

Course Outcomes – Program Outcomes (COPO) Mapping

Program Outcomes (PO): B.Sc. (H) Botany

Learning Outcome-based Curriculum Framework (LOCF)

The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner

ABBREVIATIONS / NOMENCLATURE

Sno.	Nomenclature	Description	Aggregate Courses
1.	PO	Program Outcome	PO1, PO2, PO3
2.	CO	Course Outcome	CO1, CO2, CO3, CO4, CO5, CO6, CO7
3.	CC	Core Courses	CC1, CC2, CC3, CC4, CC5, CC6, CC7, CC8, CC9, CC10, CC11, CC12, CC13, CC14
4.	DSE	Discipline Specific Elective	DSE1, DSE2, DSE3, DSE4
5.	GE	Generic Electives	GE1, GE2, GE3, GE4

LOCF

Sno.	Program Outcomes (PO): B.Sc. (H) Botany	Statements
1.	PO1	Understanding of plant classification systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various life-forms.
2.	PO2	Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and is well versed with the use of transgenic technologies for basic and applied research in plants.
3.	PO3	Understanding of various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology and use of bioinformatics tools and databases and the application of statistics to biological data.

Course Outcomes (CO): B.Sc (H) Botany

SEMESTER 1:			
CC1: Microbiology and Phycology			
Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161101	CC1: Microbiology and Phycology	CO1	Students would have understanding of the classification, characteristic features, cell structure and growth and reproduction in viruses, bacteria, and various groups of marine and fresh water algae and their ecological and economic importance.
CC2: Biomolecules and Cell Biology			
32161102	CC2: Biomolecules and Cell Biology	CO1	The relationship between the properties of macromolecules, their cellular activities and biological responses
		CO2	Understanding of Cell metabolism, chemical composition, physiochemical and functional organization of organelle
		CO3	Contemporary approaches in modern cell and molecular biology.
GE-1: Biodiversity (Microbes, Fungi, Algae, and Archegoniatae)			
32165101	GE-1: Biodiversity (Microbes, Fungi, Algae, and Archegoniatae)	CO1	Combination of Theoretical and Practical components will provide comprehensive information and insight into the fascinating world of Microbes and Plants.
		CO2	Hands on Training will help students learn use of microscope, mounting, section-cutting and staining techniques for the study of plant material

		CO3	Making Drawings in Practical Records will enhance understanding morphological and structural details and related functional aspects in diverse plant groups.
		CO4	Use of Illustrations, Photographs, Charts, Permanent Slides, Museum and Herbarium Specimens along with ICT Methods will provide an interesting insight into the beautiful world of microbes and plants.
		CO5	Scope of Biodiversity includes Medicinal field, Industry, Agriculture, Research and Study, Job Opportunities and Environmental Conservation. This paper is both informative and interesting and will enable students to learn about Biodiversity not only as a plant or nature lover, but also for higher academic pursuits, particularly in the field of Biological Sciences, Environment and Biodiversity Conservation.

COPO MAPPING

SEMESTER I: COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC1	CO1	✓		
		✓		
CC2	CO1	✓		
	CO2			
	CO3		✓	✓
GE1	CO1	✓		
	CO2		✓	✓
	CO3			✓
	CO4			✓
	CO5	✓		

SEMESTER II:**CC3: Mycology and Phytopathology**

Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161201	CC3: Mycology and Phytopathology	CO1	Understand the world of fungi, lichens and pathogens of plants
		CO2	Understand characteristics the ecological and economic significance of the fungi and lichens
		CO3	Understand the application of mycology in various fields of economic and ecological Significance
		CO4	Understand the economic and pathological importance of fungi, bacteria and viruses
		CO5	Identify common plant diseases and their control measures
CC4: Archegoniatae			
32161202	CC4:Archegoniatae	CO1	The students will be made aware of the group of plants that have given rise to land habit and the flowering plants.
		CO2	Through field study they will be able to see these plants grow in nature and become familiar with the biodiversity.
		CO3	Students should create their small digital reports where they can capture the zoomed in and zoomed out pictures as well as videos in case they are able to find some rare structure or phenomenon related to these plants
GE2: Plant Ecology and Taxonomy			
32165201	GE2: Plant Ecology and Taxonomy	CO1	After successful completion of the course the student shall have adequate knowledge about the basic principals of environment and taxonomy.

