

Department of Botany

Programme: M.Sc Botany

COURSE OUTCOMES (COs)

Semester I

Course: BOT1 C01. PHYCOLOGY, BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS

1. Provide knowledge on the occurrence and evolution of plant groups like Algae, Bryophytes, Pteridophytes and Gymnosperms.
2. Develop understanding on the classification, nomenclature, diversity and distribution in these plant groups with up-to-date research knowledge.
3. Develop understanding on the range of variation in their structural and life cycle patterns, cellular organization and ecological / economic importance as separate plant groups.
4. Develop hands-on approaches to study algae, Bryophyte, Pteridophyte and Gymnosperm populations and their growth forms in the surrounding environment.
 - Understand and distinguish the diverse group of algae
 - Infer the economic value of different types of algae
 - Outline the ecological significance of algae
 - Build the skills for collection, identification and artificial culture of algae.
 - Interpret different groups of Bryophytes and Pteridophytes
 - Analyze the different theories regarding the origin of both Bryophytes and Pteridophytes and develop ideas regarding their evolution.
 - Compare the structural evolution of gametophytes and sporophytes in both Bryophytes and Pteridophytes.
 - Clarify organization of different types of steles, sori and sporangial characters in an evolutionary perspective
 - Validate the ecological and economical roles played by both Bryophytes and Pteridophytes.
 - Understand the classification of Gymnosperms
 - Make use of the economic value of Gymnosperms
 - Acquire the skills for field identification of Gymnosperms

Course: BOT1C02: MYCOLOGY & LICHENOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY

1. Develop understanding of the major groups of organisms like fungi, lichens and microorganisms, their occurrence, distribution and systematic classification.
2. Acquaint with the basic understanding of plant diseases, causative organisms, mode of action and measures for their control
3. Acquire practical knowledge on fungi, lichens, micro-organisms, plant pathogens and mode of their growth in specific habitats.
4. Develop understanding on the ecological and economic significance of the above groups of organisms.
 - a. Understand the diversity of fungi.
 - b. Classify fungi based on different classification system and recognize recent trends in classification of fungi
 - c. Distinguish fungal group with their characteristic features
 - d. Understands the interaction of fungi with other living organisms.
 - e. Understands economic importance of different fungal groups
 - f. Identify the different types of fungi with reason.
 - g. Develop the understanding of the concept of microbial nutrition
 - h. Classify viruses based on their characteristics and structure
 - i. Examine the general characteristics of bacteria and their reproduction
 - j. Enhance their awareness and appreciation of human friendly viruses, bacteria and their economic value
 - k. Understand the basic principles of plant pathology and plant protection
 - l. Identify the different plant diseases and their quarantine measure.
 - m. Familiarize with the basic skills and techniques related to mycology and plant pathology

Course: BOT1C03. ANGIOSPERM ANATOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY & LAB TECHNIQUES

1. Develop understanding of the structural composition and functional organization in major land plants
2. Acquire knowledge on the reproduction and developmental processes associate with major land plants

3. Understand the significance of pollen studies in developmental process and the recent developments in palynology
4. Practical knowledge on cell and tissue organization, developmental stages and process associated with the reproduction in major land plants.
 - a. Retrieve different types of tissues, non-living inclusions in plant cells.
 - b. Interpret structure, function and roles of vascular cambium and cork cambium.
 - c. Categorize different types of Anomalous secondary growth and their anatomical peculiarities and adaptational significance.
 - d. Illustrate significance and properties of wood & fibres used commercially.
 - e. Analyze leaf initiation, types of stomata and trichomes and appraise anatomical peculiarities in C₃, C₄ and CAM plants.
 - f. Compare Nodal anatomy, Floral anatomy and their evolutionary significance
 - g. Illustrate the organogenesis in plants
 - h. Acquire the basic concepts of developmental biology
 - i. Summarize the embryogenesis in plants
 - j. Familiarizes with biological instrumentation and plant micro technique

Course: BOT1L01. PRACTICALS OF PHYCOLOGY, BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS, MYCOLOGY AND LICHENOLOGY

1. Provide practical knowledge on the collection and identification of members of Algae, Fungi and Lichens
2. Provide practical knowledge on the collection of plant groups like Bryophytes, Pteridophytes, Gymnosperms and assessment of their morphological and anatomical features through laboratory exercises.

Course: BOT1L02. PRACTICALS OF MICROBIOLOGY, PLANT PATHOLOGY, ANGIOSPERM TAXONOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY AND LAB TECHNIQUES.

1. Provide practical knowledge on the collection, culturing and identification of microorganisms (general and pathogenic) from specific habitats and evaluation of their growth performances.

