

**ST. JOSEPH'S COLLEGE, DEVAGIRI, CALICUT
(AUTONOMOUS)**



POST GRADUATE DEGREE PROGRAMME

**ST. JOSEPH'S CHOICE BASED CREDIT SEMESTER SYSTEM
(SJCBCSSUG)**

**MASTER OF SCIENCE
BOTANY**

Course Outcome
(2019Admn Onwards)

COURSE OUTCOMES

CORE COURSES

SEMESTER I

FBOT1C01 - PHYCOLOGY, BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS

COs	COURSE OUTCOMES
CO1	Provide knowledge on the occurrence and evolution of plant groups like Algae, Bryophytes, Pteridophytes and Gymnosperms.
CO2	Develop understanding on the classification, nomenclature, diversity and distribution in these plant groups with up-to-date research knowledge.
CO3	Develop understanding on the range of variation in their structural and life cycle patterns, cellular organization and ecological / economic importance as separate plant groups
CO4	<p>Develop hands-on approaches to study algae, Bryophyte, Pteridophyte and Gymnosperm populations and their growth forms in the surrounding environment</p> <ul style="list-style-type: none">• Understand and distinguish the diverse group of algae• Infer the economic value of different types of algae• Outline the ecological significance of algae• Build the skills for collection, identification and artificial culture of algae.• Interpret different groups of Bryophytes and Pteridophytes• Analyze the different theories regarding the origin of both Bryophytes and Pteridophytes and develop ideas regarding their evolution.• Compare the structural evolution of gametophytes and sporophytes in both Bryophytes and Pteridophytes.• Clarify organization of different types of steles, sori and sporangial characters in an evolutionary perspective• Validate the ecological and economical roles played by both Bryophytes and Pteridophytes.• Understand the classification of Gymnosperms• Make use of the economic value of Gymnosperms• Acquire the skills for field identification of Gymnosperms

SEMESTER I
FBOT1C02 - MYCOLOGY & LICHENOLOGY,
MICROBIOLOGY AND PLANT PATHOLOGY

COs	COURSE OUTCOMES
CO1	Develop understanding of the major groups of organisms like fungi, lichens and microorganisms, their occurrence, distribution and systematic classification
CO2	Acquaint with the basic understanding of plant diseases, causative organisms, mode of action and measures for their control
CO3	Acquire practical knowledge on fungi, lichens, micro-organisms, plant pathogens and mode of their growth in specific habitats
CO4	<p>Develop understanding on the ecological and economic significance of the above groups of organisms.</p> <ul style="list-style-type: none"> • Understand the diversity of fungi. • Classify fungi based on different classification system and recognize recent trends in classification of • fungi • Distinguish fungal group with their characteristic features • Understands the interaction of fungi with other living organisms. • Understands economic importance of different fungal groups • Identify the different types of fungi with reason. • Develop the understanding of the concept of microbial nutrition • Classify viruses based on their characteristics and structure • Examine the general characteristics of bacteria and their reproduction • Enhance their awareness and appreciation of human friendly viruses, bacteria and their economic value • Understand the basic principles of plant pathology and plant protection • Identify the different plant diseases and their quarantine measure. • Familiarize with the basic skills and techniques related to mycology and plant pathology

SEMESTER I

FBOT1C03 - ANGIOSPERM ANATOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY AND LAB TECHNIQUES

COs	COURSE OUTCOMES
CO1	Develop understanding of the structural composition and functional organization in major land plants
CO2	Acquire knowledge on the reproduction and developmental processes associate with major land plants
CO3	Understand the significance of pollen studies in developmental process and the recent developments in palynology
CO4	<p>Practical knowledge on cell and tissue organization, developmental stages and process associated with the reproduction in major land plants</p> <ul style="list-style-type: none">• Retrieve different types of tissues, non-living inclusions in plant cells.• Interpret structure, function and roles of vascular cambium and cork cambium.• Categorize different types of Anomalous secondary growth and their anatomical peculiarities and adaptational significance.• Illustrate significance and properties of wood & fibres used commercially.• Analyze leaf initiation, types of stomata and trichomes and appraise anatomical peculiarities in C3, C4 and CAM plants.• Compare Nodal anatomy , Floral anatomy and their evolutionary significance• Illustrate the organogenesis in plants• Acquire the basic concepts of developmental biology• Summarize the embryogenesis in plants• Familiarizes with biological instrumentation and plant micro technique

