



Rayat Shikshan Sanstha's

Radhabai Kale Mahila Mahavidyalaya, Ahmednagar

An ISO 9001:2015 Certified College

Affiliated to Savitribai Phule Pune University, Pune (PU/AN/ASC/034)

Programme Outcomes

Department of Botany

Programme Outcomes (Name of the Programme B.Sc)	
PO 1	Attain thoughtful proficiency in the field of plant sciences.
PO 2	Acquire the ability to perform in multidisciplinary domains.
PO 3	Attain the ability to exercise intelligence of scientific knowledge for investigation and innovation and nourishment of the world.
PO 4	Learn value based ethical practices and principles committed to professional ethics.
PO 5	Incorporate 21 st century skill oriented self-directed and life-long learning
PO 6	Obtain the ability to inculcate the knowledge of plant science in diverse contexts with global perspective.
PO 7	Attain maturity to harness the destiny and responds to one's calling.



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Programme Specific Outcomes Department of Botany

Programme Specific Outcomes (Name of the Programme <u>B.Sc.</u>)	
PSO 1	Recall the diversity, classification, evolution and developmental changes among the plants with reference to lower and higher plant groups and create a knowledge base in understanding the basis of plant diversity, economic values and taxonomy of plants.
PSO 2	Understand the advanced concepts of Genetics, Cell biology and Plant Biotechnology of plants and its implementation for the improvement of crop productivity.
PSO 3	Acquire and utilize the skills of post-harvest, flower design, fruit processing and dehydration techniques, organic farming and various plant processing technologies for developing the economy to the growing world.
PSO 4	Know about the importance of Medicinal plants and its useful parts, economically important plants in our daily life and also about the traditional medicines and herbs, and its relevance in modern times.
PSO 5	Inculcate the methodology followed in plant breeding, pharmacognosy, herbal drug technology, plant protection, propagation and improvement.
PSO 6	Adapt methods of scientific research in plant improvement programs and create entrepreneurships, employment to the society.



PSO 7	Analyze the impact of scientific and technological advances on the environment and society and understand the importance of biodiversity conservation, green cover development, carbon sequestration and utilize the knowledge for sustainable development.
PSO 8	Explore the knowledge of biotic and abiotic stress tolerance, plant microbe interaction and Integrated pest management for making the revolution in agriculture.
PSO 9	Enrich the ability of critical thinking, development of scientific attitude, handling of problems and generating solutions, improve practical skills, and enhance communication skill.
PSO 10	Apply the fruitful knowledge of plant sciences and plant resources for the sustainable development, betterment of society and environment by recognizing the ethical values.
PSO 11	Become competent enough in various analytical and 21st century technical skills related to plant sciences for their exploration.
PSO 12	Exhibit the potential to effectively accomplish tasks independently and as a member or leader in diverse teams, and in multidisciplinary settings.
PSO 13	Employ critical thinking based problem solving and practical skills pertaining to botanical techniques and computational knowledge and apply strategies for environmental conservation.
PSO 14	Demonstrate knowledge and scientific understanding to identify research problems, design experiments, use appropriate methodologies, analyze and interpret data and provide solutions. Exhibit organizational skills and the ability to manage time and resources.



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Course Outcomes Department of Botany

Sr.No	Class with Semester	Name of the Course	Course Code	Course Outcomes
1	F.Y. Sem.- I	Applied Aspects of Plant Sciences	BOT-101-T	CO1: Students will be able to apply advanced plant biotechnology techniques, such as genetic engineering and tissue culture, to improve crop productivity, develop genetically modified crops, and produce plant-derived pharmaceuticals.
				CO2: Students will demonstrate the ability to implement and evaluate sustainable agricultural practices, including organic farming, integrated pest management, and the use of biofertilizers, to enhance soil health and crop yields while minimizing environmental impact.
				CO3: Students will be proficient in utilizing precision agriculture technologies, such as remote sensing, GIS, drones, and sensors, to monitor and manage crop health, optimize resource use, and improve overall farm management efficiency.
				CO4: Students will understand the role of plant-associated microbes in enhancing plant health and productivity, and be able to apply knowledge of beneficial microbes (e.g., <i>Rhizobium</i> , mycorrhizal fungi, PGPR) to improve soil fertility and plant growth in agricultural settings.
2		Practical Based on BOT-101-T	BOT-102-P	CO1: Students will develop hands-on expertise in using essential laboratory instruments and equipment.
				CO2: Students will gain practical knowledge in demonstrating and evaluating genetically modified crops and evaluate the agronomic performance, environmental impact, and socio-economic benefits of these genetically modified crops.
				CO3: Students will acquire the ability to estimate soil organic carbon using methods like Walkley-Black or similar wet oxidation techniques and interpret the significance of these measurements in soil health and sustainable agriculture.