COPO MAPPING

SEMESTER II : COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC3	CO1	✓		
	CO2	✓		
	CO3	✓		
	CO4	✓	✓	
	CO5		✓	
	CO6			✓
CC4	CO1	✓	✓	
	CO2	✓	✓	✓
	CO3	✓		✓
GE2	CO1	✓		✓

SEMESTER III:

CC5: Anatomy of Angiosperms

Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161301	CC5: Anatomy of Angiosperms	CO1	Knowledge of various cells and tissues, meristem, epidermal and vascular tissue system in plants.
		CO2	2. Various aspects of growth, development of the tissues and differentiation of various plant organs. Knowledge of basic structure and organization of plant parts in angiosperms.
		CO3	3. Correlation of structure with morphology and functions.
CC6: Economic Botany			
32161302	CC6: Economic Botany	CO1	After studying Economic Botany, students would have first hand information of plants used

			as food, the various kinds of nutrients available in the plants.
		CO2	The dietary requirements of proteins, fats, amino-acids, vitamins etc that can be met by plants. The students will learn to perform the micro-chemical tests to demonstrate various components.
		CO3	The students will learn about the use of fibre plants, beverages, fruits and vegetables that are integral to day to day life of plants.
		CO4	Students will learn to explore the regional diversity in food crops and other plants and their ethno-botanical importance as well.
CC7: Genetics			
32161303	CC7: Genetics	CO1	To generate interest among the students in Genetics and make them aware about the importance and opportunities in higher education and research, the first unit should be Introductory dealing with how this area has revolutionized all aspects of our life from its growth from Mendel to Genetic Engineering.
		CO2	Modes of inheritance of traits/ phenotypes and Phenotype-genotype correlation are the basic learning.
GE-3: Environmental Biotechnology			
32165302	GE3: Environmental Biotechnology	CO1	Explain the various global and regional environmental concerns due to natural causes and/or human activities.
		CO2	Investigate some examples of different types of environmental pollution and their impacts.
		CO3	Describe existing and emerging technologies that are important in the area of environmental biotechnology
		CO4	Demonstrate an awareness of emerging concerns such as climate change, waste management or reductions in fossil fuels, and new technologies for addressing these.
		CO5	Appreciate the scientific, ethical and/or social issues associated with certain applications of biotechnology for alleviating the environmental concerns.
		CO6	Explain national and international legislations, policies and role of public participation in Environmental Protection

		CO7	Students will have an insight on the causes and consequences of environmental pollution, pollutants, They can think about the prevent of degradation of environment and management of pollutants.
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SEMESTER III : COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC5	CO1	✓		
	CO2	✓		
	CO3	✓		
CC6	CO1	✓	✓	
	CO2	✓	✓	
	CO3	✓	✓	
	CO4	✓	✓	
CC7	CO1			
	CO2			
GE3	CO1	✓		
	CO2	✓	✓	
	CO3		✓	✓
	CO4		✓	
	CO5		✓	✓
	CO6	✓	✓	
	CO7	✓		✓

SEMESTER IV:			
CC8: Molecular Biology			
Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161401	CC8: Molecular Biology	CO1	Understanding of nucleic acid, organization of DNA in prokaryotes and Eukaryotes, DNA replication mechanism, genetic code and transcription process.

		CO2	Processing and modification of RNA and translation process, function and regulation of expression.
		CO3	Application in biotechnology
CC9: Ecology			
32161402	CC9: Ecology	CO1	It acquaint the students with complex interrelationship between organisms and environment; make them understand methods to studying vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography.
		CO2	This knowledge is critical in evolving strategies for sustainable natural resource management and biodiversity conservation.
CC10: Plant Systematics			
32161403	CC10: Plant Systematics	CO1	Understanding of systematics its importance in bioresource utilization and biodiversity management.
		CO2	Nomenclature pattern, Phylogeny, Classification systems of the plants.
GE-4: Economic Botany and Biotechnology			
32165401	GE4: Economic Botany and Biotechnology	CO1	Understanding of morphology, and processing and economic value of plant sources of cereals, legumes, spices, oil, rubber, timber and medicines
		CO2	Economic value of plant sources of cereals, legumes, spices, oil, rubber, timber and medicines

SEMESTER IV : COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC8	CO1	✓	✓	
	CO2	✓	✓	
	CO3	✓	✓	

CC9	CO1	✓	✓	
	CO2	✓	✓	
CC10	CO1	✓	✓	
	CO2	✓	✓	
GE4	CO1	✓		✓
	CO2	✓		✓

SEMESTER V:

