

Department of Botany

Nabajyoti College

Programmes Offered:

A. Bachelor of Science in Botany:

The Department of Botany is offering 3 year Bachelor of Science in Botany. The Programme comprises of total 6 (six) semesters viz. 1st, 2nd, 3rd, 4th, 5th and 6th. For delivering the programme based learning experiences, the syllabus of Gauhati University is being adopted. In terms of end semester evaluation and grading Choice Based Credit System (CHCS) as prescribed by the Gauhati University is being followed.

Under Choice Based Credit System (CBCS)

Programme Outcomes (Bachelor of Science in Botany)

Programme Outcomes (PO):

PO1. Knowledge and understanding:

1. Diversity of plants in terms of structure, function, reproduction and ecological roles.
2. The evaluation and assessment of plant diversity.
3. Plant systematics and classification including flora of India with special reference to Assam and major biomes of the world.
4. The role of plants in the functioning of the global ecosystem.
5. Application of Statistics in biological data.
6. Application of computer and bioinformatics- utilization of biological data in different branches of biological science.

PO2. Intellectual skills – able to:

1. Logical interpretation of ideas and concepts into an organized form.
2. Accumulate and organize Knowledge and ideas through reading and searching in internet
3. Transformation of Knowledge based concepts from one area to another within the subject.
4. Plan, hypothesis and test.
5. Propose and carry out independent survey or research in various areas of the subject.

PO3. Practical skills:

Giving opportunities to students to conduct experiments practically both in field and laboratory. Efficient practical classes help the students to gain proficiency and skills in different topics of modules offered to them.

1. Study of plant morphology and anatomy.
2. Character correlation for Plant identification.
3. Study of structure and composition of vegetations.
4. Phyto-chemical analyses of plant materials to establish the presence of various biochemical's with reference to plant physiology and biochemistry.
5. Study of plant diseases and their control measures with reference to economic crops.
6. Accumulation and analysis of biological data using statistical methods.
7. Knowledge and use of computers.
8. To develop the Knowledge of sustainable utilization of plant recourses in different field.

PO4. Transferable skills:

1. Use of information technology for accumulation and sharing of data.
2. Dissemination of scientific ideas in writing and orally.
3. Creation of team spirit.
4. Access of library resources.
5. Regularity, punctuality, devotion and Career planning.

PO5. Scientific Knowledge:

Use of principles of basic science and fundamental process to study and analyze the plant forms.

PO6. Problem analysis:

Recognize and solve the problems of the plant world, Extraction of research literature, Formulate independent research related to Botany.

PO7. Design/development of solutions:

Formulate new concepts for a green world, sustainable development, betterment of human health specifically from medicinal plants, new formulation of phyto-chemical contents to meet specific need and ecofriendly environment. Application of indigenous Knowledge in medicinal and pharmacognosical field .

PO8. Modern tool usage:

Select and application of proper techniques and modern instruments for Biochemical experiments, Molecular Biology, Biotechnology, in vitro culture techniques, cytoGenetical and physiological activities of plants.

PO9. The Botanist and society:

Apply resource-based Knowledge to assess and access plant diversity, its importance for society and ecology, health and hazards, legal and environmental issues and conservation of biodiversity practice with responsibility

PO10. Environment and sustainability:

Aware and understand the role of the plants in environmental issues, and propagate the Knowledge for sustainable development.

PO11. Ethics:

Application of moral and ethical principles to mitigate environmental issues and biodiversity conservation.

PO12. Individual and team work:

Work with responsibilities as an individual, or as a member or leader in team works, or in multidisciplinary approaches.

PO13. Communication:

Communicate effectively the scientific temperaments for the betterment of the society, propagate effective reports, proper documentation, effective presentations, and deliver clear instructions.

Programme Specific Outcomes: B.Sc. Botany :**Under Choice Based Credit System (CBCS)****Paper I: BOT-HC-1016 Phycology and Microbiology (Semester - I Core)**

1. Understand the microbial diversity along with its mode of nutrition, reproduction and its economic importance.
2. Know the role of microbe in the maintenance of the ecological imbalance.
3. Know the importance of microbes in modern research and its application.
4. Knowledge on the systematics of viruses, algae, bacteria and their various metabolic processes.
5. Understand the difference between beneficial and harmful viruses or bacteria.
6. Understand the high industrial application of microbes based on the metabolite it develops which are useful for the human application in various fields of medicine and nutrient.
7. Role of beneficial or harmful viruses in research, medicine and diagnostics, as causal organisms of plant diseases.