2. Acquire hands-on experience on the tissue organization in major land plants.
3. Acquire practical knowledge in the reproductive structures of major land plants and the developmental processes associated with them.

Semester II

Course: BOT2C04. CELL BIOLOGY, MOLECULAR BIOLOGY AND BIOPHYSICS

1. Develop the understanding on cells, their structural and functional organization and the systematic process of growth and development.
2. Provide insight on various sub cellular materials in the molecular level and the processes associated with them, resulting in various metabolic activities.
3. Develop understanding and skills on various Biophysical methods used in cellular studies and the processes associated with them.
 - Get an idea of intracellular components and cell communication
 - Understand the life cycle of cell
 - Infer various aspects of cytoskelton
 - Analyze the chromosome organization in eukaryotes
 - Familiarize the DNA replication, repair and recombination
 - Understand the basic concepts of mechanism of gene expression
 - Familiarize the control of gene expression
 - Familiarizes with biological instrumentation
 - Understand the better use of microscopes in biology

Course: BOT2C05. CYTOGENETICS, GENETICS, BIOSTATISTICS, PLANT BREEDING AND EVOLUTION

1. Acquaint with cells and chromosomes, their structural and functional attributes, diversity and resultant manifestation on organisms.
2. Develop understanding of Mendelian Principles of Genetics.
3. Impart knowledge on human genome.
4. Provide an insight on the nature and type of data collection and its management.
5. Develop skills in data analysis using varied statistical software
 - Understand the history of genetics
 - Familiarize the concepts of linkage and genetic mapping

- Outline the basic concepts of quantitative genetics
- Understand the genetics behind cancer
- Familiarize the basic concepts of population genetics
- Understand the basic statistical methods for biological research
- Understand the basic concepts of plant breeding
- Familiarize the mechanism of hybridization in plants
- Outline the methods of breeding resistance in plants
- Familiarize the modern plant breeding methods.
- Infer the various theories of evolution
- Understand the process of evolution of plants

Course: BOT2C06. PLANT ECOLOGY, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

1. Familiarity with various types of ecosystems and the ecological principles operating in each ecosystem.
2. Evaluate the threats associated with various ecosystems and an understanding of various management strategies for their conservation.
3. Understand the nature and pattern of distribution of plant communities and the reasons underlying it.
4. Understand the nature and type of forests; their ecological as well as economic contribution and strategies for their management
 - Have an idea about the major ecosystem of the world
 - Understand the population ecology and community ecology system in the world
 - Get meticulous knowledge in ecological succession and phytogeography
 - Get knowledge in environmental pollution, global environmental problems, their mitigation and remedies and to acquire knowledge about the importance of biodiversity conservation
 - Understand the concept of conservation of nature and natural resources
 - To understand the importance of plants in environmental quality
 - Understand the importance of forest and forest products

Course: BOT2L03. PRACTICALS OF CELL BIOLOGY, MOLECULAR BIOLOGY, BIOPHYSICS, CYTOGENETICS

1. Demonstration of practical skills in the isolation of cell organelles and demonstration of cellular processes
2. Demonstration of practical skills in the isolation of genetic materials from cellular systems and to familiarize recent methods for their characterization.
3. Develop abilities in the conduct of various experiments related to the physical and chemical separation of biochemical components.
4. Demonstration of practical skills in the area of Cytogenetics and its logical reasoning.
5. Develop skills in analyzing experiments related to the course materials, their interpretation and reporting.

Course: BOT2L04. PRACTICALS OF GENETICS, BIOSTATISTICS, PLANT BREEDING, PLANT ECOLOGY, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

1. Develop skills in the statistical analysis of data, both manually and using statistical software.
2. Demonstration of practical skills in plant breeding and hybridization.
3. Develop abilities in the conduct of various experiments related to ecosystems evaluation and characterization.
4. Develop skills and abilities in assessing species composition and biotic interactions associated with heterogeneous ecosystems.
5. Demonstration of skills in the identification of phytogeographic areas, with special reference to forest biome.
6. Develop skills in evaluating the mandate of various organizations and their programmes in the priority areas specified in the course.

Semester III

Course: BOT3C07. PLANT PHYSIOLOGY, METABOLISM AND BIOCHEMISTRY

1. Understand various physiological processes associate with plant systems.
2. Understand various metabolic processes linked to biological systems.
3. Acquire knowledge on the properties of biomolecules (primary and secondary) and to understand the biochemistry of their action.

