



Department of Botany

Govt. V.Y.T. PG Autonomous College, Durg



Vision

To conduct innovative research on the patterns and processes of life with a focus on plants and their environment

Mission

- To empower the students to achieve overall development, by imbuing in them the spirit of self-respect, self-confidence, creating global opportunities for them, and to develop human resource with expertise in frontier areas of plant sciences

Program Specific Outcome (PSO) of UG

Botany course deals with the scientific study of the plants, algae and fungi.

PSO1: A student completing the course is able to understand different branches of Botany such as systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various life-forms.

PSO2: They become competent enough in various analytical and technical skills related to plant sciences

PSO3: The course is a vast combination of studying from the basic cell structure to the workings and metabolism of plants on higher levels including their evolution.

PSO4: Students gain skills and knowledge, which they can apply to do the botanical research and findings in areas such as Agriculture, Forestry, Horticulture, Plant Breeding, etc

PSO5: Course also provides a hands-on experience to the students in understanding the scientific concepts through practical knowledge.

Course Outcome of B.Sc. Botany

B.Sc. Part -I

Paper I Bacteria, Viruses, Fungi, Lichens and Algae

On completion of the course, students are able to:

CO 1: To Learn classification, characteristics, nature life cycle about viruses

CO 2: To Learn the characteristics, identification and cultural methods of Rhizobium, Azotobacter and Anabaena.

CO 3: Understand the Biodiversity and economic importance of Fungi

CO 4: Understand the diversity, Morphology and economic importance among Algae

CO 5: Understand the diversity, economic importance of Lichen and mushroom Cultivation

Paper II: Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

On completion of the course, students are able to:

CO1: Understand the morphological diversity and economic importance of Bryophytes.

CO 2: Understand the morphological diversity, life cycle and economic importance Pteridophytes.CO 3: Also, they will know about Azolla as a biofertilizer.

CO 4: Know the evolution, diversity, morphological, anatomical structure and economic importance ofGymnosperms.

CO 5: They will able to understand about geological time scale and fossil plants

B.Sc. Part -II

Paper I: Plant Taxonomy, Economic Botany, Plant Anatomy and Embryology

CO 1: Understanding of the students about the Identification, Nomenclature and their classification including recent advances in the field.

CO 2: Learn about the characters of biologically important families of angiosperms.

CO 3: The students will learn about the economic value of plant sources of cereals, legumes, spices,oil, rubber, timber and medicines.

CO 4: Understand the normal and anomalous secondary growth in plants and their causes and scope &importance of Anatomy.

CO 5: Know the application of Embryogenesis, Palynology and Experimental embryology.

Paper II: Ecology and Plant Physiology

CO 1: Understand about plants and environment and familiar with community ecology and ecosystem.

CO 2: Students will be able to understand the concept of ecosystem, food web, food chain, concept ofecological pyramid and biogeochemical cycle.

CO 3: Understand the application of vital and physical forces theories on plant physiology most preferably ascent of sap, transpiration, mineral nutrition in plants and phloem transport.

CO 4: Students will be able know about Introduction and explanation of Photosynthesis, photorespiration and respiration.

CO 5: Understand the role of plant growth regulators in plants and physiology of flowering, seeddormancy.

B.Sc. Part -III

Paper- I: Analytical Technology Plant Pathology, Experimental Embryology, Elementary Biostatistics and Environmental Pollution and Conservation

- CO 1: Students will be able to understand principles and applications of analytical instrumentation.
- CO 2: Understand the plant tissue culture techniques and application and also know the analytical techniques.
- CO 3: Understand the scope and importance of Plant Pathology and also know the prevention and control measures of plant diseases and its effect on economy of crops.
- CO 4: Learn about conservation of biodiversity, endemic species, red data book, concept of sustainable development and phytoremediation techniques.
- CO 5: Understand the application of various biostatistical tools are used in applied research.