Practical BOT-HC-1016 P- Phycology and Microbiology (Semester - I Core)

1. Develop the practical Knowledge on models of viruses and their life cycles by having a clear observation of the models.
2. Practical Knowledge on the structure, reproduction of bacteria and its know the staining of the gram positive and gram negative bacteria, thus further help in the differentiation among them.

3. Practical understanding of soil micro flora and its isolation procedure

Paper-II: BOT-HC-1026 Biomolecules and Cell Biology (Semester - I Core)

1. Knowledge on the different bonding pattern among the chemical compounds and further understand the polar compounds.
2. Understand the significance of pH, buffers and their role in biological metabolism.
3. Understand the structure, types and importance of different biomolecules (Lipids, Carbohydrates, Nucleic Acids, Protein)
4. Develop the concept on various bioenerGETics reactions and its mechanism under various conditions.
5. Understand the different redox reactions and the mechanism of ATP serving as the currency molecule.
6. The students will be able to understand the fundamental biochemical principles of enzymes, such as the structure and function of enzymatic process in living system.
7. Understand the structure and chemical composition of chromatin and concept of cell division.
8. Gain Knowledge about “Cell Science”
9. Understand Cell wall Plasma membrane, Cell organelles and cell division.

Practical –HC1026P: Biomolecules and Cell Biology (Semester - I Core)

1. Gain practical Knowledge to detect the presence of different biomolecules and differentiate among them through various qualitative tests based on their color variation.
2. Understand the different staining procedure of various cells and know the usage of different stains
3. Understand the types of cells and their structure.
4. Knowledge on the physiological phenomenon of cells in different osmotic conditions.
5. Practical observation of different stages of cell division and gain a clear concept on the cell cycle and its various steps.

Paper-III: BOT-HC-2016 –Mycology and Phytopathology (Semester - II Core)

- 1- Understand the world of microbes, fungi and Mycorrhiza.
- 2- Appreciate the adaptive strategies of the microbes and fungi.
- 3- To study the economic and pathological importance of microorganisms.

Practical-HC-2016P –Mycology and Phytopathology (Semester – II Core)

1. Develop the practical Knowledge on different groups of fungi and their staining procedure.
2. Practical Knowledge on the structure, reproduction of fungi and phaneroplasmidium..

3. Practical on different viral and bacterial plant diseases.

Paper-IV: BOT-HC-2026 – Archegoniate (Semester - II Core)

On completion of the course, students are able to:

1. Understand the morphological diversity of Bryophytes, Pteridophytes and Gymnosperms.
2. Understand the economic importance of the Bryophytes, Pteridophytes and Gymnosperms.
3. Learn about the process of fossilization and early land plants.

Practical: BOT-HC-2026P – Archegoniate (Semester - II Core)

- 1) Develop the practical Knowledge on different groups of Bryophyte and Pteridophyte.
- 2) Develop the practical Knowledge of the anatomical and morphological structure of Gymnospermic plants.
- 3) Field study offers an opportunity for a rich immersion experience and a tremendous way to facilitate learning.

Paper-V: BOT-HC-3016 – Morphology and Anatomy of Angiosperms (Semester – III Core)

- 1) Understand plant communities and ecological adaptations in plants.
- 2) Know about the different tissue and tissue system.
- 3) Understand about relation between anatomy and taxonomy.

Practical BOT-HC-3016P – Morphology and Anatomy of Angiosperms (Semester – III Core)

- 1) Develop the practical Knowledge on adaptive anatomy of Xerophytes, Hydrophytes & epiphyte.
- 2) Practical Knowledge about the distribution and types of stomata and trichomes.
- 3) Practical Knowledge about different Secretory tissue and Kranz anatomy of C₄ plants.

Paper-VI: BOT-HC-3026 – Economic Botany (Semester – III Core)

- 1) Understand the role plants in human welfare.
- 2) Gain Knowledge about various plants of economic use.
- 3) Know importance of plants & plant products.
- 4) Understand the chemical contents of the plant products

Practical BOT-HC-3026P – Economic Botany (Semester – III Core)

- 1) Micro-chemical test of different plant seeds.
- 2) Know practically about rubber tapping.
- 3) Understand about the habit and morphology of Drug-yielding and fiber yielding plants.

Paper-VII: BOT-HC-3036 – Genetics (Semester – III Core)

1. Understand the Mendelian Genetics and its extension.
2. Understand the process of synthesis of proteins and role of Genetic code in polypeptide formation.
- 3) Understand the variation in chromosome number and structure.
- 4) Learn about the process of Gene mutation and evolutionary Genetics.

Practical BOT-HC-3036P – Genetics (Semester – III Core)

- 1) Practical Knowledge about Mitosis and Meiosis cell division.
- 2) Understand about the human Genetic traits.
- 3) Practical Knowledge about Mendel's laws.

