

M. Sc., Botany Program and Course Outcome.

Program Specific Outcomes

After successful completion of program, students will be able to:

1. Understanding the lower plant diversity and range of their thallus organization and reproduction and also to understand their role in ecosystem, genetic and cultural diversity, uses and their conservation
2. Describe the advanced concepts and principles of taxonomy, evolutionary inference of important morphological characters, distribution of plants, Important families of flowering plants, their classification and important characters.
3. Understanding paleobotany and pollen grains of higher plants. Available fossils detail to understand evolution of plants. Morphological variation and characters of pollen grains and importance.
4. Knowledge about study of bio fertilizers for ecofriendly crop productions.
5. Understanding the basic concepts of cell studies helping the students to develop their analytical, quantitative and problem-solving skills of genetics and plant breeding.
6. Describe evolution, anatomy, morphology, systematic, genetics, physiology and ecology of plants.
7. The ecological and evolutionary features of the flora and fauna in environment
8. Knowledge about identify and analyze scientific problems and environmental issues using oral and written communication skills.
9. Knowledge about the continually developing and is dynamic; students can find new scientific information and compare it with existing information.
10. Describe how all scientific knowledge is continually developing and is dynamic; students can find new information and compare it with existing information

Semester I, Paper Title- BO1.1, Hard Core-1: Phycology and Mycology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Classification of algae and fungi.
2. Morphology and reproduction of lower plants such as algae, lichens and fungi.
3. Variations and comparison among two groups.
4. Understand ecology and economic importance of these lower plant groups.

Semester I, Paper Title- BO1.2, HardCore-2: Biology of Bryophytes, Pteridophytes and Gymnosperms

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Classification of Bryophytes, Pteridophytes and Gymnosperms
2. Morphology and reproduction of lower plants.
3. Variations and comparison among three groups.
4. Understand ecology and economic importance of these lower plant groups.

Semester I, Paper Title- BO1.3, Hard Core -3: Plant Taxonomy, Phytogeography and Evolutionary Biology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Classification of plants based on certain approaches
2. Principles of nomenclature. How it is governed by the ICN?
3. What important morphological characters delineate flowering plant families and their classification?
4. Distribution patterns of plants.
5. Principles and theories of evolution of land plants.

Semester I, Paper Title- BO1.3, Soft Core-1: Palaeobotany and Palynology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Processes of fossilization in ancient eras.
2. Prebiotic environment and origin of plant groups.
3. Concept of Gondwana land movements and continental drift.
4. Pollen morphology.
5. Uses of pollen grains in taxonomy, fossil fuel, honey and crime detection.

Semester I, Paper Title- BO1.4, Soft Core-2: Bio fertilizers

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Types of bio fertilizers.
2. Importance of soil microorganisms.
3. Symbiotic nitrogen fixation and assimilation.
4. Plant growth promoting fungi and Bacteria.
5. Importance of Mycorrhizae and commercial production of bio fertilizers.

Semester II, Paper Title- BO2.1, HardCore - I: Plant Ecology and Environmental Biology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Limiting factors controlling distribution and growth of organisms.
2. Characteristics of organisms as population, community and ecosystems.
3. What are the ecosystem functions?
4. Applications of ecological knowledge of ecological successions.
5. Problems of pollution and its management.

Semester II, Paper Title- BO2.2, HardCore-2: Cell Biology, Genetics and Plant Breeding

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Membrane structure and function.
2. Structural organization and function of intracellular organelles
3. Structure chromosomes and gene, regulation of cell cycle.
4. Laws of inheritance.
5. Experimental methods in genetics and plant breeding.

Semester II, Paper Title- BO2.3 Soft Core-1: Techniques in Plant Biology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Tissue and organ culture of important plants.
2. Crop improvement methods through biotechnological methods.
3. How to transfer the gene for production transgenic plants.
4. *In vitro* technology and pharma industries requirements.
5. Experimental methods in biosynthetic pathways and elicitation of compounds

Semester II, Paper Title- BO2.4: SoftCore-2: Plant Pathology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. General characters of true fungi.
2. Classification of fungi and plant diseases
3. Genetic mechanisms in fungal adaptations
4. Disease epidemiology.
5. Management of Bacterial, fungal and virus diseases.