Paper II: Genetics, Molecular Biology, Biotechnology and Biochemistry

- CO 1:** Understand the plant cell structure, cell wall structure plasma membrane and specialized plant cell type, Mendel's laws, gene concept and morphology of chromosome.
- CO 2:** Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material and process of synthesis of proteins and role of genetic code in polypeptide formation.
- CO 3:** Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication and understand the fundamentals of Recombinant DNA Technology.
- CO 4:** Understand the protein, Carbohydrate, fat- structure and classification and biosynthesis in prokaryotes and eukaryotes. They will also learn Significance of Carbohydrates and understand the Properties of saturated fatty acids, and unsaturated fatty acids.
- CO 5:** Student will get the nomenclature, classification, components enzyme, theories and enzyme kinetics.

Lab Course 1:

- CO 1: Students will be able understand the internal and external morphology of vascular and non vascular plants.
- CO 2: Familiarize with the basic skills and techniques of botany.

Lab Course 2:

- CO 1: Understand the different characteristic of plants like Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Asclepiadaceae, Acanthaceae and Lamiaceae, including monocotyledonous families.
- CO 2: Understand the classification of plant tissues with a brief account on Dicot secondary growth and Anomalous Secondary growth.
- CO 3: Understand the process of photosynthesis and respiration in higher plants.

Lab Course 3:

- CO 1: Student will be able to understand the host relation of plant disease and also develop skill about preparation of various types of culture medium, instrumentation techniques.

Program Specific Outcome of M.Sc. Botany

- PSO 1: Understanding the classification of plants from cryptogams to Spermatophyte. Identification of

the flora in field. Study of biodiversity in relation to habitat correlate with climate change, land and forest degradation.

PSO 2: Application of Botany in agriculture through study of plant pathology. Paleobotany to trace the evolution of plants.

PSO 3: Understand the ultrastructure and function of cell membranes, cell communications, signaling, genetics, anatomy, taxonomy, ecology and plant Physiology and biochemistry. To understand the multi functionality of plant cells in production of fine chemicals. There wide spread industrial applications.

PSO 4: Molecular and Physiological adaptations in plants in response to biotic and abiotic stress. Genes responsible for stress tolerance genetic engineering of plants.

Course Outcome of M.Sc. Botany

M.Sc. First Semester

Paper-I Cell biology

CO 1: The students will understand the plant cell structure, cell wall structure plasma membrane and specialized plant cell type.

CO 2: The students will get acquainted with the structure and functions of cell organelle like chloroplast, mitochondria and ribosome and plant vacuoles.

CO 3: The students will have knowledge of nucleus and its structure cell cycles and apoptosis, E2F proteins.

CO 4: The students will have the knowledge of cytoskeleton of cell and other cellular organelles their function sans structures like lysosomes, peroxisomes Golgi apparatus and Endoplasmic Reticulum. They will also have the knowledge of cell biology techniques like In Situ hybridization, FISH, GISH, ELISA, RIA.

Paper – II: Microbiology, Phycology and Mycology

CO 1: Students will get knowledge of microbes their economic importance and also get acquainted with the algae their classification a thallus structure etc.

CO 2: Students will receive the knowledge of different groups of algae like Cyanophyceae, Chlorophyceae, Charophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae, Rhodophyceae and will also know about economic importance of bio fertilizers.

CO 3: Students will get acquainted with fungus its cellular structure reproduction heterothallism and Parasexuality and they will also become aware of symptoms of plant diseases.

CO 4: The students will get knowledge of different division of fungi like Myxomycotina, Mastigomycotina, Zygomycotina, Ascomycotina and Deuteromycotina. They will also aware of mushroom cultivation.

Paper-III: Biology and diversity of Bryophyta, Pteridophyta and Gymnosperm

CO 1: The students will come to know about general characters of bryophytes, fossil bryophytes and will also acquainted with different groups of bryophytes like Marchantiales, Jungermanniales, Anthocerotales, Sphagnales and Polytrichales.

