



DPG DEGREE COLLEGE

(Affiliated to MDU Rohtak)

Sector-34, Near Marble Market, Gurugram 122001

MSC PROGRAMMS

M.Sc Botany

Program outcomes listed as follows:

PROGRAMME SPECIFIC OUTCOMES;

1. PSO1 Students will have core knowledge of the taxonomy, anatomy, morphology, systematics, genetics, physiology and ecology of plants, with particular emphasis on floristic diversity and ecosystem composition
2. PSO2 Students will be able to demonstrate a working knowledge of the foundational concepts of Botany, including cellular, organismal and evolutionary biology.
3. PSO3 Students will be to integrate floristic, ecological, physiological and biotechnological principles to better understand the functioning of biological systems.
4. PSO4 Students will be able to make observations and collect data in laboratory and in field courses and to analyze these results, derive conclusions and report their findings in the form of research papers, project reports and dissertations.
5. PSO5 Students would gain basic understanding of laboratory and field safety issues. Understanding of basic concepts,

COURSE OBJECTIVES & COURSEOUT COMES

1.	BOTANY:MSC I st SEMESTER	
	Paper: Cell and Molecular Biology	
	<ul style="list-style-type: none">• To know the structural organization of cell and intracellular organelles.• To know the general principles of cellular communication and roles of different adhesion molecules.• To make the students understand replication, transcription and translation.• To make the students understand gene expression at transcription and translational level	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none">• Understand the structural organization of cell and intracellular organelles.• Understand the general principles of cellular communication and roles of different adhesion molecules.• Learn replication, transcription and translation.• Understand gene expression at transcription and translational level.
	Paper: Cryptogamic Botany	

	<ul style="list-style-type: none"> • To make the students learn about morphological diversity of Algae, Bryophytes and Pteridophytes. • To make the students learn about the economic importance of the Algae, Bryophytes and Pteridophytes. • To make the students learn about critically evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenetic level. • To make the students to know the evolution of Pteridophytes. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand the general characters, silent features and life cycles of lower plants viz. algae, bryophytes and pteridophytes. • Understand and collect the diversified habitats of algae, bryophytes and pteridophytes. • Identify algae, bryophytes and pteridophytes from local habitats. • Understand evolution of stelar system and seed habit. • Learn about the ecological and economic significance of different lower plants.

	Subject: Plant Biotechnology -1	
	<ul style="list-style-type: none"> • To develop understanding of techniques for tissue culture, cell culture and organ transplantation. • To make the students learn about various components of plant tissue culture media, e.g. minerals, growth factors, hormones, and what governs the choice of components, • To make the students learn about various steps taken to establish and optimize media for particular purposes in particular species. • To study about the some of the more advanced techniques, e.g. embryo rescue and protoplast. • To make the students learn about how to establish and maintain plants in tissue culture and micropropagation, including morphogenesis. • To introduce to students the basic protocol to establish an unknown species and to make the students learn about various cell lines used in 	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Know theoretical information and practical experience in plant tissue culture. • Understand the techniques for determining the sources of <i>in vitro</i> plantlet regeneration problems. • Know the problems of contamination occurring during plant tissue culture. • Understand the importance of haploid and hybrid plants.

	tissue culture and their origins and uses.	
Plant Anatomy and Diversity of Gymnosperms		
	<ul style="list-style-type: none"> • To introduce to students the basic concepts related to structural components amongst plants at different stages of growth. • To make the students learn about plant structure with the function, taxonomy, archaeology and climate change studies. • To make the students learn about recovery of fossils and engage in evidence based reconstruction and identification of gymnosperms. • To introduce to students the basic understanding of distribution and diversity of gymnosperms, their vegetative and reproductive growth and their significance. 	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Understand the variations in structural components amongst plants at different stages of growth. • Relate the plant structure with the function, taxonomy, archaeology and climate change studies. • Appreciate the recovery of fossils and engage in evidence based reconstruction and identification of gymnosperms. • Understand the distribution and diversity of gymnosperms, their vegetative and reproductive growth and their significance.

