

B.Sc. Botany

Programme Outcomes

Knowledge and understanding of:

1. The range of microbial and plant diversity in terms of structure, function and environmental relationships.
2. The evaluation of plant diversity and plant diseases caused by various pathogens.
3. Plant classification and the flora of Hyderabad Karnataka.
4. The role of plants in the functioning of the global ecosystem.
5. A selection of more specialized, optional topics.

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.

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. Plant embryological development.
6. Plant pathology to be added for sharing of field and lab data obtained.
7. Analysis of environmental factors such as amount of precipitation, wind velocity etc.

Transferable skills:

1. Use of IT (word-processing, use of internet, 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.

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

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.

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

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.

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.

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.

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.

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

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

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.

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

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.

Course Outcomes of B.Sc. Botany

- CO1. Critically evaluation of ideas and arguments by collection relevant information about the plants, microorganisms, so as recognize the position of plant in the broad classification and phylogenetic level.
- CO2. 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.
- CO3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.
- CO4. 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.
- CO5. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.
- CO6. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.
- CO7. 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.

- CO8. 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.
- CO09. 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.
- CO10. 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.
- CO11. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

Programme Specific Outcomes: **PSOs of B.Sc. Botany:**

B.Sc. Part-I, Semester-I

Paper I: Bot-101: Viruses, Bacteria, cyanobacteria, Algae, Fungi and Lichens

On completion of the course, students are able to:

1. Understand the scope of microbiology in terms of human welfare
2. Understand the role of Bacteria and Cyanobacteria
3. Understand the Diversity among Algae.
4. Know the systematic, morphology and structure of Algae.
5. Understand the life cycle pattern of Algae.
6. Understand the useful and harmful activities of Algae.
7. Understand the Biodiversity of Fungi, Morphology, taxonomy
8. Know the Economic Importance of Fungi
9. Know the systematic, structure, economic importance of Lichens
10. Understand the disease symptoms, etiology and control measures of plant diseases caused by fungi, viruses and bacteria.
11. Understand the applications of various microbes as agents of Bioprospecting.

B.Sc. Part-I, Semester-II

Paper II: Bot-201: Bryophytes, Pteridophytes, Paleobotany and Gymnosperms

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. Know the evolution of Bryophytes, Pteridophytes and Gymnosperms.
4. Understand the habit of the Bryophytes, Pteridophytes and Gymnosperms plant body.
5. Know the vegetative characteristics of the plant.
6. Understand the economic importance of the lower plants.
7. Know the taxonomic position, occurrence, thallus organization, reproduction of Bryophytes, Pteridophytes and gymnosperms.
8. Become aware of applications of different plants in various industries.
9. To highlight the potential of these studies to become an entrepreneur.
10. To equip the students with skills related to laboratory as well as industries based studies
11. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.
12. Understand the various fossil genera representing different fossil groups.

B.Sc. Part-II, Semester-III

Paper III: Bot-301: Histology, Anatomy, Embryology and Palynology

On completion of the course, students are able to:

1. Understand the different kinds of tissues associated with plants
2. To analyses and prepare hypothesis to know the tissue system and their adaptations among the different group of plants
3. Understand the conducting system of the plants
4. Know the internal structure of monocotyledonous and dicotyledonous plants with typical examples
5. Understand the normal and abnormal secondary growth and development of wood in plants
6. Know the different Indian embryologists contributions to the field of plant science
7. Understand the development of male and female gametophyte, double fertilization and triple fusion among the angiosperms.

