Program Learning Outcomes (POs) in B.Sc with Botany as Major (NEP 2020)

The student who completes their studies with a Bachelor of Science degree with Botany as Major should be able to-

- Generate a strong knowledgebase in the subject of Botany, as well as related subject areas, ensuring their fundamental competency in these fields. The students will demonstrate the capability to categorise primary plant groups and analyse the distinguishing features of lower (e.g. algae and fungus) and higher (angiosperms and gymnosperms) plants, and elucidate diverse plant processes and functions, metabolic activities, concepts of genes and genome, as well as how the functioning of organisms is impacted at the cellular, tissue, and organ levels.
- Learn various hands-on techniques enabling them practically equipped for biotechnological industries.
- Showcase their proficiency in the experimental techniques and methodologies specific to their specialised field of Plant biology.
- Demonstrating their analytical proficiency i.e. their expertise in comprehending research and resolving practical issues.
- Utilize scientific methodologies to solve varied questions which involves establishing hypotheses, collecting data, and critically analysing the facts to determine the extent to which their scientific work corroborates their hypotheses.
- Develop enhanced critical thinking skills and acquire problem-solving aptitudes. Students will be gaining a deeper comprehension of fundamental concepts and their practical applications in scientific principles.
- Be advanced with digital skills and integrate core principles with modern technologies.
- Improve their ethical and moral views and develop the ability to address psychological vulnerabilities.
- Acquire collaboration and cooperation skills to work as a team thereby effectively contributing to institutions, industry, and society.

POs in B.Sc with Botany as Major (NEP 2020)

PO 1. **Generate a strong knowledgebase in the subject**

PO 2. **Learn hands-on techniques for industrial applications**

PO 3. **Showcase the proficiency in the experimental techniques**

PO 4. **Demonstrating the analytical proficiency**

PO 5. **Utilize scientific methodologies to solve varied questions**

PO 6. **Develop enhanced critical thinking skills**

PO 7. **Be advanced with digital skills**

PO 8. **Improve their ethical and moral views**

PO 9. **Acquire collaboration and cooperation skills to work as a team**

Course Learning Outcomes (COs)

Plant diversity (BOT-H-CC1-1-Th, BOT-H-CC1-1-P)

CO 1. Acquire an understanding of various algal and fungal groups including their diagnostic characters, examples and economic value.

CO 2. Accomplish an idea of lichens, as well as a curiosity for the adaptive characteristics of these organisms.

CO 3. Demonstrate a grasp of bryophytes, their life history and economic importance.

CO 4. Gain knowledge of the morphology and reproduction procedures of pteridophytes, and gymnosperms

CO 5. Develop a foundation on the origin of plant cells and importance of plants as food, fuel etc.

CO 6. Acquire a grasp of angiosperm morphology, especially of flower and fruits.

CO 7. Grasp practical knowledges to the collection, systematic study and identification of plants.

COs-POs Mapping

Plant diversity (BOT-H-CC1-1-Th, BOT-H-CC1-1-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√		√	√		√		√	√
CO2	√			√	√	√		√	√
CO3	√			√		√		√	√
CO4	√			√	√	√	√	√	√
CO5	√			√		√		√	√
CO6	√	√	√	√	√	√	√	√	√
CO7	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Plant systematics (BOT-H-CC2-2-Th, BOT-H-CC2-2-P)

CO 1. The theory of plant systematics and recognize the significance of herbarium and virtual herbarium

CO 2. Evaluate the importance of herbaria and botanical gardens

CO 3. Interpret the rules of ICN in botanical nomenclature

CO 4. Learn the concepts associated with Numerical taxonomy and Phylogenetic classification.

CO 5. Generalize the characteristics of the families under the classification scheme developed by Bentham and Hooker.

CO 6. Grasp practical knowledges to the collection, systematic study and identification of plants.

COs-POs Mapping

Plant systematics (BOT-H-CC2-2-Th, BOT-H-CC2-2-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√		√		√	√
CO2	√			√	√	√	√	√	√
CO3	√			√	√	√		√	√
CO4	√	√	√	√	√	√	√	√	√
CO5	√			√	√	√	√	√	√
CO6	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Economic Botany (BOT-H-CC3-3-Th, BOT-H-CC3-3-P)

CO 1. Develop a fundamental understanding of economic botany and be able to link to the environment, populations, communities, and biological ecosystems.

