

DEPARTMENT OF BOTANY

BISWANATH COLLEGE

PROGRAMME OUTCOMES

Link to the Gauhati University syllabus:

1. Botany Honours course (CBCS): <https://sites.google.com/a/gauhati.ac.in/syllabus-ug-cbcs/honours/botany-h>
2. Botany Regular course (CBCS): <https://sites.google.com/a/gauhati.ac.in/syllabus-ug-cbcs/regular/botany>
3. Botany Major (Non-CBCS): <https://sites.google.com/a/gauhati.ac.in/syllabus-ug-old/undergraduate-courses/tdc-in-botany-major>
4. Botany General (Non-CBCS): <https://sites.google.com/a/gauhati.ac.in/syllabus-ug-old/undergraduate-courses/tdc-in-botany-general>

PROGRAMME: B.SC. BOTANY

a. Knowledge and Understanding:

- a. Diversity of plants and microbes in terms of structure, function, reproduction and ecological roles.
- 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 *in-silico* 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.
- b. Plant classification and identification, anatomy, morphology, plant physiology, plant biochemistry, genetics, plant breeding etc.
- c. Ecological study of the local area.

- d. *In-silco* techniques in biological science.
- e. Preliminary skills on biotechnology, horticulture, biofertilizers, nursery techniques etc.

4. **Transferable Skills:**

- a. Use of information technology for accumulation and sharing of data.
- b. Dissemination of scientific ideas in writing and orally.
- c. Creation of team spirit.
- d. Access of E- library resources.
- e. Regularity, punctuality, devotion and career planning.

5. **Scientific Knowledge and problem analysis:**

Application of principles of basic science in studying and analysing problems and phenomena related to biological science.

6. **Usage of Modern tools:**

- a. Practical application of modern techniques/ instruments in Biochemical and molecular analysis, , Biotechnology, *in vitro* culture, microbiology etc.

7. **Ethics:**

- 1. Application of moral and ethical principles to mitigate environmental issues and biodiversity conservation.
- 2. Basic knowledge on environment and sustainable development will create responsible citizens.

Dr. Ratul Nath
Head
Deptt. of Botany

DEPARTMENT OF BOTANY
BISWANATH COLLEGE

Course Specific Outcomes (CBCS)

B.Sc. Botany Honours

Biswanath College is an affiliated college of Gauhati University. Hence the college has to follow the course curriculum of the affiliating university. Gauhati University course curriculum for Botany Honours under CBCS has mentioned some course outcomes while designing the curriculum. However, the college expects more outcomes from the course. Course specific outcomes of Botany Honours, CBCS is summarized below.

1. Sem I:

BOT-HC-1016: Phycology and Microbiology

- Basic knowledge on viruses and bacteria, and their importance in agriculture and medicine.
- 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 physicochemical 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

2. Sem 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.

BOT-HC-2026: Archegoniate

- Basic knowledge on morphology, anatomy, classification and properties 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.

3. Sem 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 inflorescences, 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, 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

4. Sem 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 trophical and habitat organization in an ecosystem
- Practical knowledge on property analysis of abiotic components of the ecosystem
- Practical knowledge on vegetation study and 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-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 also the knowledge on the crop response to 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

B.Sc Botany (Generic Elective Courses)

1) Sem I

BOT-HG-1016: Biodiversity (Microbes, Algae, Fungi and Archegoniate)

- Knowledge on structure and reproduction of viruses and bacteria, and their economic importance
- Describe general characteristics, morphological diversity, thallus organization, life cycles, ecological and economic importance of algae
- Describe general characteristics, morphological diversity, thallus organization, life cycles, ecological and economic importance of fungi
- General characteristics, classification, morphological diversity and evolutionary significance of bryophytes
- General characteristics and classification of pteridophytes; evolution of stele, heterospory and seed habit in pteridophytes
- . Classify gymnosperms, and describe their general characteristics and economic importance.
- Practical knowledge on staining and slide preparation to study bacteria, algae and fungi under the microscope.
- Practical knowledge on vegetative and reproductive structures of some representative bryophytes, pteridophytes and gymnosperms

2) Sem II

BOT-HG-2016: Plant Ecology and Taxonomy

- Understanding soil, water, light and temperature as ecological factors Knowledge on adaptive characters of hydrophytes and xerophyte
- Knowledge on plant community types and their succession
- Knowledge on ecosystem, trophic levels and energy flow in ecosystems
- Knowledge on biogeochemical cycling with an emphasis on carbon, nitrogen and phosphorus cycles CO6. General idea on phytogeography and endemism
- Knowledge on plant taxonomy, principles, ICN rules, ranks and hierarchy
- Knowledge on different systems of plant classification and cluster analysis
- Practical knowledge on soil temperature measurement, humidity measurement, rainfall estimation and light intensity measurement
- Adaptive morphological characterization of hydrophytes and xerophytes
- Quadrant 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) Sem III

BOT-HG-3016: Plant Physiology and Metabolism

- Understanding the roles of water in plant physiology, transpiration, and guttation
- Knowing 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, actions and inhibitions
- Knowledge on biological nitrogen fixation
- Knowledge on plant hormones, and plant responses to light and temperature
- Determine osmotic potentials of plant cells and effect of light on transpiration
- Calculate stomatal index and frequency
- Demonstrate the effect of pH and concentrations in catalase activity
- Demonstrate the effect of bicarbonate concentration on O₂ evolution in photosynthesis

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 also the knowledge on the crop response to 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

4) Sem IV

BOT-HG-4016: Plant Anatomy and Embryology

- 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

- 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 bioinformatics and its application.