Paper-VIII: BOT-HC-4016 – Molecular Biology (Semester – IV Core)

- 1) Learn the scope and importance of molecular biology.
- 2) Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a Genetic material.
- 3) Learn about the processing and modification of RNA.
- 4) Learn about the central dogma and Genetic code.

Practical BOT-HC-4016P – Molecular Biology (Semester - IV Core)

- 1) DNA estimation by UV Spectrophotometry.
- 2) Study of structure of prokaryotic RNA polymerase and eukaryotic RNA polymerase.
- 3) Preparation of LB medium and raising *E.Coli*.

Paper-IX: BOT-HC-4026 – Plant Ecology and PhytoGeography.(Semester – IV Core)

- 1). Know the different ecological factors such as abiotic and biotic factors
- 3) Understand the adaptations of the plants to various conditions or stress
- 4) Understand the concept of ecosystem and its functioning
- 5) Know the flow of energy in the nature through food chain, trophic level or food web
- 6) Know the phyto-geographical regions of India and North-East.

Practical BOT-HC-4026P – Plant Ecology and Phytogeography. (Semester – IV Core)

- 1) Practically they are able to understand the anatomical modifications of the plants for various stress created by the nature itself
- 2) Understand the methods of determination plant vegetation richness

3) Quantitative analysis of herbaceous vegetation of Lakhimpur Girl's College. 4)

Determination of pH of soil of the college campus and its surrounding areas.

Paper-X: BOT-HC-4036 – Plant Systematics (Semester – IV Core)

1. Understand the plant morphology and basic taxonomy
2. Know the vegetative characteristics of the plant.
3. Know the concept of methodology in taxonomy.
4. Know the conceptual development of taxonomy and systematic.
5. Understand the Phylogeny of angiosperms -A General account of the origin of Angiosperms

Practical: BOT-HC-4036P – Plant Systematics (Semester – IVCore)

1. Gain Knowledge about various plants of economic use.
2. Understand the chemical contents of the plant products.
3. Know the technique of herbarium preparation and its importance.

Paper-XI: BOT-HC-5016 – Reproductive Biology of Angiosperms (Semester - VCore)

- 1) Know the different Indian embryologists contributions to the field of plant science
- 2) Understand the development of male and female gametophyte, double fertilization and triple fusion among the angiosperms.
- 3) Understand the different aGEnts involved in the pollination and its significance
- 4) Know apomixis and polyembryony and their significance in the plant developmental biology
- 5) Understand the pollen morphology of the angiosperms.

Practical-BOT-HC-5016P – Reproductive Biology of Angiosperms (Semester - VCore) 1)

Practical Knowledge about Intra-ovarian pollination.

- 2) Practical Knowledge about types of ovule.
- 3) Know about the calculation of percentage of pollen germination in different media using Hanging drop method.

Paper-XII: BOT-HC-5026 – Plant Physiology (Semester – V Core)

- 1) Learn and understand about mineral nutrition in plants.
- 2) Understand the growth and developmental processes in plants.
- 3) Understand the plants and plant cells in relation to water.
- 4) Understand the rate of transpiration and its significance in plants

- 5) Learn about the movement of sap and absorption of water in plant body
- 6) Understand the process of translocation of solutes in plants
- 7) Understand the plant movements.

Practical: BOT-HC-5026P – Plant Physiology.

(Semester – V Core)

- 1) Know about the osmotic potential of plant cell sap.
- 2) To study the effect of different concentration of IAA on *Avena* coleoptiles elongation.
- 3) To study the induction of amylase activity in germinating Barley grains.
- 4) To study the effect of wind velocity and light on the rate of transpiration.

Paper-XIII: BOT-HC-6016 – Plant Metabolism.

(Semester – VI Core)

- 1) Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C₃ and C₄ pathways.
- 2) Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
- 3) Understand the mechanism of ATP synthesis.
- 4) Know about the concept of metabolism.
- 5) Understand the mechanism of signal transduction.

Practical: BOT-HC-6016P – Plant Metabolism.

(Semester – VI Core)

- 1) Chemical separation of photosynthetic pigments.
- 2) To study the activity of lipases in germinating oil seeds.
- 3) To study the absorption spectrum of photosynthetic pigments.
- 4) To compare the rate of respiration in different parts of plants.

Paper-XIV: BOT-HC-6026 – Plant Biotechnology.

(Semester – VI Core)

- 1) Understand the fundamentals of Recombinant DNA Technology.
- 2). Know about the Genetic Engineering.
- 3) Understand the principle and basic protocols for Plant Tissue Culture.
- 4) Understand the applications of biotechnology for human welfare
- 5) Know the Gene mapping, DNA finger printing, and production of monoclonal antibodies.
- 6) Understand the importance of Transgenic plants.

