



**Deccan Education Society's
Fergusson College (Autonomous), Pune
Program Specific Outcomes (PSOs) and Course Outcomes (COs) 2019-20
Department of Botany
Programme: B. Sc. Botany**

PSO No.	Program Specific Outcomes (PSOs) Upon completion of this programme the student will be able to
PSO1	Academic competence: (i) Recall classical botany concepts, state principles and outline processes underlying the field of botany and its related interdisciplinary subjects. (ii) Demonstrate an understanding of plant morphology, anatomy, physiology and application of economic botany and biotechnology. (iii) Execute botanical excursions for studying plant diversity, taxonomic identification and preparation of digital herbarium.
PSO2	Personal and Professional Competence: (i) Carry out group and individual activities for personal development and leadership qualities. (ii) Analyse the importance of plants and their conservation (iii) Formulate ideas, effective presentation and communication skills. (iv) Implement self-learning, discipline and problem solving ability.
PSO3	Research Competence: (i) Apply appropriate techniques for solving and analyzing research problems. (ii) Integrate knowledge of vital and applied aspects of botany for designing experiments and interpretation of results. (iii) Assess fundamental problems and provide solutions for betterment of society.
PSO4	Entrepreneurial and Social competence: (i) Employ the industrial applications of botany for start-up venture. (ii) Associate the impact of human activity on nature, importance of plant diversity and its conservation for sustainable development. (iii) Execute effective communication ability, presentations skills and report writing.

F.Y. B.Sc. Semester I		
Title of the Course and Course Code	Plant Diversity (BOT1101)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Outline different classification system according to evolutionary features.	1
CO2	Distinguish different plant forms to its respective group based on characteristic features and give examples.	2
CO3	Classify the group and differentiate the taxonomic forms.	3
CO4	Identify life cycle pattern of various groups.	4
CO5	Compare various groups within plant diversity and segregate the groups from each other using salient features.	5
CO6	Compile economic and ecological significance of various groups.	6
Title of the Course and Course Code	Phytochemistry (BOT1102)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Define Phytochemistry and describe metabolites.	1
CO2	Explain metabolites and differentiate primary and secondary metabolites.	2
CO3	Illustrate the basic chemical composition of carbohydrates, proteins, oils, alkaloids, fats, tannins, vitamins and organic acids.	3
CO4	Categorize plant resources and relate them to metabolites.	4
CO5	Review metabolites from plant resources and compare phytochemicals.	5
CO6	Specify commercial importance of metabolites.	6
Title of the Course and Course Code	Botany Practical-I (BOT1103)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	List and describe the plant resources containing primary and secondary metabolites.	1
CO2	Classify the different plant forms to its respective groups based on their thallus structure and reproduction.	2
CO3	Demonstrate the extraction of essential oil and its applications.	3
CO4	Identify life cycle pattern of various groups and categorize different phytochemical test for primary and secondary	4

	metabolites.	
CO5	Justify the life cycles pattern of different groups with respect to their scientific classification.	5
CO6	Write a tour report and submit photos representing plant diversity.	6
F.Y. B.Sc. Semester II		
Title of the Course and Course Code	Plant Morphology and Anatomy (BOT1201)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Retrieve the facts pertaining to the primary structure of angiosperms.	1
CO2	Discuss the basic concepts of inflorescence, parts of a typical flower, fruit and tissue systems.	2
CO3	Examine the modifications in the primary structure and correlate with the variations of plant structure in nature.	3
CO4	Identify the patterns in the anatomical structures of angiosperms.	4
CO5	Compare the variations in the reproductive parts and tissue systems within the basic taxonomic plant divisions.	5
CO6	Compile the significance of the basic morphological and anatomical differences within angiospermic plants and construct a scheme for identification of plants in nature.	6
Industrial Botany (BOT1202)		
Title of the Course and Course Code	Industrial Botany (BOT1202)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the techniques of plant tissue culture.	1
CO2	Discuss the advantages and limitations of greenhouse technology and classify the types.	2
CO3	Outline the cultivation practices, harvesting and marketing of Rose and Gerbera.	3
CO4	Explain the cultivation practices of Oyster mushroom.	4
CO5	Evaluate the advantages of biofuel technology, biocontrol and compare the important commercial products.	5
CO6	Compile the applications of industrially important fungi and collect information on their products.	6
Botany Practical - II (BOT1203)		
Title of the Course and Course Code	Botany Practical - II (BOT1203)	Number of Credits : 02