				<p>CO4: Students will demonstrate the ability to compost kitchen waste and convert it into biofertilizer, highlighting the principles of organic waste management and sustainable recycling.</p> <p>CO5: Students will study the effect of Mycorrhiza on crop plant growth attributes and understand the role of various plant-associated microbes, such as Rhizobia, Mycorrhizal fungi, PGPR, endophytic fungi, and nitrogen-fixing cyanobacteria, in improving plant health and productivity.</p> <p>CO6: Students will demonstrate post-harvest techniques, including the preparation, value addition and preservation of agricultural products.</p> <p>CO7: 1. Students will visit nurseries and plant-based industries to explore exotic ornamental plants and industry products and by-products, preparing visit reports to understand their applications in indoor gardening and economic importance.</p>
3		Flower Design Techniques	SEC-101-BOT-P	<p>CO1: Develop proficiency in creating various basic floral arrangements, including hand-tied bouquets, vase arrangements, and table centrepieces, using proper techniques and principles of design.</p> <p>CO2: Acquire advanced skills in creating complex floral designs, such as cascading bouquets, floral arches, and large-scale installations, demonstrating creativity and attention to detail.</p> <p>CO3: Gain knowledge of different floral design styles, such as traditional, contemporary, and seasonal, and stay updated with current trends in the floral industry.</p> <p>CO4: Understand the principles of flower selection, care, and handling, including proper conditioning, storage, and use of floral foam and other design tools.</p> <p>CO5: Develop the ability to create customized floral designs tailored to specific occasions, themes, and client preferences, demonstrating creativity and versatility in design.</p>
4		Plants and Human Welfare	OE-102-BOT-T	<p>CO1: Develop a comprehensive understanding of the diversity of plant species and their utility in various aspects of human life, including food, medicine, shelter, and clothing.</p> <p>CO2: Gain knowledge about medicinal plants, their active compounds, and their therapeutic uses in traditional and</p>



				<p>modern medicine</p> <p>CO3: Acquire awareness of sustainable practices in plant resource management, including conservation, cultivation, and utilization, to ensure long-term benefits for both humans and the environment.</p> <p>CO4: Appreciate the significance of traditional knowledge systems related to plants and their role in preserving cultural heritage and biodiversity.</p> <p>CO5: Develop critical thinking and problem-solving skills to evaluate the ethical, social, and environmental implications of plant use and propose sustainable solutions.</p>
5	F.Y. Sem.- II	Basics of Plant Sciences	BOT-151-T	<p>CO1: Students will demonstrate a clear understanding of the definition and concept of plant diversity, including the general outline of the plant kingdom and its major groups.</p> <p>CO2: Students will be able to identify and describe the characteristics of algae, and explain their economic and biotechnological importance, including their roles in food, industry, and future research prospects.</p> <p>CO3: Students will understand the ecological roles of fungi in nutrient cycling and symbiotic relationships, and recognize their economic importance in industry, agriculture, and food production.</p> <p>CO4: Students will identify different types of lichens and bryophytes, and describe their ecological significance and economic uses, including their roles in environmental monitoring and traditional medicine</p> <p>CO5: Students will demonstrate knowledge of the characteristics and importance of Pteridophytes, gymnosperms, and angiosperms, including their ecological roles, economic significance, and contributions to ecosystems and human welfare.</p>
6		Practical Based on BOT 151-BOT-T	152-BOT-P	<p>CO1: Students will be able to identify and classify a wide range of plant species from different habitats, understanding their ecological roles and evolutionary relationships.</p> <p>CO2: Students will be able to analyze and interpret the external and internal morphology of vegetative organs in various plant groups, enhancing their knowledge of plant anatomy and physiology.</p> <p>CO3: Students will gain practical skills in examining and describing the types and modifications of roots, stem, and</p>