Practical: BOT-HC-6026P – Plant Biotechnology.

(Semester – VI Core)

- 1) Study of anther, embryo and endosperm culture.
- 2) Study of gene transfer through photograph.
- 3) Study of steps of genetic engineering for production of Bt Cotton, Golden rice.
- 4) Isolation of plasmid DNA.

ELECTIVES (Discipline Specific)

Under Choice Based Credit System (CBCS)

Paper-DSE : BOT-HE-5016 – Natural Resource Management (Semester – V Core) 1)

Understand about land and water management strategies.

- 2) Know about different forest products and their management.
- 3) Describe about Renewable and Non-Renewable source of energy and their management and conservation.
- 4) Biodiversity threats and management.

Practical-DSE : BOT-HE-5016P – Natural Resource Management (Semester – V Core)

- 1) Ecological modeling.
- 2) Collection of data on forest cover of a reserve forest of Lakhimpur.
- 3) Calculation and analysis of ecological footprint.

Paper-DSE : BOT-HE-5026 – Horticultural Practices and Post-Harvest Technology (Semester – V Core)

1. To know about different types of economically important plants.
2. Cultivation Techniques.
3. Garden designing.

Paper-DSE : BOT-HE-5026P – Horticultural Practices and Post-Harvest Technology.(Semester – V Core)

1. To know about introduction to gardening.
2. Identification of horticultural plants.
3. Garden maintainence.

Paper-DSE : BOT-HE-6016 – Industrial and Environmental Microbiology (Semester – V Core)1) Understand the Scope of microorganism in different industrial production and their role in our environment.

2) Know the importance of microbes in agriculture.

3) Know the role of microbes in sewage and domestic waste water treatment.

4) know about the microbial enzymes of industrial interest and enzyme immobilization.

Practical -DSE : BOT-HE-6016P – Industrial and Environmental Microbiology (Semester – V Core)

1) Sterilization techniques of culture media.

2) Role of instruments in Microbiological laboratory.

Practical-DSE : BOT-HE-6026 – Analytical Techniques in Plant Sciences (Semester – V Core)

1) Know the details of Microscopy- Principles of light microscopy, electron microscopy (TEM and SEM).

2) Understand the methods used in Micrometry, Microtomy and Microphotography.

3) Know about Radioisotopes & Spectrophotometry.

4) Know about TLC, GLC, HPLC and ion-exchange chromatography.

5) know about Bio-statistical analysis such as mean, median mode etc.

Practical-DSE : BOT-HE-6026P – Analytical Technique in Plant Science.(Semester – V Core)

1) Separation of Nitrogenous base by paper Chromatography.

2) To separate proteins using PAGE.

3) To separation DNA using AGE.

4) Demonstration of ELISA.

Paper-DSE : BOT-HE-6036 – Project Work (Semester – VI Core)

1) To Get insight into the world of research.

2) Develop the basic concept of scientific writing.

3) Understand the sample analysis and data interpretation.

ELECTIVES (For students opting other than Botany as honours subject)

Under Choice Based Credit System (CBCS)

Paper- BOT-HG-1016– Biodiversity (Microbes,Algae,Fungi,Lichen& Archegoniate)(Sem I G)

- 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 Biodiversity of Fungi
- 4) Know the Economic Importance of Fungi
- 5) Understand the morphological diversity of Bryophytes, Pteridophytes and Gymnosperms
- 6) Understand the economic importance of the Bryophytes, Pteridophytes and Gymnosperms
- 7) Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes, Pteridophytes and Gymnosperms

Practical- BOT-HG-1016P – Biodiversity (Microbes,Algae,Fungi,Lichen& Archegoniate))(Sem-I G)

- 1) Practical Knowledge about vegetative and reproductive structure of Algae,Fungi,Lichen& Archegoniate.
- 2) Photographic study of T-Phage and TMV.
- 3) Photographic study of Mycorrhiza.

Paper- BOT-HG-2016 – Plant Ecology and Taxonomy. (Sem-II G)

- 1) Acquire Knowledge on classification of plant families, their characteristics and its economic importance.
- 2) Students learned about the interaction between biotic and abiotic components of the environment.
- 3) Know about the concept of energy flow in the ecosystem.
- 4) Acquire Knowledge about Biometrics and Numerical taxonomy.
- 5) Know about the principles of Botanical nomenclature

Practical- BOT-HG-2016P – Plant Ecology and Taxonomy.