On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe and identify the different types of inflorescence, flowers and fruits.	1
CO2	Explain and differentiate various steps required for cultivation of oyster mushrooms.	2
CO3	Demonstrate different steps of plant tissue culture technique.	3
CO4	Categorize the type of inflorescences, flowers and fruits.	4
CO5	Determine anatomical features of dicot and monocot.	5
CO6	Write a tour report on type of poly houses and its application in horticulture and floriculture industry.	6
S. Y. B. Sc. Semester III		
Title of the Course and Course Code	Plant Ecology and Taxonomy (BOT2301)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Outline principle biogeographical zones, Continental drift-Wagner's Theory and Endemism.	1
CO2	Explain techniques of herbaria preparation	2
CO3	Examine morphological and anatomical adaptive characters in ecological grouping.	3
CO4	Classify and identify plants upto family level.	4
CO5	Determine the position of plants in different classification system.	5
CO6	Revise the biophytogeographical regions and Wagner's theory.	6
Plant Physiology and Metabolism (BOT2302)		
Title of the Course and Course Code	Plant Physiology and Metabolism (BOT2302)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the concepts of plant water relations and importance of water.	1
CO2	Explain the mechanism and significance of transpiration, distinguish between types of transpiration, guttation and exudation.	2
CO3	Classify the nutrients, illustrate their role and deficiency symptoms.	3
CO4	Compare the structure of chloroplast and mitochondria, differentiate between types of pigments, photosystems and respiration.	4
CO5	Determine the role of different plant growth regulators. Categorize the plants based on photoperiod and explain the concept of vernalization.	5

CO6	Write about biological nitrogen fixation and compile the steps involved in nitrogen metabolism.	6
Title of the Course and Course Code	Botany Practical -III (BOT2303)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify the botanical terms used for the description of plant families and the tools of taxonomy.	1
CO2	Differentiate plant families based on their morphological characters.	2
CO3	Examine the ecological adaptations in hydrophytes and xerophytes based on their external and internal peculiarities.	3
CO4	Analyze the phenomena of imbibition and osmosis, articulate the role of mineral nutrients, auxins on plant growth based on demonstration experiments.	4
CO5	Measure the rate of transpiration under different conditions of light/wind velocity and interpret the results.	5
CO6	Perform experiment to determine diffusion pressure deficit using potato cylinders.	6
S.Y. B.Sc. Semester IV		
Title of the Course and Course Code	Plant Anatomy and Embryology (BOT2401)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify monocot and dicot plants based on anatomical peculiarities.	1
CO2	Explain pollination and fertilization in plants.	2
CO3	Examine different tissues and its functions.	3
CO4	Analyze the steps involved in sporogenesis in flower.	4
CO5	Determine embryological stages of the life cycle of higher plants.	5
CO6	Specify the differences between the normal and anomalous secondary growth in angiosperms.	6
Title of the Course and Course Code	Economic Botany and Biotechnology (BOT2402)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Recall centers of origin and their importance.	1
CO2	Explain different types of economically important plants and give examples of cereals, legumes, spices, beverages and fiber	2

	yielding plants.	
CO3	Examine and explain the role of wheat, chickpea, clove, tea, cotton with respect to their morphology and uses of products and by-products. Identify the exotic vegetables and their uses.	3
CO4	Classify and explain the tools used in gene cloning, discuss Agrobacterium mediated gene transfer in plants and outline the application of plant genetic engineering in crop improvement.	4
CO5	Compare the methods used for phytoremediation.	5
CO6	Write about the bioreactors used in fermentation and summarize the industrial applications of fermentation.	6
Title of the Course and Course Code	Botany Practical –IV (EVS2403)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify the epidermal tissue system.	1
CO2	Differentiate between the types of ovules, tetrasporangiate anther, dicot and monocot embryo.	2
CO3	Carry out the estimation of citric acid by titration method and determine the amount produced in the fermented broth.	3
CO4	Identify economically important plants based on their products.	4
CO5	Review the importance of fermentation products and plants used for phytoremediation.	5
CO6	Prepare double stained temporary preparation of transverse section of stem of Annona, Bignonia and Dracaena and specify the type of secondary growth.	6
T. Y. B. Sc. Semester V		
Title of the Course and Course Code	Cryptogamic Botany (BOT3501)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe lower and higher cryptogams.	1
CO2	Compare different plant forms based on characteristic features and distinguish them from their respective group.	2
CO3	Outline the group and differentiate the taxonomic forms.	3
CO4	Analyze life cycle patterns of different groups.	4
CO5	Review various groups of cryptogams and differentiate each other using salient features.	5
CO6	Specify economic and ecological significance of different groups.	6

