

BSc Botany, Zoology

Programme Outcomes (PO)

1. Understand, comprehend, and appreciate plant diversity, its conservation, sustainable utilization, and its application for human welfare and to gain knowledge on primitive and advanced characters based on morphology and molecular characters and appreciate the evolutionary relationship.
2. To inculcate and develop entrepreneurial skills based on quality education in herbal drug research and decision making on aspects of global importance like climate change, SDGs and green technologies.
3. Making aware of the scientific and technological advancements – information and communication, Biotechnology and Molecular Biology for further learning and research in all branches of Botany.
4. Skill development for the collection, preservation and recording of information from simple illustration to molecular database development and prepare them for National and International level competitive examinations.
5. Students gain knowledge and skill in the fundamentals of animal sciences and analyse interactions among the various animals of different phyla, their distribution
6. Apply the knowledge of cell structure, metabolism, genetics, and gene expressions to understand the complex evolutionary processes and behaviour of animals
7. Correlates the physiological processes of animals and their relationship of organ systems
8. Apply the knowledge and understanding of economic zoological aspects to one's own life and work

Semester 1 – Course Title: **1BOTDSC1-MDT: Microbial Diversity and Technology**

Course Outcomes (CO)

1. Students will appreciate the fascinating biological diversity of microbial world and its significance and get acquainted on taxonomic classification of microbes, historical development, and contribution of eminent scientists to the field of microbiology as a scientific discipline.
2. Will give an in-depth knowledge on the principal components, working mechanism, basic principle and applications of microscopy and will be familiar with stains and staining technique in microbiology and be able to differentiate gram-positive and gram-negative bacterial cells.
3. Will understand and gain laboratory skills on the various methods of safe handling and culturing of microorganisms and create awareness on diverse physical and chemical agents used for sterilization and gain knowledge on growth pattern of microbes, its measurement, nutritional types, culturing and storage and their applications in research and industry.
4. Students will be able to comprehend the fundamental functioning of the primitive cells - Viruses, Viroids, and Prions, their culturing, diseases caused and control.
5. Will be able to understand the bacterial structure and reproduction with emphasis on Actinomycetes, Cyanobacteria, Mycoplasmas and Phytoplasmas.
6. Students will gain knowledge on fungal structure, classification, reproduction, culturing, and diseases.
7. Understand the importance of VAM and Lichens in agriculture and conservation respectively.
8. Will have broad perspective on economic importance of microbes.

Semester 1 Course Title: **1ZOODSC1-CGID: Cytology, Genetics, and Infectious Diseases**

Course Outcomes (CO)

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an organism and reproduces to form a new organism.
4. How a cell communicates with its neighbouring cells.
5. The principles of inheritance, Mendel's laws and the deviations.
6. How environment plays an important role by interacting with genetic factors.
7. Detect chromosomal aberrations in humans and study of pedigree analysis.

Semester 2 Course Title: **2BOTDSC2-DNFP: Diversity of Non-Flowering Plants**

Course Outcomes (CO)

1. Understand the diversity and affinities among algae, bryophytes, pteridophytes and gymnosperms.
2. Understand the characteristics and classification of non-flowering plants.
3. To get acquainted with morphology, anatomy, reproduction and life cycles of algae, bryophytes, pteridophytes and gymnosperms and their ecological and evolutionary significance.
4. Obtain laboratory skills to preserve non-flowering plants for morphometric analysis.
5. To explore the ecological importance of non-flowering plants.
6. To understand the applications of algae in various fields like food industries, pharmaceutical industries, cosmetics, and others.
7. Understand the affinities and evolutionary significance of plants through geological time scale.
8. Understand and appreciate palaeobotanical records.

Semester 2 Course Title: **2ZOODSC2-BP: Biochemistry and Physiology**

Course Outcomes (CO)

1. To develop a deep understanding of structure of biomolecules like proteins, lipids, and carbohydrates.
2. How simple molecules together form complex macromolecules.
3. To understand the thermodynamics of enzyme catalysed reactions.
4. Mechanisms of energy production at cellular and molecular levels.
5. To understand various functional components of an organism.
6. To explore the complex network of these functional components.
7. To comprehend the regulatory mechanisms for maintenance of function in the body.

