PROGRAM OUTCOME
PROGRAM SPECIFIC OUTCOME
AND COURSE OUTCOME

DEPARTMENT OF BOTANY

BIDHAN CHANDRA COLLEGE

ASANSOL - 713304

PROGRAM OUTCOME

The students under the B.Sc. will be able to know the basics of the subject, understand the depth of the topics, apply the knowledge learnt in other areas and become skilled in their chosen field; as categorically pointed out as under:

1. Knowledge and understanding of: 1. The range of plant diversity in terms of structure, functional and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification and the flora of Maharashtra. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics. 6. Statistics as applied to biological data.

2. 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. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.

3. 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 and gain greater proficiency in a selection of them depending on their choice of optional modules. 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. Analyze data using appropriate statistical methods and computer packages. 6. Plant pathology to be added for sharing of field and lab data obtained.

4. Transferable skills: 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to work as part of a team. 4. Ability to use library resources. 5. Time management. 6. Career planning.

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

6. 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.

7. Design/development of solutions: Design solutions from medicinal plants for health problems, disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health

8. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.

9. 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.

10. 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.

11. 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.

12. Ethics: Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

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

14. Communication: **Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**

15. Project management and finance: **Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**

16. 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.**

PROGRAM SPECIFIC OUTCOME

After successfully completing B. Sc. (BOTANY) Programme students will be able to:

1. 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.

2. 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.

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

4. 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.

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

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

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

8. 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.

9. 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.

10. 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.

11. 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.

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

COURSE OUTCOME

Botany Program

Semester I

Core Course: I (Algae, Fungi and Bryophyta)

Theory:

On completion of the course, students are able to:

1. Understand the diversity among Algae.

2. Know the systematic, morphology and structure, of Algae. Understand the life cycle pattern of Algae.

3. Understand the useful and harmful activities of Algae.

4. Understand the Biodiversity of Fungi

5. Know the Economic Importance of Fungi

6. Understand the morphological diversity of Bryophytes.

7. Understand the economic importance of the Bryophytes

Practical:

On completion of the course, students are able to:

1. Understand the diversity morphology, biological characters and taxonomical importance some selected genera of algae, fungi and Bryophytes.

2. Gain knowledge about Identification of all the genera included in the theoretical syllabus.

3. Impart the knowledge on wet specimen collection and preservation.

Semester II

Core Course: II (Pteridophyta, Gymnosperms and Palaeobotany)

Theory:

On completion of the course, students are able to:

1. Understand the diversity among Pteridophytes and Gymnosperms.

2. Know the systematic, morphology and structure, of Pteridophytes and Gymnosperms .

3. Understand the life cycle pattern of Pteridophytes and Gymnosperms .

4. Understand the useful and harmful activities of Pteridophytes and Gymnosperms ,

5. Understand the Biodiversity of Pteridophytes and Gymnosperms,

6. Know the Economic Importance of Pteridophytes and Gymnosperms,

7. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.

8. Understand the various fossil genera representing different fossil groups.

Practical:

On completion of the course, students are able to:

1. Gain knowledge about Identification of all the genera included in the theoretical syllabus.

2. Obtain the knowledge about morphoanatomical structure of some genera.

Semester III

Core Course: III (Morphology, Embryology, Plant Taxonomy and Plant Anatomy)

Theory:

On completion of the course, students are able to:

1. Understand the Morphology of different parts of plants.

2. Know the process of reproduction of plants.

3. Gain knowledge about Identification, Classification and Nomenclature of Angiosperms.

4. Know the Importance of Herbaria and Botanical Gardens of the world and India.

5. Gain knowledge about Taxonomic hierarchy.

6. Understand the anatomy of various parts of Angiospermic plants.

Practical:

On completion of the course, students are able to:

1. Gain knowledge about vegetative and floral characters of some plants of selected families. Identification of all the genera included in the theoretical syllabus.

2. Obtain the knowledge about anatomy of some specific parts of some selected plants.

3. Gain knowledge about identification of some selected plant parts.

4. Understand the process of herbarium sheet preparation.

Skill Enhancement Course(SEC 1) – Biofertilizers

Theory:

On completion of the course, students are able to:

1. Build a concept about microbes and biofertilizers.

2. Know the details about Rhizobia, the plant growth promoting rhizobacteria (PGPR) and phosphate solubilizing bacteria(PSB).

