BACHELOR OF SCIENCE IN BOTANY

Programme Specific Outcomes (PSO)

The Programme Specific Outcomes based curriculum in Botany includes

1. Students acquire fundamental knowledge about plants through theory and practicals.
2. Students will understand the nature and basic concepts of all the components of plant science.
3. Students will learn about the plant diversity of the north eastern region in particular and country in general.
4. Students will become aware of bioresources, their sustainable utilization and conservation.
5. Students will get hands on experience with the tools and techniques used in biological sciences such as plant tissue culture, plant breeding and herbarium sheet preparation.

Course outcomes

On completion of Bsc course, students will are expected to get equipped with the following course outcomes

Paper 1 (Algae Bryophytes and Pteridophytes -THEORY)

The student will learn about

1. Classification, structure, pigmentation, food reserve, economic importance and life cycles of algae.
2. Classification, structure, origin and evolution and life cycles of few selected bryophytes.
3. Classification,evolution of vascular system, economic importance and life cycles of few selected pteridophytes.

Paper 1 (Algae Bryophytes and Pteridophytes-PRACTICALS)

The student will learn about

Students will be able to dissect the vegetative and reproductive parts of the prescribed specimens along with drawings, description and identification up to genus level.

Paper 2 (Gymnosperms, Paleobotany, Morphology and Anatomy-THEORY)

The student will learn about

1. Classification, structure, evolution, economic importance and life cycles of selected gymnosperms.
2. Geological time scale, general account of fossil gymnosperms and their formation with special reference of dominant Jurassic flora.
3. Basic concepts in floral morphology, bracts, inflorescence and leaf with a knowledge of evolution trends of stamens and carpels.
4. Basic concepts of vascular elements, organization of apical meristem, stomata types. Normal and anomalous secondary growth of selected genera.

Paper 2 (Gymnosperms, Paleobotany, Morphology and Anatomy-PRACTICALS)

The student will learn about

1. Students will learn double staining techniques to study anomalous secondary growth.
2. Students will learn dissection, drawing, description and identification of prescribed gymnosperms and their reproductive structure.
3. Study of permanent fossil slides.

Paper 3 (Angiosperm taxonomy, Economic botany, Ethnobotany and Phytogeography THEORY)

The student will learn about

1. The students are made acquainted with different systems of classification of angiosperms with emphasis on natural (Bentham and Hooker) and phylogenetic (Hutchinson) classification and the Principles governing Botanical Nomenclature with special reference to Rules of Priority and Type methods.
2. Diagnostic characters of few selected dicot and monocot families of North east India along with their economic importance.
3. Study of economically and ethnobotanical important plants and plant products.
4. Phytogeography with emphasis on floristic region and plant distribution in India, and centre of orgin of cultivated plants.

Paper 3 (Angiosperm taxonomy, Economic botany, Ethnobotany and Phytogeography - PRACTICALS)

The student will learn about

1. Skills in floral dissection, display, drawings and description in technical language and method of identification up to genera through proper keys.

2. Exposure to field study organized through field trips, method of collection of plant specimens and preparation of herbarium sheets which are to be submitted for examination.

3. Chemical methods of qualitative detection of starch, protein, fats and cellulose.

Paper 4 (Microbiology, Mycology and Plant Pathology THEORY)

The student will learn about

1. About basics of some special groups of microorganisms, ultrastructural details of bacteria and their reproduction.
2. Classification and characters and structures of viruses and their life cycle patterns.
3. Microbes – their growth, nutrition, role in decomposition of organic matter and food spoilage; antibiotics
4. Classification, structure, life cycles and economic importance of fungi in general with emphasis on some prescribed genera in particular.
5. Basic concept of growth forms, structure and economic importance of lichens.
6. Plant diseases and their classification, transmission and dissemination in general with reference to symptoms, disease cycles, control measures of some prescribed diseases in particular;

Paper 4 (Microbiology, Mycology and Plant Pathology PRACTICALS)

The student will learn about

1. Dissection, drawing and description and identification up to genera of prescribed fungal and pathological specimens.
2. Calibration of microscope and gram staining of bacteria.