Title of the Course and Course Code	Ethnobotany (BOT3502)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe concepts, scope and objectives of ethnobotany.	1
CO2	Explain the role of ethnobotany in plant conservation.	2
CO3	Apply ethnobotany as a tool to protect interests of ethnic groups.	3
CO4	Analyze the significance of the medicinal plants in ethnobotanical practices.	4
CO5	Determine different methodologies of ethnobotanical studies.	5
CO6	Prepare a report on ethnobotanical visits.	6
Title of the Course and Course Code	Genetics and Evolution (BOT3503)	Number of Credits : 03
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe Mendel's law and its importance.	1
CO2	Explain Coupling, Repulsion Hypothesis of Bateson, Punnet and its significance.	2
CO3	Examine character of multiple alleles and genetically controlled sex determining mechanisms.	3
CO4	Analyze different colours of phenotypes.	4
CO5	Determine age of rock and fossils by evolutionary evidence.	5
CO6	Collect evidence from comparative cytology and genetics.	6
Title of the Course and Course Code	Spermatophyta & Paleobotony (BOT3504)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Outline the position of gymnosperms, angiosperms in the latest classification system. List the morphological and anatomical characters of the group.	1
CO2	Classify the groups and differentiate the taxonomic forms.	2
CO3	Interpret the life cycles of gymnosperms and angiosperms.	3
CO4	Distinguish different families with reference to systematic position, characters and their economic importance.	4
CO5	Determine fossil plant groups along with the formations of fossils.	5
CO6	Prepare indent bracketed and artificial keys along with tools of	6

	taxonomy for plant identification and authentication.	
Title of the Course and Course Code	Horticulture and Floriculture (BOT3505)	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe concepts of horticulture and floriculture.	1
CO2	Classify the horticultural crops and discuss their nutritive values.	2
CO3	Examine the importance of conservation and cultivation of wild plants in landscape gardening. Apply the knowledge of drying plant material and discuss their applications.	3
CO4	Analyze different practices in horticulture and explain their applications with respect to different crops.	4
CO5	Evaluate the methods of cultivation of cut flowers using greenhouse technology.	5
CO6	Specify different cultivation practices followed for fruits and vegetables.	6
Title of the Course and Course Code	CELL BIOLOGY AND MOLECULAR BIOLOGY BOT 3506	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the basic concepts of cell and molecular biology. Interpret the significance of the past evidence to prove that DNA is the genetic material in cells.	1
CO2	Discuss the structural organization and functions of the cell organelles. Illustrate the assembly of chromosomes. Infer the ultrastructure of plant cell wall and plasma membrane.	2
CO3	Outline the structural details of nucleic acids and clarify the concept of genes.	3
CO4	Explain the cell division processes within the cell. Differentiate between the intricacies of the mitotic and meiotic divisions.	4
CO5	Review the significance of the cell biology, the molecular mechanisms of the cells including replication and DNA repair.	5
CO6	Assemble the cellular processes and support the fundamental functions of plant specific cell organelles.	6
Title of the Course and Course Code	BOTANY PRACTICAL Based on BOT 3501 and BOT 3502 BOT 3507	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level

CO1	List and describe the different representatives of algae, fungi, bryophytes and pteridophytes.	1
CO2	Classify the different plant forms to its respective groups based on their thallus structure and reproduction.	2
CO3	Examine different ethnobotanical plants based on its morphological characters.	3
CO4	Compare and categorize different techniques of herbarium preparations. Analyze different phytochemical tests of secondary metabolites.	4
CO5	Justify the life cycles of cryptogamic representatives with respect to their scientific classification.	5
CO6	Write a tour report, collect the specimens and organize the preserved specimens and herbarium sheets according to their evolutionary features.	6
Title of the Course and Course Code	BOTANY PRACTICAL Based on BOT 3503, BOT 3504 and BOT 3508	Number of Credits : 03
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the process of fossilisation.	1
CO1	Explain the life cycle <i>Pinus</i> and <i>Gnetum</i> .	2
CO2	Solve genetic problems based on linkage map using three-point test cross data. Interpret Dihybrid and Trihybrid cross.	3
CO3	Identify and classify the families.	4
CO4	Review cytoplasmic inheritance in <i>Mirabilis jalapa</i> .	5
CO5	Prepare, construct artificial keys of genus and species.	6
Title of the Course and Course Code	DSE -3 BOTANY PRACTICAL Based on BOT 3505, BOT 3506 and BOT 3509	Number of Credits : 04
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe different tools used for gardening.	1
CO2	Predict the amount of DNA in cauliflower. Infer the technique for RNA estimation.	2
CO3	Examine different types of cut flower harvesting and its preservation.	3
CO4	Detect the C metaphase chromosomes of onion root tips and explain the karyotype of chromosomes.	4
CO5	Evaluate different methods of dry flower preservation and ointment preparation.	5
CO6	Write a tour report and propose the importance of oxygen path plants.	6

