

M.Sc Botany

Programme Outcome	
PO1	Critical thinking
PO2	Environment and Sustainability
PO3	Self-directed and Life-long learning
PO4	Computational thinking
PO5	Problem solving
PO6	Research orientation

Program Specific outcome

PSO 1	Understand the identification, classification, structure, development and reproduction of cryptogams and phanerogams
PSO 2	Understand the diversity, evolution, interrelationship among lower and higher group of plants and their economic importance
PSO 3	Understand the concepts and applications of biology in cell and molecular biology, biotechnology, bioinformatics, biostatistics, biophysics, plant breeding, horticulture, plant physiology, biochemistry, genetics and microbiology
PSO 4	Perform lab procedures as per standard protocols in the areas of biochemistry, biophysics, biotechnology, Microtechnique, plant physiology, taxonomy, ecology, bioinformatics and microbiology

Biotechnology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand the steps involved in recombination DNA technology	PO2 PSO3 PSO4	U	PK	6	0

CO2	Understand the procedure and application of microbial biotechnology	PO2 PSO3 PSO4	U	PK	6	5
CO3	Understand different stages of plant tissue culture technique	PO2 PSO3 PSO4	U	PK	10	10
CO4	Understand the tools and techniques in genetic engineering and its applications	PO2 PSO3 PSO4	U	PK	15	5
CO5	Apply and analyze bioinformatics tools in DNA and protein analysis	PO2 PSO3 PSO4	U	PK	15	7
CO6	Create awareness about ethical issues relating to rDNA techniques	PO2 PSO3 PSO4	U	CK	5	0
CO7	Familiarize with cells involved in immunity, its interaction and auto immune disorders	PO2 PSO3 PSO4	U	CK	5	0
	Total Number of Hours				72	27

Bryology and Pteridology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand the diversity, distribution and classification of Bryophytes and Pteridophytes with examples	PO9 PSO2 PSO1	U	CK	10	6
CO2	Understand the ecological and economic importance of Bryophytes and Pteridophytes	PO9 PSO2	U	CK	9	8
CO3	Recognize, compare and distinguishing thallus structure and reproductive mechanisms of Bryophytes	PO1 PSO1	AP	PK	17	11
CO4	Compare and distinguish the anatomy of sporophytic and gametophytic generation of Pteridophytes	PO1 PSO1	AP	PK	15	9
CO5	Recognize and compare reproductive structures of different classes of Pteridophytes	PO1 PSO1	U	CK	15	12
CO6	Understand the mechanisms of spore dispersal, heterospory, apogamy and apospory of Pteridophytes	PO9 PSO1	U	CK	6	8
Total Number of Hours					72	54

: Cell and Molecular Biology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand structural organization of plant cell , ultra structure of cell organelles, chromosomal and cytoskeleton structure	PO1 PSO3	U	CK	9	2
CO2	Understand the basic concept of cell signaling and cell- cell interaction	PO1 PSO3	U	CK	6	0
CO3	Understand stages of cell cycle and its regulations	PO1 PSO3	U	CK	6	10
CO4	Understand genome organization in eukaryotes and prokaryotes	PO1 PSO3 PSO4	U	CK	11	0
CO5	Understand the concept of replication , transcription and translation in prokaryotes and eukaryotes	PO1 PSO3 PSO4	U	CK	10	24
CO6	Understand the concept of gene expression and control mechanism in prokaryotic and eukaryotic systems	PO1 PSO3 PSO4	U	CK	24	0
CO7	Describe the concept of recombination and epigenetic inheritance	PO1 PSO3 PSO4	U	CK	3	0
CO8	Categorize DNA repair mechanisms	PO1 PSO3	U	CK	3	0

		PSO4				
	Total Number of Hours				72	36

Name of Course: Clinical Microbiology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand the basic concept of immunology	PO1 PSO3	U	CK	5	14
CO2	Understand cells involved in immune systems, B cells & T cells development and differentiation	PO1 PSO3	U	CK	15	0
CO3	Understand types and structure of antigen and antibody and their interactions in -vivo and in - vitro	PO1 PSO3	U	CK	20	20
CO4	Familiarize common immune disorders and its therapy	PO1 PSO3	U	CK	15	0
CO5	Explain the process of epidemiology, prevention and	PO1	U	CK	10	0

	control measures of microbial disorders	PSO3				
CO6	Familiarize viral, bacterial, fungal and protozoal diseases	PO1 PSO3	U	CK	10	0
CO7	Understand mode of action of viral chemotherapy, vaccination and antibiotics	PO1 PSO3	U	CK	15	20
	Total Number of Hours				90	54