				<p>leave, understanding their structural adaptations and ecological functions.</p> <p>CO4: Students will acquire the ability to investigate and describe the reproductive structures and life cycles of different plant groups, including algae, fungi, bryophytes, Pteridophytes, gymnosperms, and angiosperms.</p> <p>CO5: Students will understand the morphology and function of inflorescences, flowers, fruits, and seeds, and will be able to identify key characteristics used in plant identification and classification.</p> <p>CO6: Students will gain hands-on experience in botanical fieldwork, including conducting botanical excursions, documenting vegetation, and studying plant diversity in natural habitats.</p>
7		Mushroom technology	OE-152-BOT-P	<p>CO1: Students will demonstrate a thorough understanding of the biology, taxonomy, and ecological roles of different mushroom species, recognizing their nutritional and economic importance.</p> <p>CO2: Students will acquire practical skills in various mushroom cultivation techniques, including substrate preparation, inoculation, spawn production, and environmental control, successfully cultivating different species.</p> <p>CO3: Students will be able to set up and manage a mushroom farm, implementing effective hygiene and sanitation practices, pest and disease management strategies, and crop rotation to ensure high yield and quality</p> <p>CO4: Students will master post-harvest handling techniques, including cleaning, packaging, storage, and transportation, to maintain mushroom quality and extend shelf life. They will also be skilled in value-added processing, such as drying and canning.</p> <p>CO5: Students will understand the economic aspects of mushroom production, including cost analysis and market trends.</p> <p>CO6: Students will successfully apply their theoretical knowledge to practical scenarios, demonstrating the ability to solve problems and optimize mushroom production processes</p> <p>CO7: Students will develop entrepreneurial skills, including business planning and management, enabling them to start and manage their own mushroom cultivation enterprises.</p>
9		Plant	SEC-151-BOT-	CO1: Students will be proficient in the use of various tools



		Preservation Techniques	P	<p>and equipment for plant preservation, understanding their specific uses and maintenance requirements.</p> <p>CO2 : Students will demonstrate mastery in several specimen drying techniques and will be able to choose and apply the best method based on the nature of the plant material and the intended use of the specimens.</p> <p>CO3: Students will gain skills in preparing and processing pressed specimens for herbarium storage, ensuring the longevity and utility of collected specimens for scientific research</p> <p>CO4: Students will acquire hands-on experience in preserving plant specimens using wet preservation methods, ensuring the preservation of cellular structures and morphological details necessary for further scientific study.</p> <p>CO5: Students will learn and demonstrate modern methods used in the preservation of botanical specimens, particularly in creating dry floral arrangements.</p> <p>CO6: Through visits to museums, herbariums, and plant preservation units, students will integrate classroom learning with professional practices, understanding the operational standards and challenges in botanical preservation environments.</p> <p>CO7: Students will successfully collect, prepare, and document a variety of preserved specimens, including herbarium sheets and wet preserved samples.</p>
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SR.NO	Class with Semester	Name of the Course	Course Code	Course outcome
10	S. Y. B. Sc. Botany SEM-III	Taxonomy of Angiosperm and Plant Ecology	BO 231: Paper -I	CO1. The students will be able know the objectives, importance and scope of plant systematics
				CO2. The learners will get acquainted with sources of data on systematics, botanical nomenclature
				CO3. The learner will have a deep knowledge on different plant families and its characterization features
				CO4. The students will be made aware of environmental awareness, ecological grouping and community dynamics
				CO5. The course will be made aware of his/her role in environment and will make them a responsible citizen it will also force to think students about sustainable ecology
11	S. Y. B. Sc. Botany SEM-III	Plant Physiology	BO 232: Paper II	CO1. Learners will have an in deep knowledge about importance of plant physiology and its application
				CO2. Students will acquire understanding about biophysical phenomenon and various processes in plants like plasmolysis,



