

## **PROGRAMME OUTCOMES FOR B.SC.**

After completing the B.Sc. course a student is expected to achieve the below mentioned Programme Outcomes:

- A student should understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in the day-to-day life.
- A student should acquire the skills in handling scientific instruments, planning and performing in laboratory experiments, A student should acquire The skills of observations and drawing logical inferences from the scientific experiments.
- A student should acquire the knowledge of Environment and Sustainability: Understand the issues of environmental contexts and sustainable development. A student should acquire the knowledge of Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio technological changes.
- A student should be able to analyse the given scientific data critically and systematically and the ability to draw the objective and conclusions. A student should be able to think creatively to propose novel ideas. A student should be able to think critically: He/she should be able to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- A student should learn effective communication: Student should acquire the ability to speak, read, write and listen clearly in person and through electronic media in English and in at least one official language of Assam, and make good connections with people, ideas, books, media and technology.
- A student should learn Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings. A student should realize how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable development.
- A student should be able to develop scientific outlook not only with respect to science subjects but also in all aspects related to life. A student should be imbued

ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.

- A student should acquire the knowledge of Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- A student should learn Ethics: Recognize different value systems and understand the moral dimensions of their decisions, and accept responsibility for themselves.

### **Program specific outcomes of Subject: Botany**

**1. Knowledge and Understanding:** a. Diversity of plants and microbes in terms of structure, function, reproduction and ecology. b. Evaluation and assessment of plant diversity. c. Plant systematics and classification. d. Value of biodiversity in terms of ecological balance and sustainable development. e. Application of Statistics in biological data analysis. f. Application of different techniques in biological science. g. Basics of biotechnology, biochemistry, genetics and modern biological tools and techniques.

**2. Intellectual Skills:** a. Logical interpretation of problems related to biological science. b. Searching various burning issues related to biology, environment and sustainable development through internet. c. Capacity building for individual survey works related to nature and environment.

**3. Practical Skills:** a. Study of plant and microbial diversity in natural habitat as well as in in vitro conditions. b. Plant classification and identification by study of anatomy, morphology, plant physiology, plant biochemistry, genetics, plant breeding etc. c. Ecological study of the local area. e. Preliminary skills on biotechnology, horticulture, biofertilizers, nursery techniques etc. f. Usage of Modern tools and practical application of modern techniques/ instruments in Biochemical and molecular analysis, Biotechnology, in vitro culture, microbiology etc.

**4. Scientific Knowledge and problem analysis:** a. Use of information technology for accumulation and sharing of data. b. Dissemination of scientific ideas. c. Creation of team spirit. d. Access of E- library resources. e. Regularity, punctuality, devotion and career planning. f. Application of principles of basic science in studying and analysing

problems and phenomena related to biological science. f. Application of moral and ethical principles to mitigate environmental issues and biodiversity conservation. g. Application of basic knowledge on environment and sustainable development for creating an eco friendly habitat.

**Course Specific Outcomes (CBCS)** P.D.U.A. Mahavidyalaya, Dalgaon is an affiliated college of Gauhati University. Hence the Dept. of Botany of the college follows the course curriculum of the affiliating university. Course specific outcomes of Botany Honours, and Generic, CBCS is summarized below.

### **1. Semester I:**

#### **BOT-HC-1016: Phycology and Microbiology**

- Basic knowledge on microbes, viruses and bacteria and their importance in industry, agriculture and medicine and environment.
- Basic knowledge on Algal classification, economic and ecological importance of algae.
- Practical knowledge on structure and life cycle of Bacteriophage, microscopy of bacteria and algae

#### **BOT-HC-1026: Biomolecules and Cell Biology**

- Basic knowledge on structure, classification and physico- chemical properties of bio molecules and enzymes.
- Basic knowledge on structure, properties and functions of cell and its components
- Practical knowledge on properties of cell, microscopy of plant cell and qualitative tests of bio-molecules

#### **BOT-HG-1016 Biodiversity: Microbes, Algae, Fungi and Aarchegoniate**

(Generic Elective Course)

- General characteristics of virus and bacteria and their economic importance
- Basic knowledge of algae, fungi, bryophytes, pteridophytes and gymnosperm and their significance.
- Practical knowledge on structure and life cycle of viruses, bacteria, algae, fungi, bryophytes, pteridophytes and gymnosperms