Environmental Science

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand scope, interdisciplinary nature of environmental science	PO9 PSO4	U	CK	4	0
CO2	Analyze the concept of population and community ecology, dynamics of ecology	PO9 PSO4	U	CK	15	0
CO3	Examine ecosystem types and its conservation efforts and perceive knowledge about biosphere	PO2 PSO4	U	CK	15	5
CO4	Understand basic principles of phytogeography and applications of remote sensing	PO9 PSO4	U	CK	5	0

CO5	Discuss pollution type (water, air, noise, radioactive and thermal), sources , effects and control measures to mitigate it	PO9 PSO4	U	PK	10	20
CO6	Analyze global environmental problems and biotechnological tools in tracking it	PO9 PSO4	AP	PK	5	7
Total Number of Hours					54	27

Name of Course: Food, Agricultural and Environmental microbiology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand basic principles of food spoilage, preservation and storage	PO6 PSO3 PSO4	U	CK	7	10
CO2	Understand and apply the technology of fermented food and products	PO6 PSO4	AP	PK	12	12
CO3	Recognize food borne diseases	PO9 PSO3 PSO4	E	PK	15	8
CO4	Understand the role of microorganisms in agriculture and analyze significance of organic farming and biofertilizers	PO9 PSO3 PSO4	AN	PK	21	15

CO5	Understand the microbial diversity in the environment and apply techniques of microbiology in agriculture	PO9 PSO3 PSO4	AP	PK	15	10
CO6	Understand and apply the role of microorganisms in soil and aquatic environment	PO9 PSO3 PSO4	AP	PK	20	17
Total Number of Hours					90	72

Name of Course: Genetics and Biochemistry

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand and apply the principles of inheritance, gene introduction and linkage	PO2 PSO3	AP	PK	8	10
CO2	Understand and analysis the basic concept of human genetics and cancer	PO1 PSO3	U	CK	5	0
CO3	Understand the basic concept of mutation and carry out problems related to population genetics	PO9 PSO3 PSO4	AP	PK	5	8
CO4	Understand classification, structure, function and metabolism of biomolecules	PO1 PSO3	U	CK	20	2

CO5	Understand and evaluate the classification mechanism of action and application of enzyme	PO1 PSO3	AP	PK	10	8
CO6	Understand the classification, biosynthesis and functions of secondary metabolites	PO1 PSO3	AP	PK	6	8
Total Number of Hours					54	36

Name of Course: Gymnosperm, Evolution and Developmental Biology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand origin, general characters, distribution and classification of Gymnosperms	PO9 PSO1 PSO2	U	CK	3	0
CO2	Understand vegetative and reproductive lifecycle of Gymnosperms mentioned in the syllabus	PO9 PSO1 PSO2	U	PK	18	20
CO3	Understand the economic significance of Gymnosperms	PO9 PSO1	U	CK	2	0
CO4	Understand the evolutionary time scale and techniques used in fossil study	PO9 PSO2	U	CK	4	7
CO5	Describe the concept of natural selection and factors affecting natural selection	PO9 PSO2	R	CK	8	0

CO6	Discuss mutation as an evolutionary force and interrelation between mutation and natural selection	PO9 PSO2	U	CK	7	0
CO7	Understand concept of speciation and distinguish types of speciation and co- evolution of species interaction	PO9 PSO2	U	CK	12	0
CO8	Discuss the process of morphogenesis and organogenesis in plants and development of angiosperms	PO1 PSO1	U	CK	18	18
Total Number of Hours					72	45

Name of Course: Industrial Microbiology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Classify the sources and characters of industrially important microbes	PO1 PSO3	U	CK	4	0
CO2	Applications of methods for isolation, selection and preservation of industrially important microorganisms	PO7 PSO3 PSO4	AP	PK	10	12
CO3	Understand the concept of fermentation and categorize principle, working procedure, and	PO7 PSO3 PSO4	AP	PK	34	15

	applications of fermentation and downstream processing					
CO4	Summarize the principle, structure and applications of bioreactors	PO7 PSO3 PSO4	AN	PK	12	10
CO5	Understand the principle and procedures involved in production of industrially important products using microorganisms	PO7 PSO3 PSO4	U	CK	24	9
CO6	Explain methods and applications of immobilization of cells and enzymes	PO7 PSO3 PSO4	AP	PK	6	8
	Total Number of Hours				90	54

Name of Course: Microbiology & Phycology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Summarize milestones in Microbiology	PO1 PSO1	U	CK	2	0
CO2	Describe general features of bacteria with special reference to Bergey's Manual	PO1 PSO1	U	CK	5	1

CO3	Discuss bacterial systematics , phenotypic, biochemical & molecular features	PO1 PSO1	U	CK	10	1
CO4	Understand sterilization techniques of bacteria & method and maintaining of pure culture	PO1 PSO4	AP	PK	6	5
CO5	Describe features of viral & sub viral particles	PO1 PSO1	U	CK	4	2
CO6	Understand distribution, classification, morphology, anatomy, reproduction, life cycle and evolution of Algae.	PO9 PSO1 PSO2	U	CK	20	15
CO7	Understand the ecological economical and experimental importance of Algae	PO1 PSO2 PSO3	U	CK	13	6
CO8	Understand the technique of collection, isolation & preservation of Algae	PO1 PSO3 PSO4	AP	PK	12	15
	Total Number of Hours				72	45