				<p>osmosis, diffusion, permeability</p> <p>CO3. The learner will have an understanding about water absorption, various cells involved in the process and their functioning</p> <p>CO4. The course also emphasize on understanding of various processes such as mineral and salt absorption with references to growth</p> <p>CO5. The students will understand the role of plant growth regulators its types and also the process of flowering</p> <p>CO6. The course will help students to take up research as career and will also those provoke understanding of growth and flowering to make them successful entrepreneurs.</p>
12	S. Y. B. Sc. Botany SEM-IV	Plant Anatomy and Embryology	BO 241 Paper-I	<p>CO1. The students will have an in deep knowledge about different types of tissues with understanding of their role in plant system</p> <p>CO2. The learner of the course will also understand the process of tissues systems in plants and will be able to know the growth types happening in the plant body</p> <p>CO3. The student will understand the process of embryo formation, types of embryo and process of fertilization in plants. Which will help them to know about its application in horticulture and agricultural practices</p> <p>CO4. The learner will also get an in deep idea about a branch of botany i.e. palynology, with its application in lucrative industries viz. honey making. This will certainly help them select the stream as one of the potential career</p>
13	S. Y. B. Sc. Botany SEM-IV	Plant Biotechnology	BO 242 Paper II	<p>CO1. The student will be introduced and made acquainted with the applied field of biotechnology with special reference to the plants</p> <p>CO2. The learner of the course will have a detailed knowledge on plant genome, genetic engineering and bioprocesses</p> <p>CO3. The student will have an understanding about the different applied industries in the stream and its applications in food, medicine etc</p> <p>CO4. The learner will not only be acquainted with production processes but also will be made aware about scale ups in upstream and downstream processes</p> <p>CO5. The course will ensure enhanced the level of understanding of students in the subject area and provoke them to consider it as a potential career.</p>
14	T. Y. B. Sc. Botany SEM-V	Algae and Fungi	BO-351	<p>CO1 The learner will get acquainted with life cycles of lower cryptogams</p> <p>CO2. The students will understand details and applications of algae, fungi</p> <p>CO3. The learner of the course will have an understanding of the phylogenetic relationship and role in human welfare</p>
15		Archegoniate	BO-352	<p>CO1. The learner will get acquainted with life cycles of archegoniate</p> <p>CO2. The students will understand details and applications of</p>



				<p>bryophytes and Pteridophytes</p> <p>CO3. The learner of the course will have an understanding of the phylogenetic relationship and role in human welfare</p>
16		Spermatophyta and Paleobotany	BO-353	<p>CO1. The learner will understand gymnosperms and angiosperms in details with classification, origin and study of angiosperm</p> <p>CO2. The student will be able to identify the plants based on various keys like Latin diagnosis, bracketed keys and also will be able to prepare artificial keys</p> <p>CO3. The student will learn to identify and classify the groups of plants according to their characters</p> <p>CO4. The students will understand importance of learning Paleobotany, this will help in comparing the present day plants with primitive fossil plants</p>
17		Plant ecology	BO-354	<p>CO1. The learner of the course will have an interrelationship between the living world and environment</p> <p>CO2 The learners will understand environmental crisis, environmental impact assessment and environmental audit so as to know the responsibility</p> <p>CO3. The students of the course will also be acquainted with ecology and economics & remote sensing</p> <p>CO4. The students of the course will also be well versed with introduction of biodiversity, its aim, concept and objectives</p> <p>CO5. The learners of the course will be taught about characterization of biodiversity, by virtue of which they can understand the concept of endemism and phytogeography</p> <p>CO6. The students will be well versed with biodiversity loss, importance, IUCN categories and inventorying and monitoring of biodiversity</p> <p>CO7. The students of the course will understand current practices in conservation including in situ, ex situ and social approach to biodiversity conservation</p>
18		Cell and molecular biology	BO-355	<p>CO1.Organizational history and type of cells: prokaryotic and eukaryotic</p> <p>CO2. Physical and chemical nature of cell matrix</p> <p>CO3. Plant cell cytoplasmic constituents, cell organelles and their structure and function</p> <p>CO4. Learner will be acquainted with nuclear organization and chromosome structures, types and functions</p> <p>CO5. The student learns central Dogma of molecular biology, and various process involved in it</p> <p>CO6. Learner will be acquire knowledge related to genetic material, its nature, forms, various structure models and laws</p> <p>CO7. Learners will be enlightened with DNA replication, experiments involved in providing it and its mechanism, DNA damage and repair</p>
19		Genetics	BO-356	<p>CO1 Students will learn about concept of heredity and variation along with various branches and application of genetics.</p> <p>CO2. Learners will have basic information and understanding about Mendelism, terminology involved and various laws</p>



