

# Program Outcome

## B.Sc. (Honours) in Botany

### Choice Based Credit System (CBCS)

Upon successful completion of a Bachelor of Science with Honours in Botany program, graduates will acquire the following skills:

#### **Knowledge and Understanding:**

Plant Biology: Possess a comprehensive understanding of plant morphology, anatomy, physiology, metabolism, development, reproduction, and evolution.

Diversity and Classification: Identify and classify plants from different taxonomic groups.

Ecology and Plant Communities: Understand the interaction between plants and their environment, analyze plant communities, and assess the impact of environmental change on plant life.

Biotechnology and Applied Botany: Apply their knowledge of plant science to areas such as agriculture, horticulture, forestry, environmental conservation, and medicine.

Scientific Methods: Design and conduct scientific experiments, collect and analyze data, and interpret results effectively.

#### **Cognitive Skills:**

Critical Thinking and Problem-Solving: Analyze complex biological problems, propose solutions, and evaluate their feasibility.

Scientific Reasoning and Decision-Making: Apply scientific principles to draw conclusions and make informed decisions based on evidence.

Research Skills: Formulate research questions, access and evaluate scientific literature, conduct independent research, and communicate findings effectively.

## **Practical Skills:**

Laboratory Techniques: Perform a variety of laboratory techniques in plant biology, including plant identification, microscopy, biochemical assays, plant extraction, molecular biology, and tissue culture.

Fieldwork and Data Collection: Conduct field studies, collect plant specimens, and record data accurately.

Data Analysis and Interpretation: Use statistical software and other tools to analyze and interpret biological data.

Communication Skills: Write scientific reports, prepare presentations, and effectively communicate complex scientific concepts to diverse audiences.

## **Personal and Interpersonal Skills:**

Time Management and Self-Discipline: Effectively manage their time, set goals, and independently pursue their academic and professional development.

Teamwork and Collaboration: Work effectively as part of a team in research and learning environments.

Ethical Awareness and Professional Conduct: Understand and adhere to ethical principles in scientific research and professional practice.

Lifelong Learning: Maintain a commitment to lifelong learning and adapt to the rapidly changing field of Botany.

Additionally, graduates of a BSc. Honours in Botany program may be able to:

- Pursue postgraduate studies in plant science, including M.Sc or M.Tech degrees, PhD programs, or professional masters programs.
- Seek employment as scientist, academicians, and educators in different institutions such as Research Institutes, Universities, Colleges, Schools, Government Organizations, Forensic Laboratories, MNCs, and NGOs.
- Seek future career as an officer at Indian Forest Service, State Forest Service, Food Corporation of India, Directorate of Plant Protection, Quarantine, & Storage, Botanical Survey of India, Ministry of Petroleum and Natural Gas,

Kolkata Municipal Corporation, Biodiversity Board, Tea Board, Pollution Control Board and so on.

- Develop entrepreneurial skills and create their own businesses in areas related to plant science.
- Become informed advocates for environmental conservation and sustainable practices.

## **B.Sc. (General) in Botany**

A Botany Generic Elective/Minor course can be a valuable addition to any student's academic program. It can provide students with a strong foundation in plant biology, develop important skills, and foster a love for the natural world.

**Increased knowledge and understanding of the plant world:** Students will gain a strong foundation in plant biology, including plant anatomy, physiology, ecology, and evolution. They will be able to identify and classify different types of plants, understand how plants function, and appreciate the role of plants in the environment.

**Development of critical thinking and problem-solving skills:** Students will learn to analyze scientific data, draw conclusions, and solve problems related to plants. They will be able to evaluate different viewpoints and make informed decisions about plant-related issues.

**Improved communication skills:** Students will learn to communicate effectively about plants, both orally and in writing. They will be able to present their findings in a clear and concise manner to both scientific and non-scientific audiences.

**Enhanced appreciation for the natural world:** Students will develop a greater appreciation for the beauty and complexity of the plant world. They will understand the importance of plants in the environment and be able to make informed decisions about their own impact on the planet.

**Preparation for further study or careers in Botany:** Students who take a Botany generic elective course will be well-prepared to pursue further study in botany or a related field. They will also be prepared for careers in plant research, education, conservation, or agriculture.

# Course Outcome of Botany Honours under Choice Based Credit System (CBCS)

## **BOTACOR01T & BOTACOR01P: Phycology & Microbiology**

Upon successful completion of this paper, students will gain a comprehensive understanding of the diverse world of algae and microorganisms, their interactions with plants, and their significance in the environment and human health.

Students will be able to identify and classify common algae and microorganisms using microscopic and biochemical techniques.

Students will develop skills in aseptic techniques and culture methods for studying microorganisms.

## **BOTACOR02T & BOTACOR02P: Biomolecules and Cell Biology**

Upon completing the Biomolecules and Cell Biology course, students will grasp the intricacies of biomolecular structures and functions. They'll demonstrate proficiency in cell biology principles, applying them to plant systems.

Students will develop critical thinking skills for data analysis, excel in laboratory techniques, and communicate scientific concepts effectively. The course prepares them to comprehend the molecular basis of botanical phenomena, fostering a foundation for advanced studies or careers in botanical research.