Semester 3 Course Title: **3BOTDSC3-PADB: Plant Anatomy and Developmental Biology**

Course Outcomes (CO)

1. To understand, identify and compare anatomy of different plant tissues.
2. Skill development for the proper description and illustration of internal structure using technical terms and further classification.
3. Provide an understanding on differentiation of plant parts and compare their primary and secondary structure.
4. Observation and classification of the floral variations from the premises of college and surroundings.
5. Equip the students with the knowledge of basic structure and organization of plant parts and help students to understand plant development and appreciate the process.
6. Understand the reproductive processes in the life cycle of plants.
7. Students will be able to understand the growth, development, and embryological variations in angiosperms.
8. Elicit enthusiasm to understand evolution based on variations in reproduction among plants.

Semester 3 Course Title: **3ZOODSC3-MBBTB: Molecular Biology Bioinstrumentation & Techniques in Biology**

Course Outcomes (CO)

1. After successful accomplishment of the course, the learners will be able to acquire better understanding and comprehensive knowledge regarding most of the essential aspects of molecular biology subject which in turn will provide a fantastic opportunity to develop professional skill related to the field of molecular biology.
2. The course will mainly focus on the study of principal molecular events of cell incorporating DNA replication, transcription and translation in prokaryotic as well as eukaryotic organisms.
3. Acquiring knowledge on instrumentation and techniques in biology.

Semester 4 Course Title: **4BOTDSC4-ECB: Ecology and Conservation Biology**

Course Outcomes (CO)

1. Gain knowledge on the fundamental concepts in ecology, environmental science and phytogeography.
2. To appreciate the history, scope, importance of ecology and improve knowledge on the various ecological factors and ecological adaptations in plants.
3. To understand various concepts of ecosystems and communities along with ecological relationships between organisms and their environment.
4. To utilize various tools and techniques to study various physical and physiological parameters of ecosystems.
5. To acquaint the students with geographical phenomena and principles of phytogeography.
6. The student will appreciate and acquire detailed understanding on the phytogeographical regions of India. This knowledge is critical in understanding the vegetation, its management and biodiversity conservation of phytogeographical zones.
7. Students will be able to identify the sources of pollution, pros, and cons of urbanization with respect to pollution and provide remedies to mitigate and rectify the same.
8. To appreciate biodiversity, importance, and its conservation. Students will judiciously understand the various threats to biodiversity and methods to conserve them in the best possible ways.

Semester 4 Course Title: **4ZOODSC4-GTICB: Gene Technology, Immunology and Computational Biology**

Course Outcomes (CO)

1. Acquaint knowledge on versatile tools and techniques employed in genetic engineering and recombinant DNA technology.
2. An understanding on application of genetic engineering techniques in basic and applied experimental biology.
3. To acquire a fundamental working knowledge of the basic principles of immunology.
4. To understand how these principles, apply to the process of immune function.
5. Use, and interpret results of, the principal methods of statistical inference and design; helps to communicate the results of statistical analyses accurately and effectively; helps in usage of appropriate tool of statistical software.

Semester 5 paper 5 Course Title: **5BOTDSC5 – PTRB: Plant Taxonomy and Resource Botany**

Course Outcomes (CO)

1. To recognise and understand the concepts involved in plant taxonomy and main features in Angiosperm evolution
2. Ability to identify, classify and describe a plant in scientific terms, thereby, Identification of plants using dichotomous keys. Skill development in identification and classification of flowering plants.
3. Interpret the rules of ICN in botanical nomenclature.
4. Classify Plant Systematic and recognize the importance of herbarium and Virtual Herbarium, Evaluate the Important herbaria and botanical gardens
5. Recognition of locally available angiosperm families and plants and economically important plants. Appreciation of human activities in conservation of useful plants from the past to the present.
6. Analyse and evaluate the application of Phytochemistry, cytotaxonomy and computer application in taxonomy
7. To study and understand the morphological, embryological and palynological in relation to taxonomy.
8. To access the importance of herbal extracts in cosmeceuticals and nutraceuticals
9. To understand and evaluate the use of herbs as excipients – plant sweeteners, natural colourants, binders, flavours and perfumes
10. To understand the utility of herbs as source of pesticides and its beneficiaries

Semester 5 paper 6 Course Title: **5BOTDSC6 – CBG: Cell Biology and Genetics**

Course Outcomes (CO)

1. To Identify the basic principles and current trends in classical genetics and cell biology
2. To obtain in-depth knowledge of the cell as a basic unit of life, cell organelles and biomolecules
3. Understanding of Cell metabolism, chemical composition, physiochemical and functional organization of organelles.
4. To understand the process of mitosis and meiosis and importance of chromosomes in the process of cell division
5. Recognize the role of cyclins and protein kinases in regulating the cell cycle as well as the importance of cell cycle checkpoints.
6. Able to describe the mechanism and importance of programmed cell death
7. Ability to identify, calculate and describe crossing over, allelic generations and frequencies of recombination.
8. Understand the various types of gene interactions and their effects on the phenotype
9. To gain knowledge on chromosomal aberrations and its role in evolution.
10. Develop theoretical background on molecular genetics to provide a strong support for the student for future research and employability