SEMESTER I

FBOT1L01 - PRACTICALS OF PHYCOLOGY, BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS, MYCOLOGY, MICROBIOLOGY

COs	COURSE OUTCOMES
CO1	Provide practical knowledge on the collection and identification of members of Algae, Fungi and Lichens
CO2	Provide practical knowledge on the collection of plant groups like Bryophytes, Pteridophytes, Gymnosperms and assessment of their morphological and anatomical features through laboratory exercises

SEMESTER I

FBOT1L02 - PRACTICALS OF LICHENOLOGY, PLANT PATHOLOGY, ANGIOSPERM ANATOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY AND LABORATORY TECHNIQUE

COs	COURSE OUTCOMES
CO1	Provide practical knowledge on the collection, culturing and identification of microorganisms (general and pathogenic) from specific habitats and evaluation of their growth performances
CO2	Acquire hands-on experience on the tissue organization in major land plants.
CO3	Acquire practical knowledge in the reproductive structures of major land plants and the developmental processes associated with them

SEMESTER II

FBOT2C04 - CELL BIOLOGY, MOLECULAR BIOLOGY

AND BIOPHYSICS

COs	COURSE OUTCOMES
CO1	Develop the understanding on cells, their structural and functional organization and the systematic process of growth and development
CO2	Provide insight on various sub cellular materials in the molecular level and the processes associated with them, resulting in various metabolic activities
CO3	<p>Develop understanding and skills on various Biophysical methods used in cellular studies and the processes associated with them</p> <ul style="list-style-type: none">• Get an idea of intracellular components and cell communication• Understand the life cycle of cell Page 19 of 47• Infer various aspects of cytoskelton• Analyze the chromosome organization in eukaryotes• Familiarize the DNA replication, repair and recombination• Understand the basic concepts of mechanism of gene expression• Familiarize the control of gene expression• Familiarizes with biological instrumentation• Understand the better use of microscopes in biology

SEMESTER II

FBOT2C05 - GENETICS, BIOSTATICS, PLANT BREEDING AND EVOLUTION

COs	COURSE OUTCOMES
CO1	Acquaint with cells and chromosomes, their structural and functional attributes, diversity and resultant manifestation on organisms
CO2	Develop understanding of Mendelian Principles of Genetics
CO3	Impart knowledge on human genome
CO4	Provide an insight on the nature and type of data collection and its management

CO5	<p>Develop skills in data analysis using varied statistical software</p> <ul style="list-style-type: none"> • Understand the history of genetics • Familiarize the concepts of linkage and genetic mapping • Outline the basic concepts of quantitative genetics • Understand the genetics behind cancer • Familiarize the basic concepts of population genetics • Understand the basic statistical methods for biological research • Understand the basic concepts of plant breeding • Familiarize the mechanism of hybridization in plants • Outline the methods of breeding resistance in plants • Familiarize the modern plant breeding methods. • Infer the various theories of evolution • Understand the process of evolution of plants
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SEMESTER II

FBOT2C06 - ENVIRONMENTAL BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

COs	COURSE OUTCOMES
CO1	Familiarity with various types of ecosystems and the ecological principles operating in each ecosystem
CO2	Evaluate the threats associated with various ecosystems and an understanding of various management strategies for their conservation
CO3	Understand the nature and pattern of distribution of plant communities and the reasons underlying it
CO4	<p>Understand the nature and type of forests; their ecological as well as economic contribution and strategies for their management</p> <ul style="list-style-type: none"> • Have an idea about the major ecosystem of the world • Understand the population ecology and community ecology system in the world • Get meticulous knowledge in ecological succession and phytogeography • Get knowledge in environmental pollution, global environmental problems, their mitigation and remedies and to acquire knowledge about the importance of biodiversity conservation • Understand the concept of conservation of nature and natural resources • To understand the importance of plants in environmental quality • Understand the importance of forest and forest products