CC11: Reproductive Biology of Angiosperms

Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161501	CC11: Reproductive Biology of Angiosperms	CO1	Induction of flowering, molecular and genetic aspects of flower development.
		CO2	Anther structure, pollen development, dispersal and pollination
		CO3	Ovule, embryo sac development and fertilization,
		CO4	Endosperm development and its importance
		CO5	Alternative pathways of reproduction and their importance
		CO6	Student would be able to apply this knowledge for conservation of plants, pollinators and fruit development
CC12: Plant Physiology			
32161502	CC12: Plant Physiology	CO1	The students are able to correlate morphology, anatomy, cell structure and biochemistry with plant functioning.
		CO2	The link between theory and practical syllabus is established, and the employability of youth would be enhanced. The youth can also begin small-scale enterprises.
DSE1 : Analytical Techniques in Plant Sciences			
		CO1	Understanding of principles of light, confocal transmission and electron microscopy,

32167503	DSE1: Analytical Techniques in Plant Sciences		centrifugation, spectrophotometry, chromatography, x-ray diffraction technique and chromatography techniques
		CO2	Understanding of use of light, confocal transmission and electron microscopy, centrifugation, spectrophotometry, chromatography, x-ray diffraction technique and chromatography techniques diffraction technique and chromatography techniques
DSE2: Biostatistics			
32167502	DSE2: Biostatistics	CO1	Understanding of interpreting the scientific data that is generated during scientific experiments. It is the responsibility of biostatisticians and other experts to consider the variables in subjects to understand them, and to make sense of different sources of variation.
		CO2	In essence, the goal of biostatistics is to disentangle the data received and make valid inferences that can be used to solve problems in public health.
		CO3	Biostatistics uses the application of statistical methods to conduct research in the areas of biology, public health, and medicine. Many times, experts in biostatistics collaborate with other scientists and researchers

SEMESTER V : COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC11	CO1	✓		
	CO2	✓		
	CO3	✓		
	CO4	✓		✓
	CO5	✓	✓	
	CO6	✓	✓	
CC12	CO1	✓	✓	✓
	CO2	✓	✓	✓
DSE1	CO1	✓	✓	
	CO2		✓	✓
DSE2	CO1	✓		✓
	CO2	✓		✓

	C03		✓	✓
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SEMESTER VI:			
CC13: Plant Metabolism			
Unique Paper Code	Name of the Paper	Course Outcome: CO	Statement
32161601	CC13: Plant Metabolism	CO1	Concept and significance of metabolic redundancy in plants.
		CO2	Students will also be able to learn the similarity and differences in metabolic pathways in animals and plants.
		CO3	To have understanding of water and nutrient uptake and movement in plants, role of mineral elements, translocation of sugars, Role of various plant growth regulators, phytochrome cytochromes and phototropins, and flowering stimulus.
CC14: Plant Biotechnology			
32161602	CC14: Plant Biotechnology	CO1	Learn the basic concepts, principles and processes in plant biotechnology.
		CO2	Have the ability of explanation of concepts, principles and usage of the acquired knowledge in biotechnological, pharmaceutical, medical, ecological and agricultural applications.
		CO3	Use basic biotechnological techniques to explore molecular biology of plants
		CO4	Explain how biotechnology is used to for plant improvement and discuss the biosefty concern and ethical issue of that use.
DSE3: Industrial and environmental biotechnology			
32167601	DSE3: Industrial and	CO1	To introduce students with the industrial microbiology: concepts, principles, scope and application

	environmental biotechnology	CO2	To introduce students with the environmental microbiology: concepts, principles, scope and application
DSE4: Bioinformatics			
32167608	DSE4: Bioinformatics	CO1	With a working knowledge of the practical and theoretical concepts of bioinformatics, you will be well qualified to progress onto advanced graduate study.
		CO2	The portfolio of skills developed on the programme is also suited to academic research or work within the bioinformatics industry as well as range of commercial settings.

SEMESTER VI: COPO MAPPING				
Papers	Program Outcome : PO			
	Course Outcome: CO	PO1	PO2	PO3
CC13	CO1	✓	✓	
	CO2	✓	✓	
	CO3	✓	✓	
CC14	CO1	✓	✓	
	CO2	✓	✓	✓
	CO3		✓	✓
	CO4		✓	✓
DSE3	CO1	✓	✓	
	CO2	✓		✓
DSE4	CO1	✓		✓
	CO2	✓		✓