CO 2. Gain an in-depth comprehension of the development of the concept of organization of apex new crops and varieties, the significance of germplasm diversity, and the problems associated with access and ownership.

CO 3. Have a fundamental understanding of the taxonomic diversity and notable families of plants that are of practical utility.

CO 4. Raise people's awareness of and appreciation for the plants and plant products that they come into contact with in their daily lives.

CO 5. Recognize the wide variety of plant species and the varieties of plant products that are used by humans.

COs-POs Mapping

Economic Botany (BOT-H-CC3-3-Th, BOT-H-CC3-3-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√		√		√	√
CO2	√	√	√	√	√	√	√	√	√
CO3	√		√	√	√	√		√	√
CO4	√		√	√	√	√	√	√	√
CO5	√	√	√	√	√	√		√	√

Course Learning Outcomes (COs)

Plant Anatomy and Embryology (BOT-H-CC4-3-Th, BOT-H-CC4-3-P)

CO 1. Develop an awareness of the ideas and fundamentals of plant internal structure.

CO 2. Study the internal anatomy underlying plant systems and organs.

CO 3. Acquire a critical grasp of the development of the ideas behind the organization of the root apex and the shoot.

CO 4. Conduct an investigation of the composition of various plant sections and the interactions between them.

CO 5. Conduct an analysis of the capacities of plants to adapt and protect themselves.

CO 6. Understand the fundamental processes of the fertilization in angiosperm

CO 7. Analyze and recognize the different organs of plant involved in reproduction.

CO 8. Evaluate the structural organization of flower and the process of pollination.

CO 9. Understand the concept and evidences of Apomixis & Polyembryony.

COs-POs Mapping

Plant Anatomy and Embryology (BOT-H-CC4-3-Th, BOT-H-CC4-3-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√	√	√		√	√
CO2	√			√	√	√		√	√
CO3	√			√		√		√	√
CO4	√		√	√		√	√	√	√
CO5	√	√	√	√	√	√	√	√	√

CO6	√	√	√	√	√	√	√	√	√
CO7	√			√		√		√	√
CO8	√		√	√		√	√	√	√
CO9	√			√	√	√		√	√

Course Learning Outcomes (COs)

Phycology (BOT-H-CC5-4-Th, BOT-H-CC5-4-P)

CO 1. Learn different groups of algae with their diagnostic and reproductive features.

CO 2. Know life cycle patterns of various representative algal members.

CO 3. Assess the ways in which algae and algal products can be used as source of food and fuel.

CO 4. Understand the cultivation methods of algae including photo-bioreactors and open ponds

CO 5. Learn the strategies of biofuel production and carbon capture and sequestration using algae

CO 6. Collect and identify algae from natural habitats.

COs-POs Mapping

Phycology (BOT-H-CC5-4-Th, BOT-H-CC5-4-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√		√		√	√
CO2	√			√	√	√	√	√	√
CO3	√		√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√
CO6	√		√	√	√	√		√	√

Course Learning Outcomes (COs)

Archegoniates (BOT-H-CC6-4-Th BOT-H-CC6-4-P)

CO 1. Demonstrate a grasp of archegoniatae, bryophytes, pteridophytes, and gymnosperms.

CO 2. Acquire an in-depth knowledge of the morphology, anatomy, and reproduction procedures of bryophytes, pteridophytes, and gymnosperms

CO 3. Understand the evolution of different groups of plants and how they adapted to their new habitat.

CO 4. Proficiently demonstrate the appropriate experimental techniques and methods for study of the Bryophytes, Pteridophytes, and Gymnosperms.

COs-POs Mapping

Archegoniates (BOT-H-CC6-4-Th BOT-H-CC6-4-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√		√	√	√	√
CO2	√	√	√	√	√	√		√	√
CO3	√			√	√	√		√	√
CO4	√		√	√		√		√	√

Course Learning Outcomes (COs)

Palaeobotany (BOT-H-CC7-4-Th BOT-H-CC7-4-P)

CO 1. Demonstrate the fundamentals of plant fossils and conditions of fossilisation.

CO 2. Understanding of fossil pteridophytes and their role in plant evolution studies.

CO 3. Acquire a grasp of megafossil assemblages in Indian Gondwana system.

CO 4. Develop critical understanding on pollen structure and morphology

CO 5. Demonstrate proficiency in the experimental techniques and methods of applied palynology viz. forensic palynology, aeropalynology, melissopalynology etc.