3. Understand the importance of Cyanobacteria and Azolla as biofertizer and their influence in crop yield.

4. Know the Mycorrhizal association and Organic Farming.

Semester IV

Core Course: IV (Plant Physiology, Metabolism and Ecology)

Theory:

On completion of the course, students are able to:

1. Understand the plant-water relationship, the idea about water potential and concept about transpiration, root pressure and guttation.

2. Understand the importance of mineral nutrition, the macro and micro elements.

3. Build the concept about phloem loading unloading and understand the overall process of photosynthesis.

4. Understand the overall process of respiration

5. Know about the enzymes and its mechanisms.

6. Understand the process of N_2 metabolism.

7. Build the concept about the plant hormones.

8. Build the concept about Ecology as a whole – autoecology, synecology, energy flow, ecological pyramids, ecological succession.

9. Know about the adaptation of hydrophytes, xerophytes and halophytes. Get an idea about phytogeography and endemism.

10. Get cautious about air and water pollution by knowing its causes, effects and remidies.

Practical:

On completion of the course, students are able to

1. Determine the isotonic concentration through the learning of plasmolytic method.

2. Observe and realize the transpiration of plant in the effect of different environmental factors like light, humidity etc.

3. Get knowledge about the rate of respiration in different parts of a plant.

4. Understand the anatomical adaptations of xerophytes and hydrophytes through microscopic study

3. Impart the knowledge on wet specimen collection and preservation.

Skill Enhancement Course (SEC 2): Plant Diversity and Human Welfare

Theory:

On completion of the course, students are able to:

1. Gain a overall knowledge about Biodiversity and conservation.

Semester V

Discipline Specific Elective Courses (DSE – 1):
Cell Biology, Genetics and Molecular Biology

Theory:

On completion of the course, students are able to:

1. Build a general concept about Microscopy, SEM, TEM, the cell theory, the details about eukaryotic and prokaryotic cell, the cellular organelles, packaging of DNA, euchromatin , heterochromatin

2. Gain knowledge about cell cycle and its regulations, mitotic and meiotic cell division. And get an idea about structure and organization of cell membrane

3. Process of membrane transport and membrane models

4. Build a concept about Mendelian , Neo-mendelian, Genetics, Linkage and Crossing over.

5. To study the phenomenon of dominance, laws of segregation, independent assortment of genes.

6. To understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc.

7. Know about different types of mutations and chromosomal aberration.

8. Get detail knowledge about central dogma and a brief idea about split gene concept.

Practical:

On completion of the course, students are able to:

1. Visualize the cellular details prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.

2. Understand the different characteristics of various stages of mitosis and meiosis.

3. Get an idea about plasmolysis and deplasmolysis through different concentration and graphical representation.

4. Get an idea about cell size by micrometry.

5. Understand the karyotype and ideogram from a photograph of somatic metaphase chromosome.

Skill Enhancement Course (SEC 3) -Floriculture

Theory:

On completion of the course, students are able to:

1. Understand the process of gardening, Nursery Management and Commercial Floriculture.

Semester VI

Discipline Specific Elective Courses (DSE – 2):
Economic Botany, Pharmacognosy and Biotechnology

Theory:

On completion of the course, students are able to:

1. Know about the origin and economic importance of some cultivated plants.

2. Get an brief idea about pharmacognosy, pharmacology, pharmacopoeia, drug adulteration and evaluation.

3. Understand the importance and use of some medicinally valuable plants.

4. Build the concept about plant tissue culture, micropropagation and their applications.

5. Build the concept about Recombinant DNA Techniques.

Practical:

On completion of the course, students are able to:

1. Perform the qualitative tests of starch, protein and lipid.

2. Identify the common plant disease and their causal organism through field study.

3. Develop a knowledge about organoleptic and microscopic studies of Ginger (rhizome), Adhatoda (leaf) etc.

Skill Enhancement Course (SEC 4) - Nursery and Gardening

Theory:

On completion of the course, students are able to:

1. Build a concept about Nursery, Seed dormancy, Vegetative propagation and process of cultivation of different vegetables.