

SHRI SHIV CHHATRAPATI COLLEGE, JUNNAR, PUNE

DEPARTMENT OF BOTANY

Program Outcomes (PO), Program Specific Outcomes (PSO), and Course Outcomes (CO)

Program: B.Sc. Botany, Course:- FYBSC and SYBSC

PROGRAM OUTCOMES (PO)

POs	Program Outcomes
PO1	Understand the fundamental and advanced concepts, principles, protocols, methodologies, processes, scientific theories and phenomenon's related to subject and their applications in daily life.
PO2	Obtain the basic as well as applied skills, theoretical and practical knowledge of the subject for constructing the life career in the field of Botany.
PO3	Boost up and became self-confident in solving the subject and life related problems by acquiring the subject oriented employable knowledge and life skills for empowerment of self as well as social development.
PO4	Hardened the subject oriented thinking ability of the students to make them creative researcher for proposing the novel ideas in the field of basic and applied Botany and its implementation, being as a Human resource for fulfillment of human needs.
PO5	Cultured the life skills in student's mind for self-employment, improvement of economic status in local region, utilization of raw resources for furnished products at small scale as well as large scale agro-based industries.
PO6	Always keep aware of cultivation, conservation, protection, production of value added services to the society by utilizing the natural resources and subject knowledge for betterment and sustainable development of life.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSOs	Program specific Outcomes
PSO1	Efforts are taken to boost up the self-confidence and employable skills of the student for establishment of self-employment at small as well as large scale and generate the income source to improve the economy of poor tribal and farmers.
PSO2	Students are skilled to utilize the raw sources of agriculture and forest for various agro-based applied industries such as floriculture, mushroom industry, nursery, food processing industry.
PSO3	Hands on training related to processing of raw material for betterment of human life.
PSO4	Make the students aware of cultivation, conservation and protection of Biodiversity for sustainable development.
PSO5	Various life skills are achieved by the students for getting the success in their life.
PSO6	Make the students aware of presence of biodiversity and agricultural crop pattern and variations in surrounding area of the institution.

COURSE OUTCOMES (CO)

Class	Course	Course Outcomes
F.Y.B.Sc. (CBCS pattern)	Semester I, Botany Paper I (BO 111): Plant Life and Utilization I)	On Completion of the course, students are able to: CO1. Understand the outline classification of plant kingdom and diversity among the plants. CO2. Know the systematic, morphology and structure, of Algae. Understand the life cycle Spirogyra. Usefulness of the algae. CO3. Acquire the knowledge about Symbiotic association, types and utilization of Lichen. CO4. Know the systematic, morphology and structure, of Fungi, the life cycle of <i>Agaricus</i> mushroom, and utilization of fungi. CO5. Understand the systematic, morphology and structure, of Bryophytes with the life cycle study of representative <i>Riccia</i> . Utilization of bryophytes.
	Semester I, Botany Paper II (BO 112): Plant Morphology and Anatomy	CO1. Introduction and scope of morphology; importance of morphology in Identification, Nomenclature, Classification and Phylogeny and Plant breeding. CO2. Know the morphology of reproductive parts (Inflorescence, Flower, Floral whorls, Fruit and Seeds) in relation to their parts, types, modifications, functions and importance. CO3. Importance of anatomy in taxonomy, physiology, ecological interpretations, pharmacognosy and wood identification. CO4. Exploring the knowledge of internal organization of plants and their parts. Types of tissues and their role in plant body construction and functioning. CO5. Understand the internal porganization of primary plant body w.r.t. root, stem and leaf of monocotyledonous and dicotyledonous plants.