COs-POs Mapping

Palaeobotany (BOT-H-CC7-4-Th BOT-H-CC7-4-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√		√		√	√
CO2	√			√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Pharmacognosy and Ethnobotany (BOT-H-CC8-4-Th BOT-H-CC8-4-P)

CO 1. Be familiar with the fundamental pharmacognosy and its importance in modern medicine, crude drugs and Classification of drugs.

CO 2. Have in depth knowledge on pharmacologically active constituents and biosynthesis of various secondary metabolites.

CO 3. Learn the procedure of chemical, microscopic and histochemical tests for identification of medicinal herbs.

CO 4. Propose new strategies to implement the knowledges of ethnomedicine, taking into consideration the practical concerns that are relevant to India.

COs-POs Mapping

Pharmacognosy and Ethnobotany (BOT-H-CC8-4-Th BOT-H-CC8-4-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√	√	√	√		√	√	√	√
CO2	√		√	√	√	√		√	√
CO3	√		√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Mushroom Cultivation Technology (BOT-H-SEC-1-Th, BOT-H-SEC-1-P)

CO 1. Recognize multiple types and categories of mushrooms, their health beneficial values and idea of poisonous mushrooms.

CO 2. Showcasing several kinds of mushroom cultivation technologies including the knowledge and industrial designs and required appliances for cultivation of mushroom.

CO 3. Explore the procedures of multiple stages of mushroom cultivation and their variability in different types of mushrooms.

CO 4. Learn the management strategies to overcome the mushroom diseases and the postharvest processing technologies for increasing the shelf life.

CO 5. Assess the financial aspects related to the production of mushrooms and create innovative techniques and plans to boost the yield of mushrooms.

COs-POs Mapping

Mushroom Cultivation Technology (BOT-H-SEC-1-Th, BOT-H-SEC-1-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√		√	√	√	√		√	√
CO2	√		√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√
CO4	√		√	√		√	√	√	√
CO5	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Biofertilizer & Biopesticides (BOT-H-SEC-2-Th, BOT-H-SEC-2-P)

CO 1. Know the role of microbes as biofertilizer and biopesticides and in mineral processing.

CO 2. Increase their comprehension of the idea of plant growth promoting rhizobacteria.

CO 3. Demonstrate the role of nitrogen fixing microbes as efficient biofertilizers.

CO 4. Recognize the many types of biofertilizers and biopesticides and their applications.

CO 5. Know the use of vesicular arbuscular mycorrhizal (VAM) and nitrogenous and phosphate biofertilizers to provide integrated management for improved crop production.

CO 6. Interpret and clarify the elements, patterns, and mechanisms of bacterial growth in crop production.

COs-POs Mapping

Biofertilizer & Biopesticides (BOT-H-SEC-2-Th, BOT-H-SEC-2-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√	√	√		√	√
CO2	√	√	√	√	√	√	√	√	√
CO3	√		√	√		√	√	√	√
CO4	√		√	√	√	√	√	√	√
CO5	√		√	√	√	√		√	√
CO6	√	√	√	√	√	√	√	√	√

Course Learning Outcomes (COs)

Plant Tissue Culture and Horticultural Practices (BOT-H-SEC-3-Th BOT-H-SEC-3-P)

CO 1. Develop aptitude on different types of plant tissue culture techniques.

CO 2. Understand the totipotency, organogenesis and embryogenesis concepts.

CO 3. Study the tissue culture techniques for production of useful metabolites.

CO 4. Examine the laboratory requirements and aseptic methods to implement tissue culture practices.

CO 5. Acquire an understanding of the concept of different types of horticultural techniques for the purpose of adding value.

CO 6. Know about various ornamental, fruit and vegetable crops and the post-harvest challenges encountered by them.

CO 7. Be familiar with the tricks of the trade and how to increase the longevity of the food.

CO 8. Learn different methods for the conservation of genetic resources related to horticultural plants including the role of micropropagation and intellectual property rights etc.

COs-POs Mapping

Plant Tissue Culture and Horticultural Practices (BOT-H-SEC-3-Th BOT-H-SEC-3-P)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	√			√	√	√		√	√
CO2	√		√	√	√	√		√	√
CO3	√		√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√

CO6	√	√	√	√	√	√	√	√	√
CO7	√	√	√	√	√	√	√	√	√
CO8	√	√	√	√		√		√	√