	Paper: Plant Reproduction	
	<ul style="list-style-type: none"> • To Study about the concepts of male and female gametophytes, spermdimorphism, microsporogenesis and megasporogenesis. • To Study about the pollen-pistil interaction, male sterility, self incompatibility and pollen allergy. • . To Study about the collection of pollen material and their identification. • To Study about dynamics of fruit development, seed formation and methods to overcome seed dormancy. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand male and female gametophytes, spermdimorphism, microsporogenesis and megasporogenesis. • Understand pollen-pistil interaction, male sterility, self incompatibility and pollen allergy. • Know about the collection of pollen material and their identification. • Understand dynamics of fruit development, seed formation and methods to overcome seed dormancy.
	CORE COURSE , Lab Course-I	
	<ul style="list-style-type: none"> • To study about the demonstration of cell membrane permeability and mitochondria activity. • To study how to isolate and quantify RNA, DNA and Proteins. • To learn how to Collect, identify and describe the local algae,bryophytes and pteridophytes. • To know about the techniques of Plant Tissue Culture and micropropagation. • To study about sample collection, media preparation, sterilizations and get familiarity with the mechanism of regeneration of complete plantlets via <i>in vitro</i> techniques. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Demonstrate the cell membrane permeability and mitochondria activity. • Isolate and quantify RNA, DNA and Proteins. • Collect, identify and describe the local algae,bryophytes and pteridophytes. • Explore and document the diversity of lower plants. • Understand the techniques of Plant Tissue Culture and micropropagation. • Learn sample collection, media preparation, sterilizations and get familiarity with the mechanism of regeneration of complete plantlets via <i>in vitro</i> techniques and other processes like Androgenesis, gynogenesis, somatic hybridization, protoplast fusion and embryo rescue etc.
	Lab Course-II	
	<ul style="list-style-type: none"> • To introduce to students the concept of basic techniques for study of plant Anatomy. • To Study about anatomical features of stems and roots of higher plants. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Learn basic techniques for study of plant Anatomy

	<ul style="list-style-type: none"> • To Study about how to prepare the temporary and permanent slides along with the process of staining and mounting. • To Study about the general characters, diversity, classification and economic importance of gymnosperms. • To Study about characters of living and fossil gymnosperms. • To introduce to students the concept of fossilization and appreciate the contribution of Indian paleobotanists. 	<ul style="list-style-type: none"> • Describe the anatomical features of stems and roots of higher plants. • Prepare the temporary and permanent slides alongwith the process of staining and mounting. • Comprehend the general characters, diversity, classification and economic importance of gymnosperms. • learn the characters of living and fossil gymnosperms. • Understand the process of fossilization and appreciate the contribution of Indian paleobotanists.
--	---	--

BOTANY:MSC IInd SEMESTER

Paper: Plant Biochemistry and Metabolism

<ul style="list-style-type: none"> • To Study about the molecular bonding of bio molecules and contribution of enzymes to cellular metabolism. • To Study about fundamental thermodynamic properties and laws. • To Study about the ways plants use light to assimilate atmospheric carbondioxide to support life on earth. • To introduce to students the concept of structure, function, synthesis and degradation of carbohydrates and lipids within plants. • To Study about the dynamics of protein structure, function and interaction • To Study about the ability of plants to uptake, transport and assimilate nitrogen and sulphur. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Learn about the molecular bonding of bio molecules and contribution of enzymes to cellular metabolism. • Explain fundamental thermodynamic properties and laws. • Understand about the ways plants use light to assimilate atmospheric carbon-dioxide to support life on this planet. • Describe the structure, function, synthesis and degradation of carbohydrates and lipids within plants. • Understand the dynamics of protein structure, function and interaction. • Understand the ability of plants to uptake, transport and assimilate nitrogen and sulphur.
---	--