(Sem-II G)

- 1) Practically they are able to understand the anatomical modifications of the plants for various stress created by the nature itself
- 2) Understand the methods of determination plant vegetation richness
- 3) Quantitative analysis of herbaceous vegetation of Nabajyoti College.
- 4) Determination of pH of soil of the college campus and its surrounding areas.
- 5) Technique of herbarium preparation.

Paper- BOT-HG 3016– Plant Physiology and Metabolism

(Sem-III G)

- 1) Learn about mineral nutrition in plants.
- 2) Understand the growth regulators and their function in developmental processes in plants.
- 3) Know about Photosynthesis and Respiration in plants.
- 4) Understand process of plant-water relation & the process of translocation of solutes in plants
- 5) Know the physiology of flowering plants.
- 6) Know the process of Nitrogen metabolism in plants.

Practical- BOT-HG–3016P Plant Physiology and Metabolism

(Sem-III G)

- 1) Know the various physiological processes of plants through practicals
- 2) Determination of OP, RQ and stomatal index
- 3) Separation of plant pigments through chromatography
- 4) Chemical tests for determination of tannin and alkaloid

Paper- BOT-HG–3016 Environmental Biotechnology

(Sem-IV G)

- 1) Know about calamities of nature.
- 2) Awareness about pollution
- 3) Specific idea about incorporation of biotechnology to environment.

Practical- BOT-HG–3016P Environmental Biotechnology

(Sem-IV G)

- 1) Analysis of soil
- 2) Microbial testing in environment
- 3) Pollution indicative analysis

Paper- BOT-HG-4016 – Plant Anatomy and Embryology.

(Sem-IV G)

- 1) Understand the development of male and female gametophyte, double fertilization and triple fusion among the angiosperms.

- 2) Understand the different agents involved in the pollination and its significance
- 3) Know apomixis and polyembryony and their significance in the plant developmental biology
- 4) Understand plant communities and ecological adaptations in plants.
- 5) Know about the different tissue and tissue system.

Practical- BOT-HG-4016P – Plant Anatomy and Embryology. (Sem-IVG)

- 1) Develop the practical Knowledge on adaptive anatomy of Xerophyte, Hydrophyte & epiphyte.
- 2) Practical Knowledge about the distribution and types of stomata and trichomes.
- 3) Practical Knowledge about types of ovule.
- 4) Know about the calculation of percentage of pollen germination in different media using Hanging drop method.

Paper- BOT-RE-5026 – Economic Botany and Plant Biotechnology. (Sem-IV G)

- 1) Know about economically important crops
- 2) Familiarization with cultivation techniques
- 3) Introduction to biotechnology

Practical- BOT-RE-5026P – Economic Botany and Plant Biotechnology. (Sem-IV G)

- 1) Cultivation techniques of crops
- 2) Basic methods in biotechnology
- 3) Introduction to bioinformatics

Paper- BOT-RE-6016 – Analytical Techniques in Plant Sciences. (Sem-V G)

- 1) Familiarization to basic instrumentation
- 2) Analysis of metabolites and characterization techniques
- 3) Statistical perspectives

Paper- BOT-RE-6016 – Analytical Techniques in Plant Sciences. (Sem-V G)

- 1) Characterization of metabolites
- 2) Analysis of metabolites by various techniques
- 3) Data interpretation and analysis

Course Outcomes (HONOURS)

BOT-HC-1016: Phycology and Microbiology

CO1. Detailed Knowledge on microbes, viruses and bacteria, and their importance in agriculture and medicine

CO2. Knowledge on Algal classification, Economic and ecological importance of Algae

CO3. Practical Knowledge on structure of T-Phage and TMV, lytic and lysogenic life cycle

CO4. Practical Knowledge on microscopy of bacteria and algae

BOT-HC-1026: Biomolecules and Cell Biology

CO1. Knowledge on structure, classification and physicochemical properties of biomolecules and enzymes

CO2. Detailed Knowledge on structure, properties and functions of cell and its components

CO3. Practical Knowledge on properties of cell and cell membrane, DNA staining techniques and microscopy of plant cell

CO4. Knowledge on qualitative tests of biomolecules

BOT-HC-2016: Mycology and Phytopathology

CO1. Detailed Knowledge on different classes of fungi, their structure, classification, life cycle and reproduction

CO2. Knowledge on diseases in plants caused by viruses, bacteria and fungi and biotechnological applications of fungi

CO3. Structural analysis of different classes of fungi and their reproductive stages

CO4. Knowledge on structures of symbiotic associations (Lichens, Mycorrhiza)

BOT-HC-2026: Archegoniate

CO1. Detailed Knowledge on morphology, anatomy, classification and properties of bryophytes, pteridophytes and gymnosperms

