



**NSCB Memorial Govt. Degree College  
Hamirpur  
District Hamirpur (H.P.)**



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**Department of Botany**

**Program Specific Outcomes (PSO's)**

**Programme: B.Sc. with Botany**

S. No.	A student completing B.Sc. (Botany) will be able to
PSO1	Acquire fundamental knowledge and skills in plant identification, basic knowledge of various tools, techniques and instruments for biotechnology, molecular biology, bioinformatics and plant breeding
PSO2	Analyze complex phenomena, issues, and situations in the field of research and development.
PSO3	Learn Botany as an inter-disciplinary and multi-disciplinary science
PSO4	Develop an appreciation for nature, become socially responsible citizens, and apply acquired knowledge to actively conserve the environment for a sustainable future.
PSO5	Select courses based on their interest and career goals and thus acquire specific skills that will enhance their employability and personal growth
PSO6	Students will develop the ability to enhance their analytical, interpretive, and writing skills by actively participating in field or laboratory experiments, which involve data collection, analysis, and comprehensive report writing.

## **COURSE OUTCOMES (CO's): B.Sc. with Botany**

The course outcomes (CO) are mapped to the revised Bloom's Taxonomy using the following abbreviations:

R- Remembering, U – Understanding , Ap- Applying, An- Analyzing , E- Evaluating, C- Creating

### **FIRST YEAR DISCIPLINE SPECIFIC COURSES-DSC's**

**COURSE NAME: Biodiversity  
(Microbes, Algae, fungi and Archaeogoniaties)**

**COURSE TYPE: DSC**

**COURSE CODE: BOTA101**

**CREDITS: 4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to:</b>	<b>PSOs addressed</b>	<b>Cognitive levels</b>
CO1	Understand in detail general characteristics,ecology and significance of microbes,early plants lower plants as well as higher plants.	1	R
CO2	Understand basis of classification and to distinguish between various plant groups	1,2,4	R,U
CO3	Comprehend thoroughly ecological and economic importance of various plant groups	1,4	U
CO4	Recognize the significance of studying the life cycles of type specimens for accurate species identification, conservation efforts, and advancing our understanding of evolutionary processes.	1,4	R,U

**COURSE NAME: Biodiversity (Microbes, Algae, fungi and Archaeogoniates) PRACTICAL**  
**COURSE CODE: BOTA101** **CREDITS: 2**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>
CO1	Understand plant biodiversity, including identification, classification, and ecological roles.	1,6
CO2	Gain practical skills in fieldwork and data collection for studying and documenting plant diversity.	1,4,6
CO3	Contribute to conservation efforts through sustainable management and preservation of plant species and their habitats.	1,4

**COURSE NAME: Plant Ecology and Taxonomy**  
**COURSE CODE: BOTA102**

**COURSE TYPE: DSC**  
**CREDITS: 4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
CO1	Understand the relationships between plants, their environment, and other organisms, enabling analysis of ecological patterns and processes.	1,4	R,U
CO2	Develop skills to identify and classify plant species based on their characteristics, facilitating accurate plant identification and classification.	1,2,4	R,U
CO3	Explore how plants adapt to different habitats and understand their ecological functions, enabling assessment of environmental impacts and conservation strategies.	1,4	U
CO4	Understand and learn in detail the concepts of phytogeography, biometrics, numerical taxonomy and cladistics	1,4	R,U

CO5	Students will be able to appreciate the importance of plant taxonomy rules in providing a standardized framework for naming, classifying, and organizing plant species	1,2,4,	R,U
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**COURSE NAME: Plant Ecology and Taxonomy PRACTICAL**

**COURSE CODE: BOTA102**

**CREDITS: 2**

Sr. No.	On completing the course, the student will be able to	PSO's addressed
CO1	Apply fieldwork techniques to study plant species, habitats, and ecological interactions.	2,6
CO2	Develop proficiency in plant identification and classification through practical experience.	6
CO3	Analyze ecological patterns and processes using knowledge of plant ecology and taxonomy.	1,4, 6

**SECOND YEAR  
DISCIPLINE SPECIFIC COURSES (DSC's)**

**COURSE NAME: Plant Anatomy and Embryology**

**COURSE TYPE: DSC**

**COURSE CODE: BOTA201**

**CREDITS: 4**

Sr. No.	On completing the course, the student will be able to	PSO's addressed	Cognitive levels
CO1	Gain a comprehensive understanding of plant anatomy, including the structure and organization of plant tissues and organs, enabling the identification and interpretation of anatomical features in different plant species.	1,4	R,U
CO2	Understand the processes and significance of secondary growth in plants, different parts of a flower and their functions, as well as the processes of pollination and fertilization, including the agents involved and their significance.	1,4	R,U
CO3	Explore different types and mechanisms of apomixis and examine the occurrence of polyembryony in certain plant species and discuss the ecological and evolutionary implications of these reproductive strategies.	1,4	U