CO 2: The students will get the knowledge of general characters classification stele evolution heterospory of pteridophytes and will also have the knowledge of fossil pteridophytes and different groups like Psilopsida, Lycopsidea and Pteropsida.

CO 3: The students will know about general characteristics, classification of gymnosperms and general account of Cycadeoidales, Cordiales, Pteridospermales, Medullosaceae, Caytonaceae and Pentoxylales.

CO 4: The students will become aware of the structure and reproduction of Zamia, Araucaria, Cedrus, Ephedra, Welwitschia, Gnetum, and Ginkgo biloba.

Paper – IV: Plant Physiology

CO 1: The students will get the knowledge of energy flow principles of thermodynamics, redox reactions and fundamentals of enzymology.

CO 2: The students will have the knowledge of membrane transport and translocation of water and solutes, plant water relations, mechanism of water transport through xylem and root microbe interaction.

CO 3: The students will get the knowledge of signal transduction, phospholipids signaling, role of cyclic nucleotides and diversity in protein kinases and phosphatases.

CO 4: The students will become aware of plant growth regulators and elicitors, phytohormones, they will also get acquainted with stress physiology.

Lab Course 01: Based on Paper I & II

CO 1: Understand the Squash and Smear techniques and showing the stages of mitosis (Onion root tips) and showing permanent slides/photographs of mitosis and meiosis.

CO 2: Student will be able to develop practical skills of bacterial staining and understand the basic procedure of fungal identification.

Lab Course 02: Based on Paper III & IV

CO 1: Students will get the knowledge about monographic study of bryophytes, pteridophyte and Gymnosperm plants.

CO 2: Understand the various plant physiological protocols and biochemical activity.

M.Sc. Second Semester

Paper I: Genetics

CO 1: The students will come to know about chromosome structure organization of centromere and telomere, special types of chromosomes and cytoplasmic inheritance. They will also get the knowledge of sex determination in plants.

CO 2: The students will have the knowledge of structural alterations in chromosome, numerical alteration in chromosome and genetics of prokaryote and eukaryotic organelles.

CO 3: The students will get the knowledge of genetic recombination, recombination enzymes, linkage

etc.

CO 4: The students will understand chromosomes inheritance, Mendelian laws, transposons, DNA damage and repair.

Paper II: Taxonomy of Angiosperm

CO 1: The students will have the knowledge of taxonomic tools like herbarium and Floras; they will also understand the salient features of international code of botanical nomenclature and taxonomic hierarchy.

CO 2: The students will have the knowledge of system of angiosperms, salient features of the systems proposed by Bentham and Hooker, Hutchinson, Takhtajan and Cronquist. They will also learn the taxonomic evidences.

CO 3: The students welcome to know the diversity of flowering plants and will learn the following families like Polypetalae, Ranunculaceae, Magnoliceae, Annonaceae, Nymphaeaceae, Rutaceae, Meliaceae, Myrtaceae, Lythraceae.

CO 4: The students will learn the general account of the following families Asteraceae, Lamiaceae, Verbenaceae, Polygonaceae, Euphorbiaceae, Musaceae, Liliaceae, Palmaceae and Cyperaceae.

Paper- III: Molecular Biology

CO 1: The students will have the knowledge of DNA structure, replication, tRNA structure its function, protein synthesis in prokaryote and eukaryotes.

CO 2: The students will get the knowledge of protein sorting, mutations, and translocation.

CO 3: The students will come to know about gene structure and expression, regulation of gene expression in prokaryote and eukaryotes, genetic, mapping and genetic markers.

CO 4: The students will have the knowledge of molecular cytogenetic C-Value Paradox, Restriction Mapping, Alien gene transfer, transfer of individual chromosome and chromosome segments and inbreeding and heterocyst.