CO2. Knowledge on reproduction and economic importance and ecological significance of bryophytes, pteridophytes and gymnosperms

CO3. Practical Knowledge on morphology and reproductive structures of archegoniate

CO4. Spore morphology analysis and detailed Knowledge on male and female reproductive structures in gymnosperms

BOT-HC-3016: Morphology and Anatomy of Angiosperms

CO1. Knowledge on morphology of angiosperms and developmental biology of plant body

CO2. Knowledge on structural and anatomical organization of tissue system in plants and their classification

CO3. Practical Knowledge on inflorescences and fruits of angiosperms

CO4. Practical Knowledge on anatomical features of plant body parts

BOT-HC-3026: Economic Botany

CO1. Knowledge on morphology, uses and economic importance of crop plants

CO2. Knowledge on uses of industrially important plants

CO3. Practical Knowledge on economically important plant parts and their products

BOT-HC-3036: GENetics

CO1. Knowledge on Mendelian concepts in GENetics; structure, functions and properties of chromosome; chromosomal aberration

CO2. Knowledge on GENe structures and GENe mutations, population GENetics

CO3. Practical Knowledge on chromosomal mapping and GENE interaction studies

CO4. Practical visualization of chromosomal anomalies

BOT-HC-4016: Molecular Biology

CO1. Detailed Knowledge on architecture of nucleic acids, organization of DNA in organisms, models of replication and the factors associated with it

CO2. Detailed Knowledge on transcriptional and post transcriptional events in a cell, translation of proteins

CO3. Practical acquaintance of isolation and quantification of DNA from plants

CO4. Knowledge on photographic study of RNA polymerases and RNA modification machinery

BOT-HC-4026: Plant Ecology and PhytoGEOgraphy

CO1. Knowledge on origin, formation and properties of abiotic components of the ecosystem, interactions and adaptation of plants with biotic and abiotic factors

CO2. Knowledge on properties of communities in a population and trophical and habitat organization in an ecosystem

CO3. Practical Knowledge on property analysis of abiotic components of the ecosystem

CO4. Practical Knowledge on vegetation study and different ecological sites

BOT-HC-4036: Plant Systematics

CO1. Knowledge on plant identification and classification systems, plant nomenclature

CO2. Knowledge on phyloGENetic and evolutionary relationships of angiosperms

CO3. Practical Knowledge on foliar morphology and taxonomical study of angiosperms

BOT-HC-5016: Reproductive Biology of Angiosperms

CO1. Knowledge on detailed morphological and anatomical study of reproductive structures of angiospermic plants

CO2. Knowledge on embryology and embryological abnormalities in angiosperms

CO3. Structural documentation of reproductive structures of angiosperms

CO4. Practical Knowledge on developmental biology of embryo and endosperms

BOT-HC-5026: Plant Physiology

CO1. Knowledge on mechanisms of water, minerals and nutrient absorption of plants

CO2. Knowledge on roles of plant hormones and mechanism of flowering in plants

CO3. Practical Knowledge on effects of growth regulators on plant parts

CO4. Practical Knowledge on determination of osmotic and water potential

BOT-HC-6016: Plant Metabolism

CO1. Detailed Knowledge of metabolic events of photosynthesis and nutrient metabolism

CO2. Knowledge of signalling molecules and pathways in the plant cell

CO3. Practical Knowledge on different types of chromatographic techniques

CO4. Estimation of TAN, sugar and protein contents in plant sample

BOT-HC-6026: Plant Biotechnology

CO1. Knowledge on applications of tissue culture techniques, construction of recombinant DNA and transformation into hosts, construction of DNA libraries

CO2. Knowledge on development of transGENic plants for agricultural or industrial use

CO3. Practical utility on isolation of plasmid DNA, its diGESTion and separation of fragments through GEI electrophoresis

CO4. Preparation of media for tissue culture techniques and photographic study of plant tissue culture

CO5. Photographic study of GEnErating transGENic plants for agriculture

ELECTIVES (Discipline Specific)

BOT-HE-5016: Natural Resource ManaGEMent

CO1. Comprehensive Knowledge on different types of natural resources and their ecological, economical and socio-cultural values

CO2. Basic understandings of land, water and forest resources

CO3. Overall Knowledge on resource degradation, their judicious use and management for sustainability

CO4. Knowledge on biodiversity - its importance, management and Bioprospecting

CO5. Knowledge on IPR, and global arena on resource management, conservation and benefit sharing

CO6. Hands on experience on the domestic solid waste estimation and determining its impact on land degradation