**COURSE NAME: Plant Anatomy and Embryology -PRACTICAL**

**COURSE CODE: BOTA201**

**CREDITS: 2**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>
CO1	Gain practical skills in plant anatomy and embryology through hands-on laboratory exercises, including microscopic techniques and identification of plant structures.	1,5,6
CO2	Apply theoretical knowledge to practical scenarios by conducting experiments and analyzing data related to plant anatomy and embryonic development.	5,6
CO3	Improve scientific communication and research skills through effective documentation, presentation of findings, and fostering a curiosity-driven mindset for further exploration in the field.	5,6

**COURSE NAME : Plant Physiology and Metabolism**

**COURSE CODE: BOTA202**

**COURSE TYPE: DSC**

**CREDITS:4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
CO1	Understand the fundamental concepts and mechanisms of plant-water relations, including diffusion, osmosis, water potential, transpiration, and factors influencing transpiration rate.	1,4	U
CO2	Gain knowledge about essential macro and micronutrients for plants, their roles, and the mechanisms of ion transport across cell membranes.	1	R,U
CO3	Comprehend the processes of phloem translocation, including the composition of phloem sap, the pressure flow model, and phloem loading and unloading.	1	U

CO4	Develop a comprehensive understanding of photosynthesis, respiration, enzymes, nitrogen metabolism, plant growth regulators, a	1	R,U
CO5	Acquire knowledge about plant responses to light and temperature, including the roles of photosynthetic pigments, electron transport, carbon fixation pathways, enzymatic catalysis, nitrogen fixation, and plant hormones.	1,4	R,U

**COURSE NAME : Plant Physiology and Metabolism -PRACTICAL**

**COURSE CODE: BOTA202**

**CREDITS:2**

Sr. No.	On completing the course, the student will be able to	PSO's addressed
CO1	Develop practical skills in conducting experiments and measurements related to plant physiology.	6
CO2	Acquire proficiency in using laboratory equipment and techniques for data collection and analysis in plant physiology.	5, 6
CO3	Apply theoretical knowledge to practical scenarios, interpreting experimental results and drawing meaningful conclusions related to plant physiological processes	4, 6

### SKILL ENHANCEMENT COURSES

**COURSE NAME: Biofertilizers**

**COURSE CODE: BOTA203**

**CREDITS: 4**

Sr. No.	On completing the course, the student will be able to	PSO's addressed	Cognitive levels
1	Understand the concept and importance of biofertilizers in sustainable agriculture. Learn about the different types of biofertilizers, their composition, and mode of action.	1,3,4,5	U
2	Gain knowledge on the production, formulation, and application of biofertilizers.	1,3,5	R,U

3	Detailed knowledge regarding waste management and vermicompositing techniques	5	R,U
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**COURSE NAME: Gardening and Floriculture**

**COURSE CODE: BOTA204**

**CREDITS: 4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
1	Study garden designs and their principles, including formal and informal gardens and features like walls, hedges, and water.	1,3,4	R,U
2	Learn about the propagation of garden plants through sexual and vegetative methods, considering the role of plant growth regulators.	1.3.4	R,U
3	Explore a variety of ornamental plants, including annuals, perennials, shrubs, climbers, trees, and bulbous plants, as well as indoor gardening and bonsai.	1,3,5	U,Ap
4	Understand commercial floriculture, including factors affecting flower production, cultivation of important flower crops, and post-harvest management techniques for flower handling, storage, and transport	1,3,5	U,Ap

