
Subject: Life Sciences



Unit I: Biochemistry

- Biomolecules and their structure and function
- Enzymes and enzyme kinetics
- Bioenergetics
- Metabolism of carbohydrates, lipids, proteins and nucleic acids

Unit II: Cell and Molecular Biology

- Cell structure and organization
- Membrane biology and transport
- Cell cycle, cell signaling and apoptosis
- DNA replication, transcription, translation and gene regulation
- Genome organization and epigenetics

Unit III: Genetics and Genomics

- Principles of inheritance
- Chromosome biology
- Molecular, microbial and human genetics
- Mutation and genetic variation
- Population genetics
- Genomics and functional genomics

Unit IV: Microbiology and Immunology

- Diversity, classification and physiology of microorganisms
- Bacteriology, virology and mycology
- Host–microbe interactions
- Innate and adaptive immunity
- Vaccines, immunotherapy and microbiome biology

Unit V: Plant Sciences

- Plant diversity and classification
- Plant structure and physiology
- Photosynthesis and respiration
- Plant growth and development
- Plant hormones and stress physiology
- Plant pathology and plant biotechnology

Unit VI: Animal Sciences

- Animal diversity and classification
- Comparative physiology
- Developmental biology
- Endocrinology and reproduction
- Neurobiology
- Homeostasis and adaptation

Unit VII: Ecology, Evolution and Biodiversity

- Ecology and ecosystem functioning
- Population and community ecology
- Biodiversity and conservation biology
- Evolution and natural selection
- Taxonomy and systematics
- Environmental biology, climate change and sustainability

Unit VIII: Biotechnology

- Recombinant DNA technology
- Genetic engineering and genome editing
- Molecular diagnostics
- Tissue culture
- Fermentation technology
- Industrial, agricultural and medical biotechnology
- Applications of biotechnology in health, agriculture and environment

Unit IX: Bioinformatics and Computational Biology

- Biological databases
- Sequence analysis and phylogenetics
- Omics technologies
- Systems biology
- Artificial intelligence applications in Life Sciences

Unit X: Biological Techniques

- Microscopy and imaging techniques
- Chromatography, electrophoresis and centrifugation
- Spectroscopy and analytical instrumentation
- PCR, DNA sequencing and molecular marker techniques
- Immunological and molecular biology techniques

Note: The syllabus is indicative in nature and is based on the postgraduate (M.Sc.) curriculum in Life Sciences and allied disciplines. Candidates are expected to refer to standard postgraduate textbooks and recent developments in the relevant areas of Life Sciences.