- Get an idea about the plant water relations
- Understand the transport of ions, solutes and other macromolecules
- Infer various aspects of photosynthesis.
- Understand respiratory metabolism in plants
- Analyze the nitrogen metabolism in plants.
- Familiarize the affects different types of stresses in plants
- Outline the basic knowledge in sensory photobiology
- Examine the various plant growth regulators
- Understand the structure and function of biomolecules
- Familiarize different types of secondary metabolites

Course: BOT3C08. ANGIOSPERM MORPHOLOGY, ANGIOSPERM TAXONOMY AND PLANT RESOURCES

1. Acquaint with the structure and organization of various plant organs and a detailed analysis on their origin and evolution.
2. Understand various principles and practices of Plant Systematics.
3. Acquire knowledge on the recent development in plant systematics and the institutions involved in it.
4. develop understanding on the history, occurrence, and botanical characteristics of various plant resources of commercial importance.
 - Recognize concepts of taxonomic hierarchy and phylogeny of angiosperms.
 - Illustrate sources of taxonomic characters in solving taxonomic disputes.
 - Recall the principles, rules and recommendations of ICN in plant taxonomy
 - Conceptualize the plant classification system proposed by different taxonomists
 - Develop critical understanding of the different tools in taxonomy
 - Develop critical evaluation of taxonomic keys
 - Recognize the importance of digital resources of taxonomy and virtual herbarium
 - Enhance their observation capacity by dissecting different floral structures and to improve their taxonomic illustrations and floral imaging
 - Critically evaluate the interrelationships and evolutionary trends of angiosperm families
 - Understand the economic importance of plants and its commercial applications

Course: BOT3C09. BIOTECHNOLOGY AND BIOINFORMATICS

1. Understand the basic principles and practices and develop skills in the advanced areas of plant tissue culture.
2. Acquire knowledge on the recent techniques and developments in Genetic Engineering and the legal procedures underlying genetic manipulation.
3. Acquaint with the principles and applications of Bioinformatics and to acquire skills in the use of computer aided Bioinformatics tools.
 - Get a thorough knowledge in plant tissue culture
 - Familiar with genetic engineering and advanced tools
 - Get knowledge in genomic and proteomics
 - Get basic knowledge in bioinformatics
 - The students will be able to familiarize with social issues in biotechnology

Course: BOT3L05. PRACTICALS OF PLANT PHYSIOLOGY, METABOLISM, BIOCHEMISTRY, ANGIOSPERM MORPHOLOGY, AND ANGIOSPERM TAXONOMY

1. Develop skills in conducting / demonstrating experiments related to various physiological processes in plants.
2. Demonstration of practical skills in the area of separation of biomolecules and their assays.
3. Develop abilities to test various biochemical components in plants using standard protocols.
4. Develop skills and abilities in assessing plant organs and to comment on their developmental processes.
5. Demonstration of skills in the collection, preservation and systematic elucidation of plant specimens to their respective families using conventional and modern methods.

Course: BOT3L06. PRACTICALS OF PLANT RESOURCES, BIOTECHNOLOGY AND BIOINFORMATICS

1. Develop skills in the identification of plant specimens having commercial / economic value.
2. Develop skills and abilities in undertaking tissue culture protocols.
3. Develop skills and abilities in the separation of genetic materials from plant specimens.
4. Acquire skills in the use of computers for conventional applications and also for computational purposes using statistical software.
5. Demonstration of skills in using computer software relating to Bioinformatics purposes.

Semester IV

Electives for M.Sc. Botany CBCSS Programme:

Course: BOT4E01-2. ENVIRONMENTAL BIOLOGY AND BIODIVERSITY CONSERVATION

1. Develop advanced understanding of various concepts and principles in Ecology and Environmental Biology
2. Provide insights on existing Environmental Challenges and analyze their future impacts due to increasing anthropogenic interferences.
3. Enable students to acquire knowledge and analyze unique habitats with regard to their environmental settings, processes and threats.
4. Develop hands-on skills to study environmental samples like soil and water and thereby its qualitative elucidation.

Course: BOT4E02-2. PATHOLOGY OF PLANTATION CROPS AND SPICES.

1. Develop advanced understanding of various concepts in Plant Pathology.
2. Provide insights on various crops plants, pests and methods used for the control of pests from various farming systems.
3. Understand various diseases associated with major plantation crops and analyze various methods adopted for their control.
4. Develop hands-on skills for the isolation of pathogens, analysis of disease cycles and measures for their control.

AUDIT COURSES

Course: ACIAEC: ABILITY ENHANCEMENT COURSE: SCIENTIFIC DOCUMENTATION AND REPORT WRITING

1. Provide insights on data collection, organizing research schedules, collection of databases and its interpretation, scientific writing and presentation of research findings on various platforms.

**Course: AC2PCC: PROFESSIONAL COMPETENCY COURSE: INTELLECTUAL
PROPERTY RIGHTS**

1. Develop understanding of various legal provisions for safeguarding intellectual contributions from getting misused / exploited.