**THIRD YEAR**

**DISCIPLINE SPECIFIC Elective (DSE)**

**COURSE NAME: Economic Botany & Biotechnology**

**COURSE TYPE: DSE**

**COURSE CODE: BOTA301**

**CREDITS:4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
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CO1	Comprehend the concept of centers of origin and their importance, with reference to Vavilov's work. Learn about the origin, morphology, and economic importance of cereals -wheat and rice	1,4	R,U,Ap
CO2	.Acquire a general understanding of morphology,cultivation practices and economic importance of pulses and vegetable:gram, soybean, and potato.Explore specific details on specific spices, including their botanical details, morphology, and diverse uses.	1,4	R,U,Ap
CO3	Familiarize with the morphology, processing, and uses of tea and coffee and understand the significance of beverages in human consumption and culture.	1,4	R,U,Ap
CO4	Develop a broad description of oils, sugar, fiber-yielding plants (with a focus on groundnut,sugarcane and cotton), medicinal plants ( <i>Ocimum, Tinospora, Aloe, Rauwolfia, Emblica and Cathranthus</i> ), spices and their respective characteristics, uses, and applications	1,4	R,U,Ap
CO5	Gain proficiency in tissue culture techniques, micropropagation, haploid production, and embryo & endosperm culture.Understand the wide-ranging applications of plant tissue culture in agriculture, horticulture, and forestry for crop improvement and conservation efforts.	1,2,3,5	R,U,Ap

**COURSE NAME: Economic Botany & Biotechnology -PRACTICAL**

**COURSE CODE: BOTA301**

**CREDITS:2**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>
	Learn in detail rearding the morphology and importance of economically important cereals,pulses,vegetables,oil,sugar and fibre yielding plants	1,4
	Delve deeper into the significance of non-alcoholic beverage yielding plants, their processing. Gain understanding of various spice yielding plants and special focus on some of the medicinally important plants and their uses.	1,3,4
	Gain basic knowledge about tools, techniques and equipments used in tissue cultureand micropropagation	2,3,5,6

**COURSE NAME:Cell and Molecular Biology**

**COURSE CODE: BOTA 303**

**COURSE TYPE: DSE**

**CREDITS: 4**



Sr. No.	On completing the course, the student will be able to	PSO's addressed	Cognitive levels
CO1	Understand in detail the techniques commonly used in biological research, including microscopy (light microscopy, electron microscopy), X-ray diffraction analysis, and sample preparation.	1,2,3,5	U,Ap
CO2	Understand the fundamental concepts of cell biology, including the Cell Theory, characteristics of prokaryotic and eukaryotic cells, cell organelles, and the structure and function of the cell membrane and cell wall.	1,2,3,5	R,U
CO3	Gain knowledge about cell cycle, various stages of mitosis and meiosis and the differences between them. genetic material, including DNA structure, replication mechanisms, and types of genetic material, as well as transcription and translation processes in prokaryotes and eukaryotes.	1,4	R,U,An
CO4	Explore the regulation of gene expression in both prokaryotes and eukaryotes, including operon systems and the molecular mechanisms involved.	1,4	R,U

**COURSE NAME: Cell and Molecular Biology PRACTICAL**  
**COURSE CODE: BOTA 303**

**CREDITS: 2**

Sr. No.	On completing the course, the student will be able to	PSO's addressed
CO1	Develop essential laboratory skills and techniques specific to cell and molecular biology.	2,3,5,6
CO2	Gain detailed understanding of prokaryotic and eukaryotic living systems	1,2
CO3	Hands on experience of studying and identifying and studying various stages of Mitosis and Meiosis.	2,3,6

### **SKILL ENHANCEMENT COURSES**

**COURSE NAME: MEDICINAL BOTANY AND ETHNOBOTANY**

**COURSE CODE: BOTA306**

**CREDITS:4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
1	Understand the history and significance of traditional systems of medicine, including the use of medicinal herbs in Ayurveda, Unani, and Siddha.	3,4,5	U
2	Gain knowledge about ethnobotany as an interdisciplinary science and its relevance in contemporary contexts, along with an understanding of the diverse ethnic groups and tribes in India and their lifestyles.	3,4,5	U
3	Develop skills in conducting ethnobotanical studies, including fieldwork, herbarium research, and analyzing ancient literature and archaeological findings. They will also explore the role of ethnobotany in modern medicine and its connection to plant genetic resources conservation	3,4,5	U,Ap

**COURSE NAME: MUSHROOM CULTIVATION TECHNOLOGY**

**COURSE CODE: BOTA307**

**CREDITS:4**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to</b>	<b>PSO's addressed</b>	<b>Cognitive levels</b>
1	Gain an introduction to edible mushrooms, including their history, nutritional value, and medicinal benefits. They will also learn about the potential risks associated with poisonous mushroom	1,3,4	U
2	The focus will be on cultivation technology, including the necessary infrastructure and equipment, as well as the process of obtaining pure cultures and preparing spawn for mushroom cultivation.	3,5	U,Ap
3	Explore the cultivation practices of specific mushroom species, such as <i>Agaricus bisporus</i> , <i>Pleurotus sp.</i> , and <i>Volvoriella volvacea</i> . They will also learn about composting technology, mushroom bed preparation, and factors that can affect the process	3,5	U,Ap