Paper: Taxonomy of Angiosperms		
<ul style="list-style-type: none"> • To study about origin and evolution of flowering. • To introduce to students the concept of speciation and species. • To know about the rules and regulation of International Code of Botanical Nomenclature and Phylocode. • To study silent features, merits and demerits of different systems of angiosperm classification. • To study about modern techniques and tools of plant taxonomy. • To learn about how to collect plant specimens and preparation of herbaria. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Learn about origin and evolution of flowering. • Understand speciation and various species concepts. • Learn the rules and regulation of International Code of Botanical Nomenclature and Phylocode. • Understand the silent features, merits and demerits of different systems of angiosperm classification. • Understand modern techniques and tools of plant taxonomy. • Collect the plant specimens, record field notes, prepare herbaria and will be able to use flora and manuals for plant identification 	
Paper: Plant Development		
<ul style="list-style-type: none"> • To understand the development of SAM and RAM • To understand the mechanism of seed germination and growth • to understand the mechanism of cell to cell communication 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand about various developmental processes in plants viz. shoot, leaf and flower. • Understand cytological and molecular analysis of development of root apical meristem and shoot apical meristem. • Understand the genetics of floral organ differentiation. • Understand various physiological and biochemical aspects of seed germination and seedling growth. 	
Paper: Tools and Techniques		
<ul style="list-style-type: none"> • To know about techniques of chromatography to separate the various substances that makes up a mixture. • To know about microscopy techniques and their applications 	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Use different chromatographic techniques and handling of sophisticated instruments 	

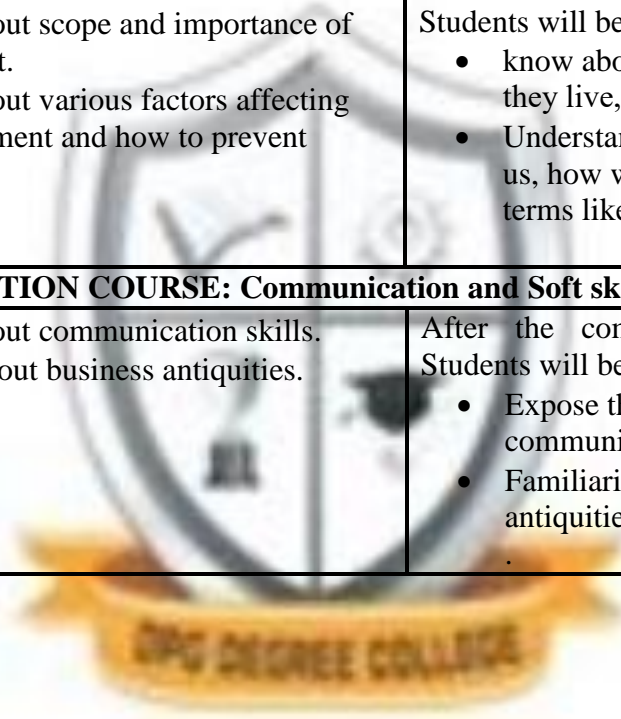
	<ul style="list-style-type: none"> • To learn about spectroscopy techniques and for studying the structures of atoms and molecules. • To learn about molecular biology techniques. 	<ul style="list-style-type: none"> • Learn about the principles and handlings of different techniques such as RT-PCR, AFLP, electrophoresis and sequence of nucleic acid etc. used in molecular biology • Various techniques in field botany, preparation of herbarium and identification of plant materials • Understand the database and its efficient use in bioinformatics.
--	--	--

Subject: OPEN ELECTIVE: ENVIRONMENTAL ISSUES

<ul style="list-style-type: none"> • To learn about scope and importance of environment. • To learn about various factors affecting the environment and how to prevent pollution. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • know about environment in which they live, it's importance , • Understand how atmosphere affect us, how we affect it , scientific terms like global warming etc.
---	---

