

Ananda Mohan College

Department of Botany

Name of the Program: **B.Sc. Botany (Honours)** under **CBCS** curriculum, University of Calcutta

Year of Introduction: 2018

Program Specific Outcomes (PSOs)

The outcomes for an undergraduate B.Sc. (Hons. in Botany) program under the CBCS curriculum of University of Calcutta, can be outlined as below:

1. **Knowledge of Plant Diversity:** Students will acquire a comprehensive understanding of the diversity of plant life (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms), including their natural habitat, identification, classification, economic importance, and ecological significance via theoretical, practical, and field studies.
2. **Understanding of Plant Structure and Function:** Students will learn about plant anatomy, morphology, palynology, cell biology, molecular biology, and an in-depth knowledge on the different life processes in plants.
3. **Plant Physiology and Metabolism:** The students will study the physiological processes and metabolic pathways of plants, such as photosynthesis, respiration, nutrient uptake, flowering, and a deeper understanding of how plants function and adapt to different environmental conditions and get influenced by different plant growth regulators.
4. **Proficiency in Fieldwork and Laboratory Techniques:** Students will develop practical skills in fieldwork, including plant collection, preservation, and documentation. They will also gain experience in various laboratory techniques including microscopy, and various cytogenetical, molecular biological and analytical methods.
5. **Understanding of Plant Ecology and Ecosystems:** Students will explore the principles of plant ecology, studying the interactions between plants and their environment, and the impact of human activities on ecosystems.
6. **Knowledge of Plant Genetics and Biotechnology:** Students will learn about genetic inheritance, the principles of plant breeding and different biotechnological techniques used in plant improvement and genetic modification.
7. **Awareness of Plant Conservation and Sustainable Resource Management:** Students will be introduced to the concepts of plant conservation, sustainable resource management, and the importance of biodiversity conservation for ecosystem stability.
8. **Research Skills and Scientific Methodology:** Students will develop skills in scientific research, including designing experiments, collecting, and analysing data, and interpreting research findings. They will also gain proficiency in scientific writing and communication.
9. **Critical Thinking and Problem-Solving Skills:** Students will develop analytical and critical thinking skills, enabling them to identify and address scientific problems related to plants and propose innovative solutions.
10. **Ethical and Professional approaches:** Students will be familiarized with ethical considerations in botanical research, including responsible conduct of research, respect for intellectual property, and ethical considerations in plant use and conservation. They will be well-versed for competitive examinations and various jobs.

Course Outcomes (COs)

Semester I:

Two core courses- **Phycology and Microbiology (CC1)**, and **Mycology and Phytopathology (CC2)** are included in this semester.

1. Students acquire knowledge on classification, identification, ultrastructure, life cycle and economic importance of different genera of algae and fungi, via theoretical classes, workout of algal and fungal specimen in practical classes and identify the common algal and fungal genera via local field trips.
2. In microbiology, they study different aspects of bacteria and viruses, microscopy, and staining techniques, get hands on training on various culture techniques, bacterial staining method and various microbiological methods.
3. In Phytopathology, the students learn about important plant diseases, host pathogen interaction and plant disease management, which is essential in the field of crop protection and disease management.

Semester II:

There are two core courses in Semester II.

1. In the **Plant anatomy (CC 3)** paper, they gain a detailed knowledge on anatomy of different plant parts, and learn to differentiate dicots and monocots based on their internal structural organization. They develop hands on experience of double staining technique and the anatomical details of plant tissue and organs.
2. In **Archaeogoniate (CC 4)** paper, they get in-depth knowledge on Bryophyte, Pteridophyte and Gymnosperm, and work out the specimens during practical classes.
3. In this semester students go for a long excursion in a place of higher altitude to observe and identify different plant groups in their natural habitat.

Semester III:

There are three core courses:

1. In **Palaeobotany and Palynology (CC5)** paper, the students learn about plant fossils, pollen structure and applied palynology viz. forensic palynology, aeropalynology etc.
2. In **Reproductive Biology of Angiosperms (CC6)** paper, the students learn about morphology and embryology of angiosperms.
3. In **Plant systematics (CC7)** paper, they learn the taxonomy of Angiosperms which deals with plant nomenclature, system of classification and taxonomic families. They also critically observe various angiosperm specimens and learn to identify the plant taxa based on their identifying characteristics.
4. Several local field excursions are carried out so that the students can identify different angiospermic plants in their natural habitat and learn to prepare field note book, voucher specimen book and herbarium specimens.

Semester IV:

There are three core courses:

1. In **Plant Geography, Ecology and Evolution (CC8)** paper, the students learn about different phytogeographical regions of India along with representative plant specimens,

preliminary ideas of plant ecology, important measures of biodiversity conservation, theories of plant evolution and simplified phylogeny of different plant groups.