F.Y.B.Sc. (CBCS pattern)	Semester I, Botany Paper III (BO 113): Practical Based on BO 111 and BO112	<p>CO1. Introduction to handling of microscope, sectioning and slide preparation, practical performance in view of examination.</p> <p>CO2. Understanding the life cycle pattern of various plant groups with specimen study of <i>Spirogyra</i>, <i>Agaricus</i>, and <i>Riccia</i>.</p> <p>CO3. Understand the types of lichens and process of mushroom cultivation.</p> <p>CO4. Know the external morphological features of reproductive parts viz, inflorescence, flower, floral whorls, fruits, seeds, their types, modifications and functions.</p> <p>CO5. Understand the internal primary structure of monocots and dicots with reference to root, stem and leaf for observing difference at internal organization level between these two groups.</p> <p>CO6. Botanical excursion to the nearby biodiversity area to observe the various plants of Algae, Fungi, Bryophytes, Lichens.</p>
F.Y.B.Sc. (CBCS pattern)	Semester II, Botany Paper I (BO 121): Plant Life and Utilization II)	<p>CO1. Understand the diversity among the higher plant groups pteridophytes, gymnosperms and angiosperms.</p> <p>CO2. Understand the systematic, morphology and structure, of Pteridophytes with the life cycle study of representative <i>Nephrolepis</i> and utilization of pteridophytes.</p> <p>CO3. Know the systematic, morphology and structure, of Gymnosperms. Understand the life cycle of <i>Cycas</i>. Utilization and economic importance of the Gymnosperms.</p> <p>CO4. Get acquainted with the outline classification of most evolved plant group Angiosperms. Able to understand the difference between monocot and dicot. Economic importance of Angiosperms in food, fodder, fiber, medicine and horticulture.</p>

	Semester II, Botany Paper II (BO 122): Principles of Plant Science	<p>CO1. To understand the scope and importance of plant physiology.</p> <p>CO2. Know the physiological phenomenon involved in plant such as Diffusion, Osmosis, Plasmolysis.</p> <p>CO3. Understand the concept of plant growth and factors affecting the growth.</p> <p>CO4. Know the structural details of prokaryotic and eukaryotic cell, cell wall, and ultrastructure of chloroplast.</p> <p>CO5. Understand the cell cycle in plants with reference to divisional stages of mitosis and meiosis.</p> <p>CO6. Understand the central dogma, DNA structure, Watson and crick model of DNA, types of DNA and RNA, chromosome and DNA replication process.</p>
F.Y.B.Sc. (CBCS pattern)	Semester II, Botany Paper III (BO 123): Practical Based on BO 121 and BO122	<p>CO1. Understanding the life cycle pattern of plant groups Pteridophytes and Gymnosperms with specimen study of <i>Nephrolepis</i> and <i>Cycas</i>.</p> <p>CO2. Know the comparative account of Dicotyledonous and Monocotyledonous plants w.r.t to external morphological characters.</p> <p>CO3. Demonstrating the use of plant resources in food, fodder, fiber, medicine, and horticulture industries.</p> <p>CO4. Understand the differences between prokaryotic and eukaryotic plant cells.</p> <p>CO5. Know the cell divisional stages of meiosis and mitosis with suitable plant material.</p> <p>CO6. Understand the Chlorophyll estimation process, phenomenon of plasmolysis and demonstration of osmosis through curling experiment.</p> <p>CO7. Know the diffusion pressure deficit (DPD) phenomenon in plants.</p>

Class	Course	Course Outcomes
S.Y.B.Sc. (CBCS pattern)	Semester III, Botany Paper I (BO231) : Taxonomy of Angiosperms and Plant Ecology	<p>On Completion of the course, students are able to:</p> <p>CO1. Get knowledge regarding introduction, scope and importance of taxonomy in study of angiospermic plants.</p> <p>CO2. Aware with available systems of plant classification along with their merits and demerits utilized in the taxonomy from ancient period to the date for classification of flowering plants.</p> <p>CO3. Understand the plant diversity, and study the representative specimen of plant families with reference to systematic position, salient features, floral formula, floral diagram and economic importance of that family.</p> <p>CO4. Know naming the plants in botanical terms using rule of nomenclature and following the system of Binomial nomenclature.</p> <p>CO5. Understand the introduction to ecology in terms of concept, types of ecology, ecosystem and their components, food chain, food web, and ecological pyramids.</p> <p>CO6. Understand the grouping of plants on the basis of external and internal ecological adaptation present in the plant in response to climatic conditions surrounding.</p>
	Semester III, Botany Paper II (BO 232) : Plant Physiology	<p>CO1. Understand the introduction about plant physiology with its scope and applications.</p> <p>CO2. Know the role of water in plants, mechanism of water absorption and factors affecting it.</p> <p>CO3. Understand the vital, physical and transpiration pull theories of ascent of sap and factors affecting ascent of sap.</p> <p>CO4. Know the process of transpiration and stomata structure involved in transpiration; mechanism, significance and factors affecting transpiration</p>