				involved
				CO3. The students will make an understanding about interactions involved in genes Multiple allele using Nicotiana and Drosophila as model organism
				CO4. The learner of this course will have an understanding of quantitative and cytoplasmic inheritance and sex linked inheritance with reference to Drosophila.
				CO5. The student will learn about ploidy specifically euploidy and aneuploidy. They will be acquainted with chromosomal aberrations
20		Medicinal botany	BO3510	CO1. The students will be introduced to pharmacognosy its origin history and scope
				CO2. The learner will be introduced to ayurvedic pharmacy, tridosha concept, ayurvedic principles and formulations
				CO3. The students will be made understand analytical medicinal botany along with cultivation, collection and processing of herbal drugs
				CO4. The course will also help the students to study the drugs w.r.t. occurrence distribution and cultivation, microscopic characters and constituents
				CO5. The learner of the course will have a in depth knowledge on applied medicinal botany, concepts of major metabolic pathway, ethnobotany
21		Plant diversity and human health	BO3511	CO1: Student will understand plant diversity and importance of it in human health
				CO2: They will come to know about exotic species- Identification and morphological characteristics
				CO3: To make student realize ecological importance of plants and describe the role of plants in relation to Human health
				CO4: Students will know diversity issues and types of diversity, conservation strategies to implement in their daily life
				CO5: The students will be made acquainted with agrobiodiversity and its importance in human health
22	T. Y. B. Sc. Botany SEM-V	Plant Physiology And Metabolism	BO 361	CO1. The learner of the course will understand details on plant physiology, photosynthesis, and different pathways
				CO2. The students will have knowledge on respiration, structure of mitochondria, and various cycles involved like glycolysis, TCA, ETS and ATP synthesis
				CO3. The learners will understand translocation of organic solutes, and stress physiology
				CO4: The learner should understand the functional aspect of the plant's metabolism
23		Biochemistry	BO 362	CO1. The learner is able to learn the mechanism of conversion of simple to complex components and their functions
				CO2. The learners of the course will be made available knowledge on carbohydrates, amino acids, proteins, lipids
				CO3. The students will understand definition and nature of enzymes and properties of enzymes



				CO4. The students will be acquainted with definition and types of secondary metabolites and will understand production of secondary metabolites via mevalonic and shikimic acid pathways.		
24	Plant pathology	BO- 363	CO1. The learners will be made acquainted with fundamentals of plant pathology, and important terminologies and significance	CO2. The students will be having a wide exposure to various institutes working on such area, concept of disease cycle, disease development and its mechanism		
			CO3. The students will be made versed with methods of studying plant diseases, fungal, bacterial, mycoplasma, nematodal, viral plant disease, non parasitic diseases.	CO4. The course will provide insights in principles of plant disease control and molecular diagnostics and transgenic in crop protection		
25			Evolution And Population Genetics	BO 364	CO1: After completing the course the student should understand and be able to explain fundamental terminology and concepts in the fields of genetics and evolution	CO2: The student should have a good understanding of central concepts in population and quantitative genetics
					CO3: Students should also understand the basic scientific methods, including data analysis, used in these fields, and be able to carry out simple analyses using empirical population genetics and quantitative genetics data.	CO4: Students should be able to combine this knowledge to interpret results from studies in population and quantitative genetics
	CO5: The student should be capable of reflect on the outcome of genetic and evolutionary studies on a general level and evaluate their biological significance					
26	Advanced Plant Biotechnology	BO-365			CO1. Understand the fundamental of recombinant DNA technology	CO2. Understand tissue culture techniques
					CO3. Role of microbes in agriculture, medicine & industry	CO4. Know the fermentation technology
			CO5. Understand technical germplasm & cryopreservation	CO6. Understand the concept of bioinformatics, genomics & proteomics		
27			Plant breeding & Seed technology	BO. 366	CO1. Understand the scope & importance of plant breeding	CO2. Know the technique of production of new superior crop varieties
					CO3. Know the about heterosis, hybrid vigor etc	CO4. Know the process of hybrid variety, development & their release
					CO5. Know about seed germination, processing ,	



				production etc
28	Nursery And Gardening Management	BO 3610	CO1. Nursery management, nursery sites, preparation of sites, design and layout, producing plants from seed	
CO2. Learning of plants through vegetative propagation				
CO3. Methods of growing plants like polyhouse, greenhouse etc				
CO4. Gardening, pre-requisites of commercial gardening, harvesting and processing of flowers, commercial production of flowers				
29	Biofertilizers	BO 3611	CO1. Learners will understand the importance of organic farming	
CO2. To study the use of bio fertilizers in environment sustainability				
CO3. Learners will be acquainted with the types, functions and applications of bio fertilizers				
CO4. To understand the large scale production of bio fertilizers				
CO5. To understand the method of marketing, popularizing the biofertilizer technology				