2. At least one long excursion at different phytogeographic region of India is being carried out in this semester. This field trip helps the students to understand the phytogeographic features and the characteristic flora of that phytogeographic region.
3. In **Economic Botany (CC9)** paper, students study about economically rich groups of plant crops viz. cereals, legumes, sugar and starches, spices, beverage, oil and fat, drug yielding plants etc. A visit to a cultivated crop field is also conducted.
4. In **Genetics (CC10)** paper, students get a clear concept on various topics of Genetics: Mendelian genetics and its extension; linkage, crossing over and gene mapping; numerical and structural aberrations of chromosomes; mutation; structural organization of gene etc. In practical classes, the students study mitotic and meiotic chromosomes, and, chromosomal aberrations developed due to exposure to pollutants or pesticides.

Semester V:

In this semester, two core courses are offered:

1. In **Cell and Molecular Biology (CC11)** paper, the students learn about the origin and evolution of cells, nucleus, chromosomes, cell cycle and its regulation, and various molecular biological processes viz. DNA replication, transcription, translation, gene regulation and recombinant DNA technology. They also learn several experiments on Plant Molecular Biology.
2. In **Plant Biochemistry (CC12)** paper, the students acquire knowledge about the molecules of life, energy flow and enzymology, membrane transport, and phosphorylation mechanism of plant cell. They also get hands on experience of various quantitative and qualitative procedures of plant biochemistry.

Semester VI:

There are two core courses in this semester:

1. In **Plant Physiology (CC13)** paper, students learn various physiological processes viz. mineral nutrition, organic translocation, photomorphogenesis, seed dormancy and seed germination, effects of different plant growth regulators, etc.
2. In **Plant Metabolism (CC14)** paper, they study primary and secondary metabolic pathways, viz. photosynthesis, respiration, nitrogen, and lipid metabolism.
3. They also learn to conduct different experiments on plant physiology and metabolism.

Skill enhancement course and Discipline specific elective course:

- In Semester III and IV, students must take one skill enhancement course such as Biofertilizer and Mushroom Culture technique etc.
- In Semester V and VI, students must opt for two Discipline specific elective courses, Biostatistics, Industrial and Environmental Biology, environmental Biology, Medicinal and Ethnobotany, Plant Biotechnology, Research Methodology etc.
- These special courses will open new avenues for their higher studies in Plant Sciences and numerous job opportunities afterwards.

Ananda Mohan College

Department of Botany

Name of the Program: **B.Sc. Botany (General)** under CBCS curriculum, University of Calcutta

Year of Introduction: 2018

Programme Specific Outcomes (PSOs)

1. Students develop a comprehensive knowledge of the different fields of plant sciences. They also learn to identify and know the natural habitats of representative specimens from different plant groups, viz. Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms, via field study.
2. Students develop a practical knowledge on the different domains of plant science and get acquainted with good laboratory practices and safety measures.
3. The present course opens new avenues for the students to qualify competitive examinations, to enter higher studies, and various job opportunities.
4. They develop individual and leadership qualities to work in a team, and management skills to take biological sciences as career.

Course Outcomes (COs)

1) Semester I:

- a) One core course, Plant Diversity I (G-CC1) is included in Semester I.
- b) In this paper, students gain a detailed knowledge on phycology, mycology, phytopathology, bryology, anatomy, and their practical aspects.
- c) Students identify the common algae, fungi, and bryophytes via local field trips. Students learn about the basics of microscopy and staining techniques.

2) Semester II:

- a) One core course, Plant Diversity II (G-CC2) is included in Semester II.
- b) Students gain a detailed knowledge on the Pteridophytes, Gymnosperms, Palaeobotany, Morphology and Taxonomy.
- c) Students work out, describe, and identify plants up to angiosperm families included in the syllabus. They develop knowledge on double staining techniques and practical knowledge on plant anatomy.
- d) Students develop skills and knowledge about field study and herbarium techniques.
- e) They get a comprehensive idea on different family of angiosperms included in their syllabus via local educational trips.

3) Semester III

- a) One core course, Cell Biology, Genetics and Microbiology(G-CC3) is included.
- b) Students get to understand plant cellular structure and their functioning mechanism in Cell Biology and Genetics.
- c) In Microbiology, they learn the basics of bacteria and viruses and their application.

- d) They undertake hands on training on gram staining, cytological staining, and various chromosome techniques.

4) Semester IV

- a) One core course, Plant Physiology and Metabolism (G-CC4) is taught in this semester. Students gain a detailed knowledge on plant physiology and metabolism.
- b) Students undergo hands on training on different plant physiological experiments.

Skill enhancement courses and Discipline specific elective courses:

- In Semester III, IV, V and VI, students must take skill enhancement courses as SEC A and SEC B such as Biofertilizer, Plant Biotechnology and Mushroom Culture technology.
 - In Semester V and VI, students must opt for two Discipline specific elective courses (DSE A and DSE B), viz. Phytochemistry and medicinal botany, Economic Botany etc.
 - These special courses will open new avenues for their higher studies in Plant Sciences and numerous job opportunities afterwards.
-