Course Specific Outcomes (NON-CBCS)

B.Sc Botany (Major)

1) Sem V

Paper: M 501 (Theory): Microbiology and Immunology

- Basic knowledge on microbiology history and development.
- Knowledge on microbial nutrition, growth and metabolism.
- Knowledge on virus nature and transmission.

Paper: M 502 (Theory): Plant Pathology and Lichen

- Basic Knowledge on common plant diseases, plant pathogens, disease etiology, Host parasite interaction etc.
- Basic knowledge on plant disease management through chemical, biological and biotechnological methods.
- Basic knowledge on Lichens.

Paper: M 503 (Cytogenetics, Plant breeding and Biometrics)

- Basic knowledge on Mendelian concepts in genetics; structure, functions and properties of chromosome; chromosomal aberration
- Basic knowledge on gene structures and gene mutations, population genetics
- Basic knowledge on chromosomal mapping and gene interaction studies
- Basic knowledge on plant breeding and biometrics

Paper: M 504 (Applied Botany)

- Basic knowledge on application of microorganism in industry, medicine, agriculture and bioremediation.
- Basic Knowledge on crop improvement for disease resistance.
- Application of plant growth regulators in Agriculture.

Paper: M505 (Microbiology, plant pathology and Lichen)

- Practical knowledge on basic microbial techniques, identification of plant pathogen and plant disease and basic structure of Lichen

Paper: M 506 (Cytogenetics, plant breeding, Biometrics and applied botany)

- Practical Knowledge basics on plant genetic techniques, emasculation and common plant breeding techniques.
- Practical knowledge on basics of Bio-statistical techniques and study of microbes used in industry.

2) Sem VI

Paper: M 601 (Molecular Biology and Plant Biochemistry)

- Basic knowledge on gene regulation and expression, mutation, DNA replication etc.
- Basic knowledge on genetic codes and its properties.
- Basic knowledge on Biomolecules structure and function.

Paper: M 602 (Bioinformatics, Computer application and Biotechnology)

- Basic knowledge on Bioinformatics, biological database, DNA data bank, application of Bioinformatics.
- Basic knowledge on computer application and operating system.
- Basic knowledge in plant Biotechnology, plant tissue culture techniques, genetic engineering techniques and application.

Paper: M 603 (Plant Physiology)

- Basic knowledge on plant –soil-water relationship, classification of soil, transpiration etc
- Basic knowledge on Photosynthesis and its mechanism
- Basic knowledge on translocations of organic solutes in plants
- Basic knowledge on plant growth regulators and inhibitors, stress physiology.

Paper: M 604 (Plant Resource Utilization)

- Basic knowledge on plant introduction, classification of plant resources and uses.
- Basic knowledge on fibres yielding plants, timber and non-timber resources.
- Knowledge on medicinal plants, its botany and uses
- Basic knowledge on Ethnobotany, IPR, traditional knowledge etc.

Paper: M 605 (Molecular Biology, Biotechnology, Bioinformatics and computer application)

- Practical basic knowledge on techniques of molecular Biology and Biotechnology.
- Practical basic knowledge on Bioinformatics such as sequence alignment, sequence homology and construction of phylogenetic trees.

Paper: M 606 (Plant Physiology and Plant Resource Utilization)

- Basic practical knowledge on techniques of plant physiology, micro chemical and histochemical test analysis of important medicinal plants.

B.Sc Botany (General)

1) Sem V

Paper: E 501 (Theory): Structure, Development and reproduction in flowering plants

- Knowledge on parts of flowering plants, types of tissues, Anatomy of primary and secondary roots, stem and leaf of both monocot and dicot.
- Knowledge on the embryology of flowering plants

Paper: E 502 (Practical): Structure, Development and reproduction in flowering plants

- Practical knowledge on secondary growth, study on epidermal hairs, different types of fruits
- Demonstration of the method and process of budding, Air layering etc.

2) Sem VI

Paper: E 601 (Theory): Ecology and Utilization of Plants

- Knowledge regarding basic concept of ecology, types of ecosystem, components of ecosystem
- Understand the significance morphological significance of adaptation of plant in various environment.
- Basic knowledge pollution and their types.
- Knowledge regarding utilization of important crop plants like sugarcane, gram, Pea, Timber and medicinal plants etc with their uses and botanical sources.

Paper: E601 (Practical): Ecology and Utilization of Plants

- Practical knowledge on the anatomical features of some common hydrophytes and xerophytes etc.
- Practical knowledge on the morphology, part used, chemical nature etc. of some important crop plants.

Dr. Ratul Nath
Head
Deptt. of Botany