		<p>CO5. Understand the process of nitrogen metabolism with reference to BNF, and processes of denitrification, ammonification, nitrification, amination, transamination and role of nitrogen in plants.</p> <p>CO6. Learn the types of seed dormancy, methods of seed dormancy and metabolic changes during seed germination.</p> <p>CO7. Understanding the physiology of flowering with reference to photoperiodism, Phytohormones, and vernalization.</p>
	<p>Semester III, Botany Paper III (BO 233): Practical based on BO 231 and BO 232</p>	<p>CO1. Understand the taxonomic and ecological tools used in study of taxonomy and ecology.</p> <p>CO2. Know the plant families with reference to diagnostic features, floral formula, floral diagram, and systematic position with locally available plant material of the given family.</p> <p>CO3. Understand the external and internal ecological adaptations in Hydrophytes and Xerophytes.</p> <p>CO4. To get acquainted with vegetation study by List-Count Quadrature method.</p> <p>CO5. Understand the process of starch and protein estimation by phytochemical test and leaf protein isolation and estimation.</p> <p>CO6. Performing the physiological experiments for identification of Diffusion pressure deficit (DPD), and rate of transpiration in different climatic conditions.</p> <p>CO7. Know the demonstration of various plant physiology experiments and determination of seed germination index.</p> <p>CO8. Understand the vegetation of nearby localities through Botanical excursion.</p>

<p>S.Y.B.Sc. (CBCS pattern)</p>	<p>Semester IV, Botany Paper I (BO 241) : Plant Anatomy and Embryology</p>	<p>CO1. Know the scope of plant anatomy in various field.</p> <p>CO2. Understand the structure, types and functions of epidermal tissue system with reference to epidermis, stomata and epidermal outgrowths.</p> <p>CO3. Learn the mechanical tissue system with reference to their distribution in plants and following the principle for providing the strength and support to the plants.</p> <p>CO4. Understand the types of vascular tissue system and their role in development of normal or abnormal secondary growth in various plant as per the need of plant.</p> <p>CO5. Study of scope and importance of plant embryology with reference to microsporangium and male gametophyte development; megasporangium and female gametophyte development.</p> <p>CO6. Provide in depth knowledge to the students related to pollination mechanism; process and significance of double fertilization followed by structure, types, and functions of endosperm and embryo in flowering plants.</p>
<p>S.Y.B.Sc. (CBCS pattern)</p>	<p>Semester IV, Botany Paper II (BO 242) : Plant Biotechnology</p>	<p>CO1. Understand the concept, scope, importance and current status of Biotechnology.</p> <p>CO2. Know the concept of plant tissue culture and cellular totipotency, basic techniques of PTC, commercial applications of PTC and tissue culture laboratories in India.</p> <p>CO3. Understand the concept of single cell protein (SCP), importance of protein, production of SCP from algae (Spirulina) and fungi (Yeast) and its acceptability with economic application.</p> <p>CO4. Understand the concept, and techniques of plant genetic engineering for development of genetically modified plants and their applications for sustainable development.</p> <p>CO5. Learn the concepts of Genomics, Proteomics and Bioinformatics.</p>

		<p>CO6. Understand the concept of bioremediation using plants and microbes and methods of phytoremediation.</p> <p>CO4. Know the concept and types of renewable and non-renewable energy sources, concept of Biogas, Bioethanol, Biobutanol Biodiesel and Biohydrogen.</p>
<p>S.Y.B.Sc. (CBCS pattern)</p>	<p>Semester IV, Botany Paper III (BO 243): Practical based on BO 241 and BO 242</p>	<p>CO1. Understand the plant anatomy practically, through study of epidermal tissue system, mechanical tissue and their distribution in root, stem and leaves.</p> <p>CO2. Understand the normal and abnormal secondary growth pattern in plants with suitable examples.</p> <p>CO3. Understand the plant embryology with respect to study of tetrasporangiate anther, types of ovules, dicot and monocot embryo.</p> <p>CO4. Know the instrumentation used in PTC, stages of PTC such as media preparation and sterilization, surface sterilization and inoculation of explant.</p> <p>CO5. Understand the process of SCP cultivation using <i>Spirullina</i>.</p> <p>CO6. Know the demonstration experiments of Biotechnology such as Transgenic crops, principle and working of agarose gel electrophoresis, centrifuge, spectrophotometer.</p> <p>CO7. Understand the setup of Commercial plant tissue laboratory through the visit to nearby PTC commercial unit.</p>