Paper: FOUNDATION COURSE: Communication and Soft skills

<ul style="list-style-type: none"> • To learn about communication skills. • To know about business antiquities. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Expose themselves to better communication skills. • Familiarize with business antiquities.
---	---



Core course, Lab Course-I		
	<ul style="list-style-type: none"> • To know about quantitative analysis of proteins, sugars and lipids. • To learn about enzyme kinetics. • To know about techniques of precipitation and gel filtration. • To know about photosynthetic pigments and Hill activity. 	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Carry out of the quantitative analysis important biomolecules such as proteins, sugars and lipids. • Perform experiments on enzyme kinetics. • Purify proteins/enzymes from plants sources using the techniques of precipitation and gel filtration. • Determine the content of photosynthetic pigments and study their absorption spectra. • Demonstrate Hill activity • Describe a specimen from the locally available angiospermic families.
Core course , Lab Course-II		
	<ul style="list-style-type: none"> • To know about hysiological and biochemical aspects of seed germination and seedling growth. • To learn about different reproductive parts of plants. • To learn about total proteins and carbohydrates from seeds of cereals and legumes. • To know about isolation of plasmids. • To know about various basic botanical and biotechnological tools 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand about physiological and biochemical aspects of seed germination and seedling growth. • Study epidermal peels of leaves and trained in microscopic examination of vertical/transverse and longitudinal sections of different reproductive parts of plants. • Estimate the total proteins and carbohydrates from seeds of cereals and legumes by different methods. CO₄ Students will be able to perform the experiments of seed and pollen tube germination. • Isolate and co-cultivate plasmids from bacteria and able to quantify it spectrophotometrically. • Understand the basic botanical and biotechnological tools to study the concepts of plant development.

BOTANY:MSC IInd SEMESTER

Paper: Plant Physiology

- To know about plant-water relations, mineral nutrition.
- To learn about the concept of ligands and receptors.
- To know about growth and development of plants.
- To know about physiological aspects of the plants ability to withstand and grow under the unfavorable conditions.
- To introduce to students the concept of plant hormones and secondary metabolites to plant growth and development.

After the completion of the course, Students will be able to

- Explore the plant-water relations, mineral nutrition and solute transport.
- Learn about the sequence of events triggered by the binding of ligands to their receptor.
- Understand the growth and development of plants as influenced by the light.
- Understand the nature, function and mode of action of plant growth regulators.
- Learn about the resilient nature of plants and physiological aspects of their ability to withstand and grow under the unfavorable conditions
- Learn about the importance of plant hormones and secondary metabolites to plant growth and development.

Paper: Plant Ecology

- To Distinguish between species, populations, communities, ecosystems biomes and
- To learn about the factors that affect population size, density, distribution, and dynamics.
- To learn about climatic and edaphic factors that affects major terrestrial biome.

After the completion of the course, students will be able to

- Understand characteristics of plants at community, population and ecosystem levels.
- Have sound background of ecosystem structure and function.
- Use various tools and techniques for ecological studies.
- Carry out survey of ecologically unique plants and study the ecological adaptations of locally available hydrophytes and xerophytes.
- Differentiate the climatic and edaphic, floral and faunal characteristics of major terrestrial biome.

Paper: Microbiology and Pathology		
	<ul style="list-style-type: none"> To introduce concepts and principles of plant pathology. To know about interaction between plant and pathogen in relation to the overall environment. The course aims to provide students with an introduction of the living entities that cause diseases in plants; the interactions between the disease causing agents. 	<p>After the completion of the course, students will be able to</p> <ul style="list-style-type: none"> Understand the ultrastructure, isolation, multiplication and economic importance of viruses Understand general account, ultrastructure, multiplication and economic importance of bacteria Understand thallus organization, nutrition and reproduction of fungi, lichens structure, Know about the reproduction and economic importance Learn pathogenesis and plant defense mechanisms, different causal organism of diseases, symptoms and its management
Paper: - Evolutionary and Economic Botany		
	<ul style="list-style-type: none"> To know about origin and evolution of economic important plants. To learn about diversity of agriculture and plants as a source of energy. To learn about morphology and cultivation of various important plants. To introduce to the students basic knowledge of medicinal and industrial values of plants. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> Know the origin of life and evolution of economic important plants. Know about the origin and diversity of agriculture and plants as a source of energy. Learn about the morphology and cultivation of plants used in daily life as food, fibers, spices etc. Gain knowledge about aesthetic and medicinal and industrial values of plants. Learn about the uses of medicinal plants and other non wood forest product.
Paper: , DISASTER MANAGEMENT		
	<ul style="list-style-type: none"> To know about several calamities, their causes and prevention. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> Learn about calamities can face in their life and its reason, how to face it, so that less loss will be of mankind.
Lab Course 1		