## **BOTACOR03T & BOTACOR03P: Mycology and Plant pathology**

Upon completion of this paper, students will gain in-depth knowledge about the vast world of fungi that constitutes a distinct kingdom of their own.

Students will also learn about different types of plant diseases, disease cycles and factors affecting disease development, mechanisms of disease resistance as well as the principles of plant disease management.

## **BOTACOR04T & BOTACOR04P: Archegoniate**

Students will gain a comprehensive understanding of the Archegoniates (Bryophytes and Pteridophytes), their morphological, anatomical, and physiological features.

They will be able to analyze the evolutionary relationships between different archegoniate groups and their significance in plant evolution as well as appreciate the ecological roles and economic importance of archegoniates in diverse ecosystems.

## **BOTACOR05T & BOTACOR05P: Morphology and Anatomy**

Upon successful completion of this course, students will possess a comprehensive understanding of plant morphology and anatomy, encompassing both vegetative and reproductive structures across various plant groups.

### **BOTACOR06T & BOTACOR06P: Economic Botany**

Students will gain in-depth knowledge about economically important plants, their uses, and cultivation practices including food crops, fibre-yielding plants, medicinal plants, timber-yielding plants, industrial crops as well as ornamental plants.

They will understand the relationship between plants, human needs, and sustainable development.

### **BOTACOR07T & BOTACOR07P: Genetics**

In the Genetics course of B.Sc. Botany Honours, students acquire a comprehensive understanding of plant genetics, encompassing Mendelian inheritance, molecular genetics, and genetic diversity. They develop proficiency in genetic analysis, applying techniques to address botanical challenges. Students explore the genetic basis of plant traits, contributing to advancements in agriculture and conservation. This course cultivates critical thinking and communication skills, preparing students for careers in genetic research and applied fields within the botanical sciences.

### **BOTACOR08T & BOTACOR08P: Molecular Biology**

Upon successful completion of this course, students will be able to explain the fundamental principles of molecular biology, including the structure and function of DNA, RNA, and proteins.

They will have a thorough understanding of the central dogma of life and the process of DNA replication, transcription, and translation.

### **BOTACOR09T & BOTACOR09P: Plant Ecology & Phytogeography**

Upon successful completion of this course, students will grasp plant interactions with environment & communities, analyze factors shaping plant distribution globally & regionally, and master biogeographical patterns & vegetation types worldwide.

They will be able to evaluate human impacts & conservation strategies for ecosystems, and develop field research & data analysis skills in plant ecology.

### **BOTACOR10T & BOTACOR10P: Plant systematics**

Completing the Plant Systematics course in B.Sc. Botany Honours equips students with an adept understanding of plant taxonomy. They will master classification

principles, herbarium techniques, and molecular tools for evolutionary analyses. Students refine field botany skills, contribute to biodiversity studies, and critically evaluate taxonomic literature. This prepares them to apply taxonomic knowledge to real-world challenges, ensuring a solid foundation for careers in botanical research, conservation, and ecological management.

### **BOTACOR11T & BOTACOR11P: Reproductive Biology of Angiosperms**

In the Reproductive Biology in Angiosperms course of B.Sc. Botany Honours, students attain a profound understanding of plant reproductive structures, pollination mechanisms, fertilization processes, and seed development. Acquiring practical embryology techniques, they explore genetic control of reproduction, evolutionary aspects, and apply knowledge to agriculture and conservation. This prepares them for careers in plant breeding, research, and environmental sustainability, fostering skills in communication and documentation of reproductive biological concepts.

### **BOTACOR12T & BOTACOR12P: Plant Physiology**

Students will gain a comprehensive understanding of the fundamental physiological processes in plants, including photosynthesis, respiration, water relations, mineral nutrition, transport, growth and development, reproduction, and stress responses.

They will learn to appreciate the interrelationships between plant physiology and other botanical disciplines such as plant anatomy, morphology, ecology, and evolution.

They will recognize the significance of plant physiology in agriculture, horticulture, forestry, and environmental science and understand the applications of plant physiology in crop improvement, plant breeding, and sustainable agriculture practices

### **BOTACOR13T & BOTACOR13P: Plant Metabolism**

In the Plant Metabolism course of B.Sc. Botany Honours, students will delve into the intricacies of plant biochemical processes. They comprehend metabolic pathways, energy transformations, and the synthesis of vital compounds. Developing skills in experimental techniques, students apply knowledge to study plant adaptation to environmental cues. This course cultivates critical thinking, laboratory proficiency, and an understanding of how plant metabolism contributes to ecological and physiological functions, preparing students for roles in botanical research and biotechnology.

### **BOTACOR14T & BOTACOR14P: Plant Biotechnology**

In the Plant Biotechnology course of B.Sc. Botany Honours, students gain expertise in applying biotechnological tools to manipulate plant traits. They learn genetic engineering techniques, explore molecular markers, and understand genomic applications in plant science. This equips them to address contemporary challenges in agriculture, environmental sustainability, and biodiversity. The course fosters critical analysis, laboratory skills, and ethical considerations, preparing students for careers in cutting-edge plant biotechnology research and its applications in botanical sciences.