SEMESTER II

FBOT2L03 - PRACTICALS OF CELL BIOLOGY, MOLECULAR BIOLOGY, BIOPHYSICS AND BIOSTATISTICS

COs	COURSE OUTCOMES
CO1	Demonstration of practical skills in the isolation of cell organelles and demonstration of cellular processes
CO2	Demonstration of practical skills in the isolation of genetic materials from cellular systems and to familiarize recent methods for their characterization
CO3	Develop abilities in the conduct of various experiments related to the physical and chemical separation of biochemical components
CO4	Demonstration of practical skills in the area of Cytogenetics and its logical reasoning
CO5	Develop skills in analyzing experiments related to the course materials, their interpretation and reporting

SEMESTER II

FBOT2L04 - PRACTICALS OF GENETICS, PLANT BREEDING, ENVIRONMENTAL BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

COs	COURSE OUTCOMES
CO1	Develop skills in the statistical analysis of data, both manually and using statistical software
CO2	Demonstration of practical skills in plant breeding and hybridization
CO3	Develop abilities in the conduct of various experiments related to ecosystems evaluation and characterization
CO4	Develop skills and abilities in assessing species composition and biotic interactions associated with heterogeneous ecosystems
CO5	Demonstration of skills in the identification of phytogeographic areas, with special reference to forest biome
CO6	Develop skills in evaluating the mandate of various organizations and their programmes in the priority areas specified in the course

SEMESTER III
FBOT3C07 - PLANT PHYSIOLOGY, METABOLISM AND BIOCHEMISTRY

COs	COURSE OUTCOMES
CO1	Understand various physiological processes associate with plant systems
CO2	Understand various metabolic processes linked to biological systems
CO3	<p>Acquire knowledge on the properties of biomolecules (primary and secondary) and to understand the biochemistry of their action</p> <ul style="list-style-type: none"> • Get an idea about the plant water relations • Understand the transport of ions, solutes and other macromolecules • Infer various aspects of photosynthesis. • Understand respiratory metabolism in plants • Analyze the nitrogen metabolism in plants. • Familiarize the affects different types of stresses in plants • Outline the basic knowledge in sensory photobiology • Examine the various plant growth regulators • Understand the structure and function of biomolecules • Familiarize different types of secondary metabolites

SEMESTER III
FBOT3C08 - ANGIOSPERM MORPHOLOGY, TAXONOMY AND PLANT RESOURCES

COs	COURSE OUTCOMES
CO1	Acquaint with the structure and organization of various plant organs and a detailed analysis on their origin and evolution
CO2	Understand various principles and practices of Plant Systematics
CO3	Acquire knowledge on the recent development in plant systematics and the institutions involved in it

CO4	<p>Develop understanding on the history, occurrence, and botanical characteristics of various plant resources of commercial importance</p> <ul style="list-style-type: none"> • Recognize concepts of taxonomic hierarchy and phylogeny of angiosperms. • Illustrate sources of taxonomic characters in solving taxonomic disputes. • Recall the principles, rules and recommendations of ICN in plant taxonomy • Conceptualize the plant classification system proposed by different taxonomists • Develop critical understanding of the different tools in taxonomy • Develop critical evaluation of taxonomic keys • Recognize the importance of digital resources of taxonomy and virtual herbarium • Enhance their observation capacity by dissecting different floral structures and to improve their taxonomic illustrations and floral imaging • Critically evaluate the interrelationships and evolutionary trends of angiosperm families • Understand the economic importance of plants and its commercial applications
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SEMESTER III

FBOT3C09 - BIOTECHNOLOGY AND BIOINFORMATICS

COs	COURSE OUTCOMES
CO1	Understand the basic principles and practices and develop skills in the advanced areas of plant tissue culture
CO2	Acquire knowledge on the recent techniques and developments in Genetic Engineering and the legal procedures underlying genetic manipulation
CO3	<p>Acquaint with the principles and applications of Bioinformatics and to acquire skills in the use of computer aided Bioinformatics tools</p> <ul style="list-style-type: none"> • Get a thorough knowledge in plant tissue culture • Familiar with genetic engineering and advanced tools • Get knowledge in genomic and proteomics • Get basic knowledge in bioinformatics • The students will be able to familiarize with social issues in biotechnology