CO7. Hands on experience on forest study using tools like GPS/GIS, and understanding of ecological importance of forest resources

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

CO1. Basic understandings on Horticultural science and its importance in employment GEneration and socio-economic development

CO2. Classification of horticultural crops, identification of potential horticultural crops – their cultivation, production, management and commercialization

CO3. Knowledge on horticultural techniques, landscaping and gardening

CO4. Overall Knowledge on post-harvest technology, disease management, and germplasm manaGEMent for horticulture

CO5. Field Knowledge of gardening, nurseries, standing crops of horticultural importance

BOT-HE-6016: Industrial and Environmental Microbiology

CO1. Understanding the roles of microbes in industries and environment

CO2. Basic Knowledge of different kinds of bioreactors and fermentation processes

CO3. Knowledge on production processes of some microbial products in industries through site visits

CO4. Knowledge on application of enzymes in industries

CO5. Diversity and distribution of microbes in air, water and soil

CO6. Basic understandings on water microbiology and water analysis methods

CO7. Usefulness of microbes in agriculture and bioremediation of contaminated soils

CO8. Practical experiences on basic microbiological techniques and handlings

BOT-HE-6026: Analytical Techniques in Plant Sciences

CO1. Knowledge on microscopy and imaging in plant science

CO2. Principles and application of centrifuge, spectroscopy and chromatography in biology

CO3. Basic Knowledge on biostatistics including measures of central tendency and dispersions, statistical data analysis and representations

CO4. Practical Knowledge on microscopy, chromatography, centrifugation and spectroscopy

BOT-HE-6036: Project Work/Dissertation

CO1. Practical Knowledge on addressing relevant scientific questions through experimentation

GENERAL ELECTIVE COURSE (For students opting other than Botany as an honours subject)

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

CO1. Knowledge on structure and reproduction of viruses and bacteria, and their economic importance

CO2. Describe General characteristics, morphological diversity, thallus organization, life cycles, ecological and economic importance of algae

CO3. Describe General characteristics, morphological diversity, thallus organization, life cycles, ecological and economic importance of fungi

CO4. General characteristics, classification, morphological diversity and evolutionary significance of bryophytes

CO5. General characteristics and classification of pteridophytes; evolution of stele, heterospory and seed habit in pteridophytes

CO6. Classify gymnosperms, and describe their General characteristics and economic importance

CO7. Practical Knowledge on staining and slide preparation to study bacteria, algae and fungi under the microscope

CO8. Practical Knowledge on vegetative and reproductive structures of some representative bryophytes, pteridophytes and gymnosperms

BOT-GE-2016: Plant Ecology and Taxonomy

- CO1. Understanding soil, water, light and temperature as ecological factors
- CO2. Knowledge on adaptive characters of hydrophytes and xerophytes
- CO3. Knowledge on plant community types and their succession
- CO4. Knowledge on ecosystem, trophic levels and energy flow in ecosystems
- CO5. Knowledge on biogeochemical cycling with an emphasis on carbon, nitrogen and phosphorus cycles
- CO6. General idea on phytogeography and endemism
- CO7. Knowledge on plant taxonomy, principles, ICN rules, ranks and hierarchy
- CO8. Knowledge on different systems of plant classification and cluster analysis
- CO9. Practical Knowledge on soil temperature measurement, humidity measurement, rainfall estimation and light intensity measurement
- CO10. Adaptive morphological characterization of hydrophytes and xerophytes
- CO11. Quadrant size determination for herbaceous plant studies in ecology
- CO12. Estimation of frequency distribution of herbaceous plants using quadrant method
- CO13. Practical Knowledge on plant identification upto the family level that belongs to Brassicaceae, Solanaceae and Lamiaceae; Preparation of herbarium specimens

BOT-GE-3016: Plant Physiology and Metabolism

- CO1. Understanding the roles of water in plant physiology, transpiration, and guttation
- CO2. Knowing of macro- and micro-nutrients and mineral uptakes in plants
- CO3. Understanding the transportations of minerals and foods in plants
- CO4. Knowledge on photosynthetic pigments, photosynthetic reactions and photorespiration
- CO5. Understanding of respiration processes – glycolysis, TCA and PPP pathways
- CO6. Knowledge on enzyme properties, actions and inhibitions
- CO7. Knowledge on biological nitrogen fixation
- CO8. Knowledge on plant hormones, and plant responses to light and temperature
- CO9. Determine osmotic potentials of plant cells and effect of light on transpiration
- CO10. Calculate stomatal index and frequency

CO11. Demonstrate the effect of pH and concentrations in catalase activity

CO12. Demonstrate the effect of bicarbonate concentration on O₂ evolution in photosynthesis