Paper- IV: Plant Metabolism

CO 1: The students will have the knowledge of phytochemistry and photosynthesis, and carbon assimilation.

CO 2: The students will learn the respiration and lipid metabolism.

CO 3: The students will come to know about nitrogen fixation and sulfur metabolism.

CO4: The students will have the knowledge phytochromes and cytochromes, photoperiodism, significance, vernalization and endogenous and its regulation.

Lab Course 03: Based on Paper I & II

CO 1: Understand the Karyotype analysis, cytological techniques and study the salivary gland chromosomes from Chironomus larva.

CO 2: Student will be able to identify scientifically the plants up to species level around their locality.

Lab Course 04: Based on Paper III & IV

CO 1: Students get knowledge the techniques of isolation and estimation of DNA, Protein from plants.

CO 2: Understand the Plant Metabolism and Biotechnology describes the biosynthetic pathways of plant metabolites, their function in plants, and some applications for biotechnology.

M.Sc. Third Semester

Paper – I: Plant development and Plant Resources

CO 1: The students will have the knowledge of unique features of plant development.

CO 2: The students will get acquainted with shoot development secretory ducts, wood developments etc.

CO 3: The student will understand the growth of leaf and development of flowers in plants, they will also come to know about senescence.

CO 4: The students will come to know the importance of plant resource in the form of food/fodder plants, oil yielding plants, fiber crops, timber and fiber wood plants etc.

Paper- II:Plant Ecology

CO 1: The students will learn about structure o ecosystem its functions primary productions energy dynamics litter fall and decomposition and C, N, P and S mineral cycle.

CO 2: The students will come to know about ecosystem stability and management, principle and threats of sustainable development.

CO 3: The students will have the knowledge of vegetation and organization concepts of community and community coefficients.

CO 4: The students will have the knowledge of temporal changes, types of ecological successions.

Paper- III:Biotechnology and genetic engineering of plants

CO 1: The students will learn the principles and scopes of biotechnology plant cell and tissue culture. They will also learn about cell culture and culture media.

CO 2: The students will get the knowledge of application of plant tissue culture strategy for plant conservation, ex-situ and in-situ conservations.

CO 3: The students will get the knowledge of organogenesis and adventives embryogenesis (somatic embryogenesis & somatic androgenesis) and somatic hybridization.

CO 4: The students will learn about Aims, strategies and development of transgenic (gene transfer method), chloroplast transformation and its utility and molecular maps of plant genomes.

Paper- IV: Microbial Ecology (Elective I)

CO 1: The students will get the knowledge of methods in microbial ecology and instrumental (principle, structure and functions).

CO 2: The students will learn clay- Humus-Microbe interaction, plant-microbe interaction, Animal Microbe interaction etc.

CO 3: The students will learn about the nutritional type (Autotrophs, Heterotrophs, Phototrophs, Chemotrophs) and Extremophiles, Physiology, molecular, adaptation and application.

CO 4: The students will come to know about the soil as a habitat for microorganism, Rhizosphere and rhizoplane microorganisms, organic matter decomposition and biogeochemical cycling.

Paper- IV:Ethnobotany (Elective II)

CO 1: The study of ethno medicine is concerned with the study of the traditional medical system from the indigenous point of view.

CO 2: The ethno medical approach proves particularly useful for the study of indigenous therapeutic agents.

CO 3: Understand the healing practices according to indigenous explanatory models and its correlation to the modern medicine or allopathy.

CO 4: Ethno medicine will strengthen our understanding of the issues relating to tribal problems and development.

Lab Course 05: Based on Paper I & II

CO 1: Understand the role plants in human welfare.

CO 2: Students will develop skill about anatomical studies of root, stem and leaf of monocotyledons and dicotyledons plants.

CO 3: Skill to develop define ecology and the four levels of ecological research and describe examples of the ways in which ecology requires the integration of different scientific disciplines.