### **2. Semester II**

### **BOT-HC-2016: Mycology and Phytopathology**

- Basic knowledge on different classes of fungi, their structure, classification, life cycle and reproduction
- Basic knowledge on diseases in plants caused by viruses, bacteria and fungi and biotechnological applications of fungi Structural analysis of different classes of fungi and their reproductive stages and symbiosis by fungi
- Practical study of different fungi and applied mycology

### **BOT-HC-2026: Archegoniate**

- Basic knowledge on morphology, anatomy, classification and life cycle of bryophytes, pteridophytes and gymnosperms
- Basic knowledge on reproduction and economic importance and ecological significance of bryophytes, pteridophytes and gymnosperms
- Practical knowledge on morphology and reproductive structures of bryophytes, pteridophytes and gymnosperms

### **BOT-HG-2016: Plant Ecology and Taxonomy (Generic Elective Course)**

- Understanding soil, water, light and temperature as ecological factors
- Knowledge on adaptive characters of hydrophytes and xerophyte
- Knowledge on ecosystem, plant community and their succession
- Knowledge on bio geochemical cycling
- General idea on phyto geography and endemism
- Knowledge on plant taxonomy.
- Practical knowledge on soil temperature measurement, humidity measurement, rainfall estimation and light intensity measurement
- Adaptive morphological characterization of hydrophytes and xerophytes, quadrat size determination for herbaceous plant studies in ecology, estimation of frequency distribution of herbaceous plants using quadrat method.
- Practical knowledge on plant identification upto the family level that belongs to Brassicaceae, Solanaceae and Lamiaceae, Preparation of herbarium specimens.

## **3. Semester III**

### **BOT-HC-3016: Morphology and Anatomy of Angiosperms**

- Basic knowledge on morphology of angiosperms, anatomical organization of tissues and developmental biology of plant body.

- Practical knowledge on inflorescence, fruits of angiosperms and anatomical features of plant body.

#### **BOT-HC-3026: Economic Botany**

- Basic knowledge on morphology of economically important plants such as cereals, legumes, spices, fibres, beverages, timber plants, drug-yielding plants etc.
- Practical Knowledge on micro-chemical tests of economical plants.

#### **BOT-HC-3036: Genetics**

- Knowledge on Mendelian concepts in genetics; structure, functions and properties of chromosome; chromosomal aberration Knowledge on gene structures and gene mutations, population genetics
- Practical knowledge on chromosomal mapping and gene interaction studies
- Practical visualization of chromosomal anomalies

#### **Skill Enhancement Paper BOT-SE-3014: Biofertilizers**

- Basic knowledge on the microbes used as biofertilizer and understand the process of their isolation, identification, mass multiplication, carrier based inoculants and knowledge on Actinorrhizal symbiosis
- Concept on the general characteristics, isolation, mass multiplication carrier based inoculants of Azospirillum and Azotobacter.
- Basic knowledge on Cyanobacteria including factors affecting growth of Cyanobacteria, concept on the nitrogen fixation and use of blue green algae in rice cultivation
- Brief knowledge on the Mycorrhizal association and understand the details of various types, taxonomy, occurrence, distribution and growth parameters of Mycorrhiza
- Details about the organic farming, maintenance and recycling of biodegradable waste material and understand the methods of making biocompost and vermicompost with application.

#### **BOT-HG-3016: Plant Physiology and Metabolism (Generic Elective Course)**

- Understanding the roles of water in plant physiology.
- Knowledge of macro- and micro-nutrients and mineral uptakes in plants.
- Understanding the transportations of minerals and foods in plants
- Knowledge on photosynthetic pigments, photosynthetic reactions and photorespiration
- Understanding of respiration processes – glycolysis, TCA and PPP pathways

- Knowledge on enzyme properties, biological nitrogen fixation
- Practical knowledge on plant hormones, and plant responses to light and temperature, osmotic potentials of plant cells, stomatal index, catalase activity and photosynthesis.