BOT-GE-3026: Environmental Biotechnology

CO1. Knowledge on environment and the cause of environmental pollutions

CO2. Knowledge on the methods of pollution measurement and bioremediation

CO3. Knowledge on waste water treatment processes

CO4. Knowledge on xenobiotics – their types and bioremediation

CO5. Knowledge on application of immobilized cells/enzymes in industries

CO6. Knowledge on national legislations and international treaties for environmental protection and pollution management

CO7. Practical Knowledge on determining basic properties of soil and water like DO, salinity, pH, total hardness, etc

CO8. Practical Knowledge on gravimetric analysis of effluents

CO9. Practical Knowledge on the assessment of microorganisms in air and water samples

BOT-GE-4016: Plant Anatomy and Embryology

CO1. Knowledge on different types of tissues and their organizations in plants

CO2. Knowledge on secondary growth and anomalous structures in plants

CO3. Knowledge on adaptive and protective characters of plants

CO4. Understanding the reproductive units of a flower; ovule types, ovary types, pollination and fertilization mechanisms; embryo and endosperm developments and functions

CO5. Hands on experiences on slide preparation for anatomical studies of leaf, stem and root

CO6. Flower dissection and study of flower reproductive parts and events

BOT-GE-4026: Economic Botany and Plant Biotechnology

CO1. Understanding the concept of ‘centre of origin of crop plants’ and their distribution with a special emphasis on wheat

CO2. Overall Knowledge on economically important crops with their botanical characters and parts used

CO3. Knowledge on plant tissue culture and the basic molecular techniques used in biotechnology

CO4. Basic concept of bioinformatics and its application

SKILL ENHANCEMENT PAPER

BOT-SE-3014: Biofertilizers

CO1. 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

CO2. Concept on the General characteristics, isolation, mass multiplication carrier based inoculants of Azospirillum and Azotobacter also the Knowledge on the crop response to Azotobacter

CO3. Basic Knowledge on Cyanobacteria including factors affecting growth of Cyanobacteria, concept on the nitroGEN fixation and use of blue green algae in rice cultivation

CO4. Brief Knowledge on the Mycorrhizal association and understand the details of various types, taxonomy, occurrence, distribution and growth parameters of Mycorrhiza

CO5. Details about the organic farming, maintenance and recycling of biodegradable waste material and understand the methods of making biocompost and vermicompost with application

BOT-SE-3024: Herbal Technology

CO1. Concept on the plants used as traditional medicine, and understanding the process of cultivation, harvesting, processing, storAGe, marketing and utilization of medicinal plants

CO2. Brief Knowledge on medicinal drugs obtained from plants and comprehensive idea about systematic position, medicinal uses of Tulsi, GinGEr, Fenu greek, Indian goose berry and Ashoka

CO3. Concept on the phytochemistry of medicinal herbs and identification, utilization of medicinal plants

CO4. Basic Knowledge on quality control, owing the medicinal properties of herbal drugs including the secondary metabolites and concept of drug adulteration, types, methods of drug evaluation

CO5. Understand the process of micro propagation of important medicinal plant species

BOT-SE-4014: Nursery and Gardening

CO1. Brief idea about objectives, scope, infrastructure and maintenance of Nursery

CO2. Concept on structure, types and dormancy of seeds and brief idea about seed storAGe including types and process and Knowledge on seed production technology

CO3. Knowledge on various modes of veGEtative propagation and maintenance of plants in green house

CO4. Brief idea about development and maintenance of gardening including scope and types and understand the various gardening operations including management of pests and diseases

CO5. Detail Knowledge on managements of seeds and seedlings and concept about cultivation, storage and marketing of important vegetables

BOT-SE-4024: Floriculture

CO1. Basic Knowledge including history, importance and scope of floriculture

CO2. Brief idea about Nursery management and garden operations and Knowledge on the terms related to gardening and concept about role of plant growth regulators

CO3. Covers the Knowledge of various ornamental plants and concept of cultivations of plants in pots and Knowledge about Bonsai

CO4. Idea about various garden designs and features of such gardens and Knowledge about some famous gardens of India

CO5. Knowledge about the process of making garden more attractive by altering the existing design in places of public importance, highways and educational institute

BOT-SE-4034: Intellectual Property Rights

CO1. Knowledge on IPR, their types and infringement

CO2. Understanding about traditional Knowledge and their protection, bio-prospecting and bio-piracy.

CO3. Knowledge on protection of plant varieties, farmer rights

CO4. Knowledge on Information technology related IPR; data, database, chips and domain name protection

CO5. Knowledge on novelty, bio-based patenting, and moral issues associated with biotechnological inventions