Title of the Course and Course Code	BIO-FERTILIZERS BOT 3511	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	State and recall the microbes used as biofertilizer.	1
CO2	Summarize the method of isolation and mass multiplication of <i>Rhizobium</i> , <i>Azospirillum</i> and <i>Azotobacter</i> carrier-based inoculants.	2
CO3	Examine the role of blue green algae- <i>Azolla</i> , <i>Anabaena azollae</i> in nitrogen fixation, outline the factors affecting their growth and use of <i>Azolla</i> in rice cultivation.	3
CO4	Distinguish types of mycorrhizal associations. Explain the isolation and inoculum production of VAM and its influence on growth and yield of crop plants.	4
CO5	Assess the methods of organic farming, recommend recycling of biodegradable municipal, agricultural and industrial wastes.	5
CO6	Design and develop the methods for making bio-compost, vermicompost and their field applications.	6
Title of the Course and Course Code	TECHNIQUES IN PLANT SCIENCES AND BIOSTATISTICS BOT3512	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the types of microscopy and micrometry	1
CO2	Categorize different types of lab techniques with respect to its applications. Summarize the various dimensions of scientific data with respect to central tendency and dispersion.	2
CO3	Interpret the applications of spectrophotometry and electrochemical techniques in lab experiments.	3
CO4	Differentiate the various methods of sampling and representation of data.	4
CO5	Review separation techniques with respect to chromatography and centrifugation	5

CO6	Design statistically valid experiments with appropriate tests of significance	6
T. Y. B.Sc. Semester VI		
Title of the Course and Course Code	PLANT PHYSIOLOGY AND BIOCHEMISTRY BOT3601	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe various physiological processes in plants and biochemical constituents of plants.	1
CO2	Associate different physiological processes in plant cells and classify biomolecules.	2
CO3	Illustrate structure of biomolecules.	3
CO4	Analyze the properties of biomolecules in plants.	4
CO5	Review plant metabolisms and pathways of production of metabolites.	5
CO6	Specify role of metabolites in plants.	6
Title of the Course and Course Code	NURSERY AND GARDENING BOT3602	Number of Credits : 03
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Define objectives and scope of nursery and gardening.	1
CO2	Illustrate types, dormancy, storage and production technology of seed.	2
CO3	Examine different types of gardens and their operations.	4
CO4	Analyze different methods of vegetative propagation.	3
CO5	Review methods of seedling raising and cultivation of vegetables.	5
CO6	Prepare a project report of the field visit.	6
Title of the Course and Course Code	PLANT ECOLOGY AND BIODIVERSITY BOT3603	Number of Credits : 04
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Outline the basic components of ecology and functional aspects of ecosystem.	1

CO2	Explain biotic and abiotic components of the ecosystem.	2
CO3	Illustrate various levels of Biodiversity.	3
CO4	Analyze the need for biodiversity conservation.	4
CO5	Determine the role of Universities and other Educational Institutions in Biodiversity Conservation.	5
CO6	Generate data for remote sensing applications in ecology.	6
Title of the Course and Course Code	PLANT BREEDING AND SEED TECHNOLOGY BOT3604	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe objectives and importance of plant breeding.	1
CO2	Explain different methods of plant breeding.	2
CO3	Examine different seed tests for quality seed production and seed processing.	4
CO4	Analyze the mechanism of chemical and physical mutagens and characteristics of polyploidy in crop improvement.	3
CO5	Determine different operations in the Seed Industry.	5
CO6	Prepare a report based on development of seed industry in India, seed marketing and distribution.	6
Title of the Course and Course Code	MYCOLOGY AND PLANT PATHOLOGY BOT3605	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	State general characters of fungi and their ecological significance.	1
CO2	Explain the basis of classification of fungi and their life cycles.	2
CO3	Classify the causal organisms according to the diseases caused by them.	3
CO4	Compare the defense mechanism of host and pathogens at structural and biochemical level.	4
CO5	Evaluate the methods of epidemiology and disease forecasting systems.	5