8. Understand the different agents involved in the pollination and its significance
9. Know apomixis and polyembryony and their significance in the plant developmental biology
10. Understand the pollen morphology of the angiosperms

B.Sc. Part-II, Semester-IV

Paper IV: Bot-401: Ecology and Environmental Biology

On completion of the course, students are able to:

1. Understand the Aims and scope of ecology with respect to plant growth and survival
2. 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. Understand the ecological succession
7. Know the biogeochemical cycles of carbon, nitrogen and phosphorus
8. Understand the community ecology through quadrates and transects
9. Practically they are able to understand the anatomical modifications of the plants for various stress created by the nature itself
10. Understand the methods of determination plant vegetation richness
11. Understand the scope and importance of natural resources such as renewable and non renewable resources.
12. Know the significance of conservation ecology
13. Understand the soil erosion control methods
14. Know the conservation and management of wild life and their importance in ecological balance
15. Know the phyto-geographical regions of India and Karnataka

B.Sc. Part-III, Semester-V

Paper V: Bot-501: Morphology, Taxonomy and Economic Botany

On completion of the course, students are able to:

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 „systematics“
5. Understand the Phylogeny of angiosperms -A general account of the origin of Angiosperms.

6. Understand the general range of variations in the group of angiosperms.
7. Trace the history of development of systems of classification emphasizing angiospermic taxa.
8. To learn the wide activities in angiosperm and trends in classification.
9. Learn about the characters of biologically important families of angiosperms.
10. Know the floral variations in angiospermic families, their phylogeny and evolution.
11. Understand various rules, principles and recommendations of plant nomenclature produces in plant identification.
12. Understand major evolutionary trends in various parts of angiospermic plants
13. Know the technique of herbarium preparation and its importance
14. Understand the recent classifications methods used for classification angiosperms
15. Understand the role plants in human welfare.
16. Gain knowledge about various plants of economic use.
17. Know importance of plants & plant products.
18. Understand the chemical contents of the plant products.
19. Know about the utility of plant resources.

B.Sc. Part-III, Semester-V

Paper VI: Bot-502: Cell Biology and Cytogenetics

On completion of the course, students are able to:

1. Gain knowledge about "Cell Science".
2. Understand Cell wall Plasma membrane, Cell organelles and cell division.
3. Learn the scope and importance of molecular biology.
4. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.
5. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.
6. The concept of operon and its structure and regulation.
7. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.
8. Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication.
9. Mendelian and Neo-mendelian genetics
10. To study the phenomenon of dominance, laws of segregation,

independent assortment of genes.

11. To understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc.
12. Understand sex determination in plants and organisms

B.Sc. Part-III, Semester-VI

Paper VII: Bot-601: Plant breeding, Biotechnology and Plant tissue culture

On completion of the course, students are able to:

1. Understand the science of plant breeding.
2. To introduce the student with branch of plant breeding for the survival of human being from starvation.
3. To study the techniques of production of new superior crop varieties.
4. Understand the modern strategies applied in Genetics and Plant Breeding to sequence and analyze genomes
5. Get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e. Mass selection, Pureline Selection, Recurrent and Clonal selection.
6. Know about exploitation of Heterosis, hybrid and variety development and their release through artificial hybridization.
7. Understand the fundamentals of Recombinant DNA Technology.
8. Know about the Genetic Engineering.
9. Understand the principle and basic protocols for Plant Tissue Culture.
10. Understand the applications of biotechnology for human welfare
11. Know the gene mapping, DNA finger printing, and production of monoclonal antibodies.
12. Understand the ELISA method to detect the plant diseases
13. Understand the importance of Transgenic plants

B.Sc. Part-III, Semester-VI

Paper VIII: Bot-602: Plant Physiology

On completion of the course, students are able to:

- 1) Know importance and scope of plant physiology.
- 2) Learn and understand about mineral nutrition in plants.
- 3) Understand the growth and developmental processes in plants.
- 4) Know the nitrogen metabolism and its importance.
- 5) Understand the plants and plant cells in relation to water.
- 6) Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.
- 7) Understand the respiration in higher plants with particular emphasis

on aerobic and anaerobic respiration.

- 8) Understand the rate of transpiration and its significance in plants
- 9) Learn about the movement of sap and absorption of water in plant body
- 10) Understand the process of translocation of solutes in plants
- 11) Understand the plant movements.
- 12) Structure and general features of enzymes.
- 13) Concept of enzyme activity and enzyme inhibition.