Paper 5 (Plant physiology and Biochemistry THEORY)

The student will learn about

1. The importance of water potential. Mineral nutrition - properties and deficiency symptoms and Translocation of minerals.

2. Detail mechanism of photosynthesis, respiration, photorespiration and biological nitrogen fixation; photoperiodism and vernalization; role of some plant growth regulators in plants as well as dormancy of seeds and process of senescence in plants.
3. The molecular structure, functions, properties and classification of carbohydrates, Amino Acids and Proteins.
4. The fundamental concepts of thermodynamics with special emphasis to living systems.
5. The classification, structure, mechanism of action and kinetics of enzymes and catalysis including a basic understanding on the roles of vitamins in this context.

Paper 5 (Plant physiology and Biochemistry PRACTICALS)

The student will learn about

Basic experimental tools and techniques in plant physiology and biochemistry to study transpiration rates, water potential, photosynthesis, quantitative estimation, chromatography and enzyme kinetics.

Paper 6 (Ecology and Conservation Biology THEORY)

The student will learn about

1. The ecological hierarchy which forms the platform of interaction between different ecological factors with living organism leading to manifestation of ecological adaptations in plants to overcome the environmental stress for optimum survival.
2. Population attributes and co-relation resulting in positive and negative interactions that determine their extent of growth analysed through survivorship and growth curves.
3. Qualitative parameters of community structure which leads to community development through different stages of succession with typical case studies on hydrosere and xerosrer.
4. Ecosystem – structure (biotic and abiotic components) and function (energy flow, ecological pyramids, primary productivity, food chain and food web); biogeochemical cycles (Water, Carbon and Phosphorus).
5. Environmental pollution (air, water and soil) with emphasis on Global environmental problems; biodiversity and conservation.

Paper 6 (Ecology and Conservation Biology PRACTICALS)

The student will learn about

1. The spatial and temporal variations in climatic factors and detailed analysis of soil – soil pH, soil moisture content and soil organic matter of samples collected from different sites.
2. The quantitative attributes of community by determining requisite size and number of quadrats which are used as sampling units.
3. Sectioning of plant materials to study the different adaptive features in plants.

Paper 7: (Genetic, Plant Breeding and Molecular Biology THEORY)

The student will learn about

1. The process and significance of Meiosis and Mitosis, Structure of chromosomes and their role in inheritance, Mendel's laws of inheritance, gene interaction, Linkage, crossing over and concepts of alleles and multiple alleles.
2. Extra nuclear inheritance with examples.
3. Sex chromosomes and mechanism of sex determination; chromosomal aberrations in plants.
4. The application of different techniques of crop improvement through breeding programmes like domestication, pure line selection, mass selection and hybridization and the role of gene mutation in crop improvement, the knowledge which they may carry in future to researches related to food grain production in the country.
5. The molecules of life namely DNA, RNA and Proteins including their molecular structure, synthesis and role in life specifically with reference to prokaryotic systems.
6. Modes of genetic information transfer in bacteria including conjugation, transformation and transduction.
7. Operons, their structure, types and mode of function.

Paper 7: (Genetic, Plant Breeding and Molecular Biology - PRACTICALS)

The student will learn about

Basic experimental tools and techniques in genetics, plant breeding and molecular biology to study mitosis, meiosis, polyteny, mendelian ratios, quantitative estimation of DNA, RNA and protein and hybridization of self pollinated plants.

Paper 7: (Plant reproductive biology and plant biotechnology THEORY)

The student will learn about

1. Detail process involving microsporogenesis, microgametogenesis, megasporogensis and megagametogenesis; pollen distribution in time and space; pollen pistil interaction leading to fertilization and endosperm formation.
2. Concept of Totipotency and cellular differentiation. Methods, Tools and techniques of Micropropagation. Production of haploid plants. Cryopreservation, vitrification and artificial seeds.
3. Concepts, applications, tools and techniques and notable achievements within the field of genetic engineering.
4. Basic concept of the rapidly growing field of bioinformatics.

Paper 7: (Plant reproductive biology and plant biotechnology PRACTICALS)

The student will learn about

Basic experimental tools and techniques in plant reproductive biology and plant biotechnology to study pollen morphology, endosperm, embryo and tissue culture.