CO6	Develop the methods of studying plant diseases.	6
Title of the Course and Course Code	Plant Molecular Biology and Biotechnology BOT 3606	Number of Credits : 04
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Describe the molecular aspects of transcription and translation.	1
CO2	Explain different approaches in plant tissue culture.	2
CO3	Illustrate the process of polymerase chain reaction with its applications.	3
CO4	Differentiate various methods of secondary metabolite production and discuss the concepts of bioinformatics.	4
CO5	Determine the applications of biotechnology with respect to transgenic plants and review the biosafety concepts of plant biotechnology.	5
CO6	Revise the heterocatalytic activity of DNA and compile the plant tissue culture process and its applications.	6
Title of the Course and Course Code	BOTANY PRACTICAL Based on BOT 3601, BOT 3602 and BOT 3607	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify the concept of TAN in CAM plants. Describe the variations produced by tissue culture in plants.	1
CO2	Compare the types of pigments in leaves and interpret the chlorophyll content of different leaves.	2
CO3	Implement qualitative analysis of Alkaloid, Glycoside and Tannin.	3
CO4	Categorize different types of weeds in the field.	4
CO5	Discriminate the various nursery techniques with respect to its utility.	5
CO6	Write tour report and compile information on various types of gardens.	6
Title of the Course and Course Code	BOTANY PRACTICAL Based on BOT 3603, BOT 3604 and BOT 3608	Number of Credits : 02
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify the instruments used to measure microclimate variables.	1
CO2	Compare different soil samples for their water holding capacity.	2

CO3	Use colchicine treated onion root tips to examine tetraploidy. Infer the effect of chemical mutagen on seed germination.	3
CO4	Analyze the herbaceous vegetation data of college campuses quantitatively with the list count quadrat method.	4
CO5	Compare the hybridization techniques, determine seed viability using tetrazolium test, select Hot Spots of the World on the world map.	5
CO6	Perform the experiment to specify the amount of dissolved oxygen from the polluted and unpolluted water samples.	6

Title of the Course and Course Code	BOTANY PRACTICAL Based on BOT 3605, BOT 3606 and BOT 3609	Number of Credits :2
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify different plant diseases based on its symptoms.	1
CO2	Discuss the techniques of inoculation and isolation of plant pathogens.	2
CO3	Implement the bioinformatics tools in retrieval of genetic information from databases. Infer the amount of proteins in seeds.	3
CO4	Explain the technique of separation of DNA by agarose gel electrophoresis method.	4
CO5	Validate the concept of transcription and translation by solving problems. Assess the results of experiments, calculate the result and interpret it with the help of graphs.	5
CO6	Plan and design experiments on plant tissue culture using different types of explants. Compile the results and specify the applications of tissue culture.	6

Title of the Course and Course Code	MEDICO-BOTANY BOT3611	Title of the Course and Course Code
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	List different methods of drug adulteration, extraction and evaluation.	1
CO2	Categorize and Classify different natural drugs. Associate active principal of drug plants with its application.	2

CO3	Generalize cultivation, collection and processing of herbal drugs.	3
CO4	Identify and differentiate medicinally important drugs with respect to plant part used.	4
CO5	Compare and review different ayurvedic formulations.	5
CO6	Write report on ethnobotany and its economic importance.	6
Title of the Course and Course Code	Mushroom Culture Technique BOT3612	Number of Credits :2
On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Identify and define types of mushrooms. (Edible and poisonous).	1
CO2	Discuss infrastructure, composting technology and other factors affecting cultivation technology.	2
CO3	Classify different kinds of substrates for mushroom cultivation and infer the skillset to prepare media for mushroom cultivation from these substrates.	3
CO4	Categorize mushroom storage and analyse their nutritional value.	4
CO5	Test and evaluate the food prepared at various levels of research centres.	5
CO6	Develop knowledge for self-employment such as cost benefit ratio and marketing statistics.	6