Semester 5 paper 5 Course Title: **5ZOODSC5 – DNCEZ: Diversity of Non – Chordates and Economic Zoology**

Course Outcomes (CO)

1. Demonstrate the comprehensive identification abilities of non-chordates.
2. Understand and explain evolutionary relationship amongst non-chordate groups.
3. Encourage and equip them for entrepreneurship.
4. Enable students to take up research in Biological Science.

Semester 5 paper 6 Course Title: **5ZOODSC6 – DCCA: Diversity of Chordates and Comparative Anatomy**

Course Outcomes (CO)

1. Demonstrate comprehensive identification abilities for chordates diversity.
2. Understand the structural and functional diversity of chordates.
3. Develop the ability to work collaborative team-based projects.
4. Study the evolutionary relationship amongst chordate groups.
5. Enable students to take up research in biological Science.

Semester 6 paper 7 Course Title: **6BOTDSC7 – PPB: Plant Physiology and Biochemistry**

Course Outcomes (CO)

1. To understand the importance of water and the mechanism of transport.
2. To gain conceptual clarity of various physiological processes in plants and understand the interconnections of the processes thereby gaining idea about the importance of plants in the dynamicity of nature
3. Preliminary understanding and appreciation of the basic functions and metabolic process taking place in plant body such as respiration, photosynthesis, nitrogen fixation etc., which are important for life
4. To gain knowledge on the role, functions and importance of mineral nutrients in plant metabolism and crop yield.
5. To understand biosynthesis, breakdown and energetics of biomolecules in plants
6. Understand and evaluate the role of plant hormones in plant development and about secondary metabolites.
7. To understand and analyse the importance of Sensory Photobiology, Plant movements and Programmed cell death
8. To analyse and appreciate the types of stresses and their effect on plants
9. To understand the structure, biosynthesis and role of secondary metabolites (phytochemicals) in plants and as defence molecules
10. Evaluate the importance of secondary metabolites for humans

Semester 6 paper 8 Course Title: **6BOTDSC8 – PBMB: Plant Biotechnology and Molecular Biology**

Course Outcomes (CO)

1. Understand and acquire skill in plant tissue culture, plant molecular biology and transgenic plants
2. Understand and acquire skills in basic laboratory organization, culture media, various culturing methods and germplasm conservation.
3. Gain knowledge about the enzymes that are frequently used in genetic engineering and about different types of vectors that can be used for gene cloning
4. Understand the basic procedure for cloning and the different types of DNA - library.
5. Understand and get acquainted with the applications of transgenic plants in different fields
6. Understand the mechanism and concept of life process at molecular level through central dogma concept
7. Understand the concept of Gene, epigenetics and genome organization and also acquire the emerging technology skills in plant genetic engineering, genomics and proteomics
8. Understand various concepts related to molecular biology including DNA and RNA structure, DNA replication, transcription and translation
9. Gain knowledge on the mechanism of DNA replication repair mechanisms
10. Understand the basics of Bioinformatics and its application

Semester 6 paper 7 Course Title: **6ZOODSC7 – EDB: Evolutionary and Developmental Biology**

Course Outcomes (CO)

1. Understand that by biological evolution many of the organisms that inhabit the earth today are different from those that inhabited it in the past.
2. Understand that natural selection is one of the several processes that can bring about evolution, although it can also promote stability rather than change.
3. Integrate genetics, molecular biology, biochemistry, cell biology, anatomy and physiology during embryonic development.
4. Understand a variety of interacting processes, which generate an organism's heterogeneous shapes, size, and structural features.
5. Understand how a cell behaves in response to an autonomous determinant or an external signal, and the scientific reasoning exhibited in experimental life science.

Semester 6 paper 8 Course Title: **6ZOODSC8 – EBWMC: Environmental Biology, Wildlife Management & Conservation**

Course Outcomes (CO)

1. Develop an understanding of how animals interact with each other and their natural habitat.
2. Develop the ability to use the fundamental principles of wildlife ecology to solve local, regional and national conservation and management issues, also encourage wildlife tourism.
3. Develop the ability to work collaborative team-based projects.
4. Gain an appreciation for the modern scope of scientific inquiry in the field of wildlife conservation management.
5. Develop an ability to analyze, present and interpret wildlife conservation and management.