#### **4. Semester IV**

##### **BOT-HC-4016: Molecular Biology**

- Detailed knowledge on architecture of nucleic acids, organization of DNA in organisms, models of replication and the factors associated with it Detailed knowledge on transcriptional and post transcriptional events in a cell, translation of proteins
- Practical acquaintance of isolation and quantification of DNA from plants.
- Knowledge on photographic study of RNA polymerases and RNA modification machinery

##### **BOT-HC-4026: Plant Ecology and Phytogeography**

- Knowledge on origin, formation and properties of abiotic components of the ecosystem, interactions and adaptation of plants with biotic and abiotic factors
- Knowledge on properties of communities in a population and habitat organization in an ecosystem
- Practical knowledge on analysis of abiotic components of the ecosystem
- Practical knowledge on vegetation study in different ecological sites

##### **BOT-HC-4036: Plant Systematics**

- Knowledge on plant identification and classification systems, plant nomenclature
- Knowledge on phylogenetic and evolutionary relationships of angiosperms
- Practical knowledge on foliar morphology and taxonomical study of angiosperms

##### **Skill Enhancement Paper BOT-SE-4014: Nursery and Gardening**

- Basic knowledge of nursery and garden, infrastructure and its scope
- Understanding seed dormancy, vegetative propagation and raising of seeds and seedlings.
- Practical knowledge on setting up of nursery and propagation techniques of plants.

##### **BOT-HG-4016: Plant Anatomy and Embryology (Generic Elective Course)**

- Knowledge on different types of tissues and their organizations in plants  
Knowledge on secondary growth and anomalous structures in plants
- Knowledge on adaptive and protective characters of plants

- Understanding the reproductive units of a flower; ovule types, ovary types, pollination and fertilization mechanisms; embryo and endosperm developments and functions

Hands on experiences on slide preparation for anatomical studies of leaf, stem and root Flower dissection and study of flower reproductive parts and events

**BOT-HG-4026: Economic Botany and Plant Biotechnology**(Generic Elective Course)

- Understanding the concept of ‘centre of origin of crop plants’ and their distribution with a special emphasis on wheat Overall knowledge on economically important crops with their botanical characters and parts used
- Knowledge on plant tissue culture and the basic molecular techniques used in biotechnology Basic concept of bio informatics and its application.

**BOT-HC-5016: Reproductive Biology of Angiosperms**

- Gain knowledge of reproductive structures of Angiospermic plant and their development
- Understand the pollination and fertilization mechanism
- Know about apomixes and polyembryony
- Practical knowledge on observation of pollen wall, pollen viability, ovule, endosperm, development of embryo and female gametophyte.

**BOT-HC-5026: Plant Physiology**

- Understand the plant water relations and translocation in the phloem.
- Knowledge of mineral nutrition and nutrient uptake
- Knowledge of plant growth regulators, cryptochromes and phototropins
- Understand the physiology of flowering
- Practical knowledge of osmotic potential, water potential, transpiration,
- Practical knowledge of stomatal index, stomatal frequency, Effect of IAA, amylase on plants

**BOT-HE-5016: Natural resource Management**

- Knowledge on natural resources, biological and forest resources
- Understand the sources of energy and contemporary practices in resource management and conservation
- Practical application and estimation of solid waste management, forest cover, GPS and GIS
- Practical estimation of ecological footprint.

**BOT-HE-5026: Horticultural Practices and Post Harvest Technology**

- Knowledge of ornamental plants, fruit and vegetable crops
- Knowledge on horticultural techniques, landscaping and garden design and floriculture
- Understand the post harvest technology, disease control and management of horticultural crops
- Practical knowledge of nursery and garden management by visiting crop sites, nursery, vegetable garden and horticultural fields

#### **BOT-HC-6016: Plant Metabolism**

- Understand the concept of Metabolism
- Knowledge of mechanism of photosynthesis, respiration, ATP synthesis.
- Knowledge of Metabolisms of Carbohydrate, Lipid and Nitrogen
- Understand the Mechanism of signal transduction

#### **BOT-HC-6026: Plant Biotechnology**

- Understand the method, utilization and importance of Plant Tissue culture.
- Gain knowledge of DNA technology, Gene cloning and method of gene transfer
- Gain knowledge on application of Biotechnology

#### **BOT-HE-6016: Industrial and Environmental Microbiology**

- To understand the scope of microbes in bioreactors and fermenters
- To understand the use of microbes in industrial products and enzyme mobilization
- Knowledge of microbial flora of water, air and soil, method of isolation and use in agriculture and bio remediation.
- Practical knowledge of functioning of instruments in microbiology and pure culture techniques.

#### **BOT-HE-6026: Analytical techniques in Plant Sciences**

- Knowledge of techniques related to microscopy, centrifugation, spectro photometry, chromatography, radio isotopes, characterization of proteins and nucleic acids.
- Understand the principles of bio statistics and its uses
- Practical knowledge of the blotting techniques, TLC, centrifugation, column chromatography
- Practical knowledge of estimation and separation of proteins and DNA