Lab Course 06: Based on Paper III & IV

CO 1: Learn various techniques in Plant Biotechnology like aseptic handling of plant materials, culture of callus, protoplasts and production of artificial seeds.

CO 2: To able to understand the techniques of morphogenesis, organogenesis and methods of gene transfer.

CO 3: Know about genetic microbial technique for isolation of pure culture techniques and develop skill about various methods for identification of unknown microorganisms.

CO 4: Gain knowledge about various plants of economic uses.

M.Sc. Fourth Semester

Paper -I: Plant reproduction &Utilization of resources

CO 1: The students will learn about reproduction, pollination, pollen- pistil interaction, self – incompatibility and fertilization.

CO 2: The students will get knowledge of male gametophyte and female gametophyte.

CO 3: The students will get the knowledge of seed and fruit development (Endosperm, Embryogenesis, polyembryony and apomixes)

CO 4: The students will learn the utilization of resources.

Paper- II: Plant Ecology-II (Pollution & Biodiversity Conservation)

- CO 1: The students will learn about: - climate, soil and vegetation pattern of India (climate of India , life zones and soil types) .
- CO 2: The students will learn about pollution, climate change ecosystem, air and soil pollution, greenhouse gases and ozone layer.
- CO 3: The students will get knowledge of biological biodiversity (concepts and levels, status of India, speciation and extinction, worlds centers of primary diversity and domestic plants).
- CO 4: The students will learn about different types of conservation strategies of natural resources, role of Scientific Institute for conservation and nonformal conservation efforts.

Paper – III: Biotechnology and Genetic Engineering of Microbes

- CO 1: The students will get the knowledge of Recombinant DNA technology (genecloning, construction of genomic/cDNA libraries).
- CO 2: The students will learn about genomic and proteomics, genetic and physical mapping of genes (artificial chromosomes, genome projects, bioinformatics, functional genomics, protein profiling and its significance).
- CO 3: The students will get knowledge of microbial genetic manipulation, bacterial transformation etc.
- CO 4: The students will learn about genetic improvement of industrial microbes, enzymes technology, use of microbes in industry and agriculture, intellectual property rights, possible ecological risks and ethical concerns, cryopreservation and germplasm storage.

Paper-IV {Elective - I}: Microbial Ecology

- CO 1: The students will learn about water microbiology (types of water, water microorganisms and microbial analysis of water).
- CO 2: The students will get the knowledge of air microbiology (indoor and outdoor aero microbiology, aeroallergens and aero allergy, assessment of air quality and phylloplane microflora).
- CO 3: The students will get knowledge of environmental microbiology (waste as a resource, biogas production, sewage (wastewater) treatment, biodegradation and biodeterioration).
- CO 4: The students will learn about plant diseases (bacterial diseases, viral diseases).

Paper-IV {Elective - II}: Ethnobotany

- CO 1: Students will learn about history of Ethnobotanical research regarding both past and present relationships between plants and the traditional societies.
- CO 2: Ethnobotany may also prove an important tool in the search of new pharmaceuticals. In addition to its traditional roles in economic botany and exploration of human cognition,
- CO 3: Ethnobotanical research may be applied to current areas of study such as biodiversity prospecting and vegetation management.
- CO 4: It is hoped that, in the future, ethnobotany may play an increasingly important role in

sustainable development and biodiversity conservation.

Lab Course 07: Based on Paper I & II

CO 1: Students will be able understand about the structure of pollen grain, types of placentation, isolation techniques of embryo from monocot and dicot seeds.

CO 2: Students understand the soil analysis protocol, chlorophyll estimation and also get knowledge of diversity of plants in urban ecosystems.

Lab Course 08: Based on Paper III & IV

CO 1: Students acquired knowledge and develop skills of various biotechnological protocol and antibiotic effects of microorganisms.

CO 2: Students understand the various microbial protocols like isolation and identification of microorganisms from different environments.




Principal
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