	<ul style="list-style-type: none"> • To know about biotic and abiotic factors on plant development and growth. • To learn about effects of salt and water stress on seed germination and plant growth. • To learn about physico-chemical properties of water and soil. • To introduce to the students basic knowledge methodology of community studies 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand the effects of various biotic and abiotic factors on plant development and growth. • Perform, analyse and report on experiments and observations in plant physiology and plant ecology. • Determine the effects of salt and water stress on seed germination and plant growth. • Collect water and soil samples and their physico-chemical analysis. • Learn the methodology of community studies i.e. Line transect, point and quadrat method.
--	--	--

Lab Course II

	<ul style="list-style-type: none"> • To know about Cyanobacteria, Bacteria and Fungi. • To know about various plant diseases and their symptoms. • To learn about tools of bioinformatics and statistics for botanical research. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Identify and classify various groups Cyanobacteria, Bacteria and Fungi. • Prepare media for bacterial and fungal culture. • Identify the symptoms of plant diseases and carry plant pathological experiments. • Use the applications of computers, tools of bioinformatics and statistics for botanical research.
--	---	--

BOTANY:MSC IVth SEMESTER

Paper: Plant Genetics

	<ul style="list-style-type: none"> • To Study about organization of genetic material. • To Study about chromosomal mutations. • To learn about genome mapping and genetic transformation. • To know about construction of molecular maps. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Understand structure and function of different types of chromosome and organization of genetic material. • Learn about chromosome, mutation and its efficient use in plant breeding • Understand genome mapping in bacteria and genetic transformation using vectors. • Understand genetic recombination, construction of molecular map.
--	---	---

Paper: Biodiversity Conservation

<ul style="list-style-type: none"> • To Study about biodiversity both at national and international level. • To Study about plant diversity and its socio-economic importance. • To Study about chromosomal mutations. • To learn about genome mapping and genetic transformation. • To know about construction of molecular maps. 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • Learn about current status of biodiversity both at national and international level. • Learn about local plant diversity and its socio-economic importance. • Recognize the significance of biodiversity of human well being. • Explain the effects of habitat degradation, exotic species, overexploitation, pollution and climate change on biodiversity in general and floristic diversity in particular. • Become conversant in various traditional and modern approaches in Biodiversity conservation..
---	--

M.Sc. Program outcomes from botany department listed as follows:

Program Specific Outcomes

Students would be able to:

PSO1 Develop a thorough understanding of the chosen subject area.

PSO2 Frame the hypothesis and to define the research questions.

PSO3 Recognize the importance of planning and preparation required to undertake a research project.

PSO4 use the appropriate research tools and techniques to collate and critically assess/interpret data.

PSO5 Students will be able to identifying their own area of interest; able to explore a subject in depth; manage a research project.

PSO5 Students will develop an ability to effectively communicate knowledge in a scientific manner.

OPEN ELECTIVE COURSE

Paper: Plant Resource Utilization

<ul style="list-style-type: none"> • To Study about natural plant resources which are economically important 	<p>After the completion of the course, Students will be able to</p> <ul style="list-style-type: none"> • know about our natural plant resources Which are economically important and their sustainable utilization.
---	--