SEMESTER III

FBOT3L05 - PRACTICALS OF PLANT PHYSIOLOGY, METABOLISM, BIOCHEMISTRY AND ANGIOSPERM MORPHOLOGY

COs	COURSE OUTCOMES
CO1	Develop skills in conducting / demonstrating experiments related to various physiological processes in plants
CO2	Demonstration of practical skills in the area of separation of biomolecules and their assays.
CO3	Develop abilities to test various biochemical components in plants using standard protocols.
CO4	Develop skills and abilities in assessing plant organs and to comment on their developmental processes.
CO5	Demonstration of skills in the collection, preservation and systematic elucidation of plant specimens to their respective families using conventional and modern methods

SEMESTER III

FBOT3L06 - PRACTICALS OF PLANT RESOURCES, ANGIOSPERM TAXONOMY, BIOTECHNOLOGY AND BIOINFORMATICS

COs	COURSE OUTCOMES
CO1	Develop skills in the identification of plant specimens having commercial / economic value.
CO2	Develop skills and abilities in undertaking tissue culture protocols.
CO3	Develop skills and abilities in the separation of genetic materials from plant specimens.
CO4	Acquire skills in the use of computers for conventional applications and also for computational purposes using statistical software.
CO5	Demonstration of skills in using computer software relating to Bioinformatics purposes.

SEMESTER IV

FBOT4E01 - BIOTECHNOLOGY IN CROP IMPROVEMENT

COs	COURSE OUTCOMES
CO1	Develop advanced understanding of various concepts in Plant Biotechnology
CO2	Provide insights on the applications of Biotechnology in crop improvement.
CO3	Develop hands-on skills in various Biotechnological applications for the development of crop varieties

SEMESTER IV

FBOT4E02 - ADVANCED ANGIOSPERM TAXONOMY

COs	COURSE OUTCOMES
CO1	Develop advanced understanding on the history, importance, methods, and recent advancements in the area of Plant Taxonomy
CO2	Systematic elucidation of the characteristics of selected families cited in the syllabus with ecological / economic significance and interrelationships
CO3	Develop skills in the collection, processing and systematic elucidation of plant specimens, following standard procedures
CO4	Develop skills and abilities in undertaking tissue culture protocols
CO5	Acquire skills in floristic expeditions of areas having ecological significance

SEMESTER IV

FBOT4E03 - ENVIRONMENTAL BIOLOGY AND BIODIVERSITY CONSERVATION

COs	COURSE OUTCOMES
CO1	Develop advanced understanding of various concepts and principles in Ecology and Environmental Biology
CO2	Provide insights on existing Environmental Challenges and analyze their future impacts due to increasing anthropogenic interferences
CO3	Enable students to acquire knowledge and analyze unique habitats with regard to their environmental settings, processes and threats
CO4	Develop hands-on skills to study environmental samples like soil and water and thereby its qualitative elucidation

SEMESTER IV

FBOT4E04 - MOLECULAR BIOLOGY AND PHYTOCHEMISTRY

COs	COURSE OUTCOMES
CO1	Develop advanced understanding of plant cell and cell organelles.
CO2	Develop advance understanding of various processes associated with the cells in a molecular basis.
CO3	Provide insights on various techniques used in plant molecular biology.
CO4	Develop skills in various processes and techniques in cell and molecular biology

ABILITY ENHANCEMENT COURSE (AEC)

SEMESTER I

FBOT2A01 - SCIENTIFIC DOCUMENTATION AND REPORT WRITING

COs	COURSE OUTCOMES
CO1	Provide insights on data collection, organizing research schedules, collection of databases and its interpretation, scientific writing and presentation of research findings on various platforms

PROFESSIONAL COMPETENCY COURSE (PCC)

SEMESTER II

FBOT2A02 - INTELLECTUAL PROPERTY RIGHTS

COs	COURSE OUTCOMES
CO1	Develop understanding of various legal provisions for safeguarding intellectual contributions from getting misused / exploited