Semester II, Paper Title- BO2.5:IDE : Floriculture

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. General nature of ornamental flowers.
2. Cut flower industry.
3. Commercial flower production in India.
4. Management of flower cultivation.
5. Management of diseases and pests of flower production.

Semester III, Paper Title- BO3.1: Hard Core-1: Plant Morphogenesis and Reproductive Biology of Angiosperms

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Understand a shoot apical meristem transforms into an inflorescence and floral meristems and how these domains developmentally maintained.
2. How the male and female germ lines are established and how a variety of tissues coordinate to form gametes?
3. How seed development is accomplished and what are the mechanisms by which rejection reaction occurs during the progamic phase?
4. Understand fertilization necessary for a seed to be formed? How does a fertilized egg and central cells lead to embryo and endosperm formation?

Semester III, Paper Title- BO3.2 Hard Core-2: Plant Physiology and Biochemistry

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Students will be taught about proteins, their biosynthesis, folding into specific structures, post translational modifications and degradation mechanisms.
2. The course will deal with various phytohormones and their role in physiology of growth and development. This course will introduce students to physiological advances in sensory photobiology.
3. Students will gain the knowledge on reproductive strategies in higher plants along with physiology of flowering, molecular and hormonal basis of flowering mechanism.
4. Able to understand carbohydrate and amino acid metabolism.
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Semester III, Paper Title- BO3.3: Soft core -1: Plant Diversity and Human Welfare

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. What is the significance of plant diversity?
2. What are the adaptations in plants in relation to habitat conditions?
3. Plant diversity at different levels.
4. Geographic indications.

Semester III, Paper Title- BO3.4: Soft core -2: Plant Biotechnology

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Concepts, tools and techniques related to *in vitro* propagation of plants.
2. Various case studies related to basic and applied research in plant sciences using biotechnology.
3. Principles and methods used for phenotypic, genetic and molecular analysis of transgenic plants
4. Uses and current research paradigms in various plants of economic value.

Semester III, Paper Title- BO3.9: IDE: Plants for Human Welfare

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. The useful plants to human society
2. Identification feature of such resources
3. The students would be able to judge the value of biodiversity and its role in stabilizing the climate and economy. They would know the causes and consequences of loss of biodiversity and planning of conservation strategies.

Semester IV, Paper Title- BO4.1: HardCore-1: Ethnobotany, Medicinal Plants and Plant Resource conservation

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Ethnobotanical knowledge.
2. Importance of medicinal plants, their diversity, in treating various diseases.
3. Recent knowledge and status of medicinal plants.
4. Natural resources and their conservation.
5. Uses and current research prospects in various plants of economic value.

Semester IV, Paper Title- BO4.2: HardCore-2: Molecular Biology and Genetic Engineering of Plants

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Concepts, tools and techniques related to molecular techniques.
2. Different methods used for genetic transformation of plants, use of *Agrobacterium* as a vector for plant transformation, components of a binary vector system.
3. Various case studies related to basic and applied research in plant sciences using transgenic technology.
4. Principles and methods used for phenotypic, genetic and molecular analysis of transgenic plants.

5. Uses and current research paradigms in various plants of economic value.

Semester IV, Paper Title- BO4.5: Project Dissertation

Student Learning Course Outcomes

After successful completion of this course, the students will be learning: -

1. Formulate a scientific question.
2. Develop the ability to apply the tools and techniques of Botany in conducting independent research.
3. List the objectives and state the hypothesis of the research project.
4. Employ the finalized methodology to solve the problem which has been undertaken.
5. Analyze the data which has been generated by carrying out several experiments.
6. Create document and report on experimental protocols, results, and conclusions.
7. Explain their research findings to the audience effectively