

# Programme outcome and course outcome

## B.Sc. Botany

### Program Outcomes (PO)

The undergraduate (UG) course offered by the Department of Botany, Government General Degree College, Keshiary, strictly follows the CBCS syllabus as prescribed by the Vidyasagar University which is in alliance with UGC.

- The program is a combination of general and specialized education, simultaneously introducing the concepts of breadth and depth in learning.
- The Program offers essential knowledge and technical skills to study plants in a holistic approach.
- Students would be educated in all areas of plant biology using a unique amalgamation of core and elective papers with major inter-disciplinary components.
- The fundamental aim is to produce competent plant biologists who can employ and implement their gained knowledge in basic and applied aspects that will profoundly influence the prevailing paradigm of agriculture, industry, healthcare and environment to provide sustainable development.
- The present curriculum will not only advance their knowledge and understanding of the subject, but will also increase the ability of critical thinking, development of scientific attitude, handling of problems and generating solution, improve practical skills, enhance communication skill, social interaction, increase awareness in environment related issues and recognize the ethical value system.
- Additionally the training provided to the students will make them competent enough for doing jobs in Govt. and private sectors of academia, research and industry.
- Finally to prepare the students for lifelong learning by drawing attention to the vast world of knowledge of plants and introducing them to the methodology of systematic academic enquiry.

The UG curriculum caters an all-round development of the student, rolling out globally ready individuals into the fast pacing world.

PO1. Knowledge and understanding of: 1. The range of plant diversity in terms of structure, function and environmental relationships. 2. The evolution of plant diversity. 3. Plant classification and the flora of West Bengal. 4. The role of plants in the functioning of the global ecosystem.

PO2. Intellectual skills – able to: 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject.

PO3. Practical skills: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills in . 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry. 5. Analyse data using appropriate statistical methods. 6. Plant pathology to be added for sharing of field and lab data obtained.

PO4. Scientific Knowledge: Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.

PO5. Problem analysis: Identify the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PO6. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.

PO7. The Botanist and society: Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

PO8. Environment and sustainability: Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable

development. PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### Course Outcomes of B.Sc. Botany

CO1. Critically evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenetic level.

CO2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field of Plant Identification.

CO3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.

CO4. Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.

CO5. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.

CO6. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

CO7. Students will be able to apply fundamental mathematical tools (statistics, calculus) and physical principles (physics, chemistry) to the analysis of relevant biological situations.

CO8. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and from other forms of life.

CO9. Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped plant morphology, physiology, and life history.

CO10. Students will be able to explain how Plants function at the level of the gene, genome, cell, tissue, Flower development. Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and mode of life cycle followed by different forms of plants.

CO11. Students will be able to explain the ecological interconnectedness of life on earth by tracing energy and nutrient flow through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

CO12. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

#### Program Specific Outcomes (PSO)

##### PSOs of B.Sc. Botany:

1. Provide an introduction to Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi, including diverse plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms).
2. To enable students to understand and appreciate the relevance of Microbes and Plants to environment (ecological significance) and human well-being (economic importance).
3. Develop an understanding of Evolution of Plant forms and the consequent Biodiversity. These are instrumental in creating awareness on the threats to biodiversity and sensitizestudents towards the Conservation of Biodiversity for sustainable development.
4. To study the organization of cell, cell organelles and biomolecules (i.e protein, carbohydrate, lipid and nucleic acid) to gain knowledge on the activities in which the diverse macro molecules and microscopic structures inhabiting the cellular world of life are engaged. This will facilitate

the students to understand the various metabolic processes such as respiration, photosynthesis etc. which are important for life.

5. To introduce students to application of microbes in Industrial production and Environmental remediation strategies.

6. New knowledge and widening of the knowledge acquired in by handling of classical and modern plant biotechnology processes, including tissue culture for healthy plants, plants with improved characteristics.

7. To explore the natural genetic variation in plants and to understand how diverse factors (at the cellular level) contribute to the expression of genotypes and hence to phenotypic variation.

8. Understanding of biotechnological processes such as recombinant DNA technology and its applicative value in pharmaceuticals (vaccines, antibodies, antibiotics etc.), food industry (transgenic crops with improved qualities (nutraceuticals, industrial enzymes etc.), agriculture (biotic and abiotic stress tolerant plants, disease and pest resistant plants, improved horticultural varieties etc.), ecology (plants role in bioremediation). This knowledge is central to our ability to modify plant responses and properties for global food security and commercial gains in biotechnology and agriculture.

9. In the laboratory classes, students will achieve some of the techniques currently used to generate information and detect genetic variation.

10. Understanding of plant classification systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various plants groups.

11. Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and the use of transgenic technologies for basic and applied research in plants.

12. Understanding of various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology and use of bioinformatics tools and databases and in the application of statistics to biological data

13. To provide new information, enhance core competency and discovery/inquiry based learning of learners. A botany graduate would be competent in the field to undertake further disciplinespecific studies, as well as to begin domain-related employment.

14. To make students aware of most basic domain-independent knowledge, including critical thinking and communication.