### **BOTADSE02T & BOTADSE02P: Horticultural Practices and Post-Harvest Technology**

In the Horticultural Practices and Post-Harvest Technology course of B.Sc. Botany Honours, students acquire expertise in horticultural techniques, emphasizing plant cultivation, breeding, and pest management. They learn post-harvest technologies to preserve and enhance the quality of harvested produce. This course integrates practical skills, critical analysis of horticultural practices, and knowledge of post-harvest processes, preparing students for roles in sustainable agriculture, horticultural management, and agribusiness.

### **BOTADSE03T & BOTADSE03P: Industrial and Environmental Microbiology**

In the Industrial and Environmental Microbiology course of B.Sc. Botany Honours, students explore the role of microorganisms in ecosystems and industrial processes. They gain insights into microbial diversity, bioremediation, and applications in industries like biotechnology. Acquiring laboratory skills, students analyze microbial interactions and their impact on environmental health. This course fosters critical thinking, proficiency in microbiological techniques, and prepares students for careers in environmental management, industrial research, and bioprocessing.

### **BOTADSE04T & BOTADSE04P: Analytical technique in Plant Sciences**

Upon successful completion of this course, students will be equipped to analyze and interpret plant data using diverse analytical techniques, including spectroscopy, chromatography, microscopy, and bioassays.

They will be able to critically evaluate research findings in plant sciences through robust data analysis and statistical interpretation.

They will learn to design and execute their own plant science investigations by applying appropriate analytical methods and drawing sound conclusions.

### **BOTADSE06T & BOTADSE06P: Biostatistics**

In the Biostatistics course of B.Sc. Botany Honours, students develop statistical skills for data analysis in botanical research. They learn to apply statistical methods to

experimental design, data interpretation, and hypothesis testing. Acquiring proficiency in statistical software, students can critically evaluate and communicate scientific findings. This course enhances their quantitative reasoning, preparing students for research in botany, ecological studies, and providing a foundation for evidence-based decision-making in various botanical disciplines.

### **BOTHGEC01T and BOTHGEC01P: Biodiversity (Microbes, Algae, Fungi, and Archegoniates)**

Upon successful completion of this paper, students will gain a comprehensive understanding of the diverse world of algae and microorganisms, their interactions with plants, and their significance in the environment and human health.

Students will gain in-depth knowledge about the vast world of fungi that constitutes a distinct kingdom of their own. Students will also learn about different types of plant diseases, disease cycles and factors affecting disease development, mechanisms of disease resistance as well as the principles of plant disease management.

Students will gain a comprehensive understanding of the Archegoniates (Bryophytes and Pteridophytes), their morphological, anatomical, and physiological features.

They will be able to analyze the evolutionary relationships between different archegoniate groups and their significance in plant evolution as well as appreciate the ecological roles and economic importance of archegoniates in diverse ecosystems.

### **BOTHGEC02T and BOTHGEC02P: Plant Ecology and Taxonomy**

Upon successful completion of this course, students will grasp plant interactions with environment & communities, analyze factors shaping plant distribution globally & regionally, and master biogeographical patterns & vegetation types worldwide.

They will master classification principles, herbarium techniques, and molecular tools for evolutionary analyses. Students refine field botany skills, contribute to biodiversity studies, and critically evaluate taxonomic literature.

### **BOTHGEC03T and BOTHGEC03P: Plant Anatomy and Embryology**

Upon successful completion of this course, students will possess a comprehensive understanding of plant morphology and anatomy, encompassing both vegetative and reproductive structures across various plant groups.

### **BOTHGEC04T and BOTHGEC04P: Plant Physiology and Metabolism**

Students will gain a comprehensive understanding of the fundamental physiological processes in plants, including photosynthesis, respiration, water relations, mineral nutrition, transport, growth and development, reproduction, and stress responses.



Students will delve into the intricacies of plant biochemical processes. They comprehend metabolic pathways, energy transformations, and the synthesis of vital compounds. Developing skills in experimental techniques, students apply knowledge to study plant adaptation to environmental cues.

### **BOTSSEC01M: Plant Diversity and Human Welfare**

This special course is a treasure trove of botanical wisdom, understanding traditional plant uses for food, medicine, rituals, and technology across diverse societies.

It provides critical insights into the reciprocal relationship between humans and plants, shaping landscapes, livelihoods, and cultural identities.

The ability to identify and analyze plants of cultural significance, fostering respect for indigenous knowledge systems.

A commitment to promoting ethical and sustainable practices that safeguard both plant biodiversity and cultural heritage.

### **BOTSSEC01M: Ethnobotany**

This course aims to:

- Identify and classify key plant groups, appreciating their evolutionary relationships and ecological roles.
- Analyze the intricate links between plant diversity and human welfare, including food production, medicine, materials, and ecosystem services.
- Critically evaluate the challenges and opportunities facing plant resources in a changing world, including threats and conservation strategies.
- Advocate for the sustainable use and protection of plant diversity, fostering responsible stewardship for future generations.