Mention Name of Course: Mycology and Crop pathology

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
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CO1	Understand the general characters and classification of different fungal groups with examples	PO1 PSO1	U	CK	9	8
CO2	Understand the thallus structure and reproduction of various classes of fungi	PO1 PSO1	U	CK	15	20
CO3	Examine the fungal interaction in nature and predict their adaptive strategies	PO9 PSO2	U	CK	8	3
CO4	Understand the economical importance of fungi and assess their useful and harmful nature	PO9 PSO1 PSO2	U	CK	4	5
CO5	Recognize, compare and distinguish the processes and mechanisms involved in pathogenesis by various microbes	PO9 PSO2	U	CK	20	8
CO6	Identify and interpret the major diseases of crop plants and propose their control measures	PO9 PSO1 PSO2	AP	PK	16	10
	Total number of hours				72	54

Name of Course: Plant Anatomy and Principles of Angiosperm Systematics

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Develop an understanding of concepts and fundamentals of plant	PO1	U	CK	5	0

	anatomy and its interrelation with major disciplinary	PSO1 PSO2				
CO2	Examine the internal anatomy of plant systems and organs	PO1 PSO1 PSO3	E	PK	12	22
CO3	Develop critical understanding on evolution of concept of organization of shoot and root apex	PO1 PSO2	U	CK	9	6
CO4	Evaluate the adaptive and protective systems of plants.	PO1 PSO2	U	CK	10	8
CO5	Understand the scope, significance and general sources for taxonomic studies	PO1 PSO2	U	CK	6	0
CO6	Understand the concept of taxonomical hierarchy and general phylogenic terms related to angiosperm taxonomy	PO1 PSO2	U	CK	12	11
CO7	Identify major tools and methodology used for plant identification	PO1 PSO1	AP	PK	8	6
CO8	Understand the concept , rules and regulation of botanical nomenclature	PO1 PSO1	U	CK	10	10
	Total Number of Hours				72	63

Name of Course: Plant Physiology and Plant Breeding

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand the basic process of absorption of water and solutes	PO9 PSO3	U	CK	8	2
CO2	Understand plant metabolic process in depth	PO9 PSO3	U	CK	32	10
CO3	Understand and evaluate responses of plant to biotic and abiotic stresses	PO9 PSO3	U	CK	5	10
CO4	Understand and analyze the mechanisms involved in plant growth and development	PO9 PSO3 PSO4	AP	PK	9	5
CO5	Understand the objectives, achievements, future prospect and methods of plant breeding	PO9 PSO3 PSO4	AP	PK	10	9
CO6	Acquire knowledge on modern trends in plant breeding	PO9 PSO3	U	CK	8	0
	Total Number of Hours				72	45

Name of Course: Research Methodology, Biophysical Instrumentation, and Biostatistics and

Microtechnique

Mention Credits:

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Remember the basic concepts of research and its methodologies.	PO1 PSO3	U	CK	11	3
CO2	Understand and apply the concept of literature review, preparation of project report/proposal, thesis and research paper.	PO1 PSO3	U	CK	7	6
CO3	Understand the principles and application of various instruments in biological research.	PO1 PSO4	AP	PK	8	6
CO4	Understand the basic principles and applications of microscopy and chromatography.	PO1 PSO3	AP	PK	10	12
CO5	Understand common statistical designs in Biological experiments.	PO2 PSO3	E	CK	10	6
CO6	Analysis and application of different statistical tools in research.	PO2 PSO4	AP	PK	8	12
CO7	Understand the basic principles of Microtechnique.	PO1 PSO4	AP	PK	9	13
CO8	Develop skill in techniques of staining and slide preparation.	PO1 PSO4	AP	PK	9	14
	Total Number of Hours				72	72

Name of Course: Taxonomy of Angiosperms**Mention Credits:**

CO	CO Statement	PO/ PSO	CL	KC	Class Hrs	Lab Hrs
CO1	Understand the major systems of angiosperm classification	PO2 PSO4	AP	PK	8	0
CO2	Application of major tools of taxonomy	PO2 PSO4	AP	PK	10	0
CO3	Examine the angiosperm families mentioned in syllabus with reference to tropical flora as per Benthem and Hooker classification and their economic importance	PO2 PSO4	AP	PK	27	20
CO4	Generalize study on economically important plantation crops and their products in Kerala	PO9 PSO2	U	CK	6	9
CO5	Understand the importance, sources and methods of Ethnobotany	PO7 PSO2	U	CK	3	7
	Total Number of Hours				54	36

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