

Department of Botany
Nesamony Memorial Christian College, Marthandam
B. Sc. Botany
Course Outcome

Semester – I B. Sc. Botany					
Part	Course Name	Course Code	Credit	Hours	Course Outcome
Part - III	Core Course – I: Plant Diversity I – Algae	FCBO11	5	5	On completion of this course, students will be able to: CO1 Relate the general characteristics of algae and under the system of classification. CO2 Demonstrate knowledge in structural organization of the thallus. CO3 understanding the various life cycle patterns and the methods of reproduction in algae. fundamental concepts in algal growth. CO4 Explain the benefits of large scale cultivation of algae CO5 Determine the emerging areas of Algal Biotechnology for identifying commercial algal products and their uses.
	Core Course II: Plant Diversity I Algae – Practical - I	FCBOP1	3	3	On completion of this course, the students will be able to CO1 Recall and identify algae using key characters. CO2 Demonstrate practical skills in preparation of fresh mount and identification of algal forms from algal mixture. CO3 Describe the internal structure of algae prescribed in the syllabus CO4 Decipher the algal diversity in fresh/marine water and their economic significance CO5 Identify algae in natural habitats
Part - IV	SEC-1: Environmental Biotechnology	FSBO12	2	2	On completion of this course, the students will be able to: CO1 Recognize the various causes of pollution and control measures. CO2 Explain about the beneficially role of GMOs on environment. CO3 Reflect upon various sustainable environmental protection strategies. CO4 Analyze the different methods of air, water, and soil quality monitoring process. CO5 Evaluate the implications of international legislations and policies for environmental protection.

	Foundation Course: Basics of Botany	FFBO11	2	2	On completion of this course, the students will be able to: CO1 Develop a critical understanding on the distinguishing traits, geographic distribution and reproductive cycle of algae, fungi, lichens and bryophytes CO2 Compare the structure and function of prokaryotic and eukaryotic cell CO3 Develop critical understanding on morphology of various plant parts CO4 Understand the basic concepts of genetics CO5 Understand the core concepts and fundamentals of plant physiology
Semester – II B. Sc. Botany					
Part - III	Core Course – III: - Plant Diversity II - Fungi, Bacteria, Viruses, Plant pathology and Lichens	FCBO21	5	5	On completion of this course, the students will be able to: CO1 Recognize the general characteristics of fungi CO2 Develop an understanding on the economic uses of fungi CO3 Comprehend the structure and reproduction in bacteria and virus CO4 Analyze the structure and reproduction in Lichens and their role in agricultural and pharmaceutical applications. CO5 Identify the common plant diseases and device control measures
	Core Course - IV: Plant Diversity II - Fungi, Bacteria, Viruses, pathology and Lichens – Practical II	FCBOP2	3	3	On Completion of this course, the students will be able to: CO1 Develop practical skills for Identifying fungi using key characters CO2 Access the useful role of fungi in agriculture and pharmaceutical industry CO3 Identify the type of bacteria through grams staining procedure. CO4 Analyze the characteristics of various types of lichens pathogens CO5 Recognize the symptoms of plant diseases caused by pathogens
Part - IV	SEC-2: Herbal Medicine	FSBO22	1	2	On completion of this course, the students will be able to CO1 Define and describe the principle of cultivation of herbal products. CO2 Explain about the phytochemistry of economically important medicinal herbs. CO3 Apply techniques for evaluation of drug adulteration through biological testing. CO4 Formulate the value added processing / storage / quality control for the better use of herbal medicine. CO5 Develop the skills for cultivation of plants and their value added processing/storage/quality control.
	SEC-3: Botanical garden and landscaping	FSBO24	1	2	On completion of this course, the students will be able to CO1 Recognize fundamental concepts of gardening and CO2 Explain about significance of garden components CO3 Apply techniques for creation of garden adornments CO4 Identify methods for preparation and maintenance of Topiary and Bonsai CO5 Develop and design outdoor and indoor gardens and inculcate entrepreneurial skills for landscaping.

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Semester – III B. Sc. Botany					
Part - III	Core Course – V: Plant Diversity III - Bryophytes and Pteridophytes	EMBO31	4	4	On completion of this course, the students will be able to: CO1 Recognize morphological variations and uses of Bryophytes CO2 Explain the anatomy and reproduction of BryophytesN belonging to different classes CO3 Identify the distinguishing features of Pteridophyte CO4 Compare and contrast the variations in the internal cellular organization, gametophyte and sporophyte of Pteridophytes. CO5 Access the useful role Pteridophytes.
	Core Course - VI: Plant Diversity III Bryophytes and Pteridophytes – Practical-III	EMBOP3	2	2	On successful completion of this course the student will be able to: CO1 Recognize the major groups of Non-vascular and Vascular Cryptogams. CO2 Describe the structure of Bryophytes and Pteridophytes forms prescribed in the syllabus. CO3 Identify and illustrate the morphological and anatomical features of bryophytes and Pteridophytes. CO4 Develop comprehensive skills in sectioning and micro preparation. CO5 Interpret the significance of reproductive structures in Bryophytes and Pteridophytes.
Part - IV	SEC-4: Herbal Technology	ESBO31	2	2	On completion of this course, the students will be able to: CO1 Define and describe the principle of cultivation of herbal products. CO2 List out the categories of commercially important herbal medicines CO3 Understand the botany and importance of chemical constituents in herbal medicinesK3 CO4 Apply phytochemical tests for identification of secondary metabolites CO5 Analyze and decipher the significance of various methods of harvesting, drying and storage of medicinal herbs.
	EVS: Environmental Studies	EEVS31	2	2	Upon completion of this course, Students would have CO1 To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India. CO2 To obtain knowledge on different types of ecosystem CO3 To understand the values of biodiversity and conservation on global, national, and local scales CO4 To gain knowledge on different types of pollution in the environment CO5 To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.
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Semester – IV B. Sc. Botany

Part - III	Core Course – VII: - Plant Diversity IV - Gymnosperms, Paleobotany and Evolution	EMBO41	4	4	On completion of this course, the students will be able to: CO1 Relate to the general characteristics of Gymnosperms and their economic importance. CO2 Explain about the morphology , anatomy and reproduction in Gymnosperms. CO3 Determine the various fossilization methods and their significance in paleobotany CO4 Compare the structures of various fossil forms CO5 Understand the process of evolution of life
	Core Course - VIII: Plant Diversity IV - Gymnosperms, Paleobotany and Evolution – Practical-IV	EMBOP4	2	2	On completion of this course, the students will be able to: CO1 Analyze and observe and record the morphological features of selected species of Gymnosperms. CO2 Identify and Illustrate the morphological and anatomical features of gymnosperms . . K2 CO3 Describe the structure of fossil forms prescribed in the syllabus. CO4 Develop skills in sectioning and micro preparation. CO5 Interpret the significance evolutionary mechanisms
Part - IV	SEC-5: Fermentation technology	ESBO41	2	2	On completion of this course, the students will be able to CO1 Enumerate the significance of microbes in fermentation technology. CO2 Explain the principles of fermentation. CO3 Explain the process of maintenance and preservation of microorganisms. CO4 Analyze the various aspects of fermentation in the production Of preservatives and antibiotics CO5 Validate the experimental techniques for microbial production of enzymes: amylase and protease, bio product recover
	VBE: Value Based Education	EVBE41	2	2	CO1 Identify the contribution of social reformers and factors that influence social justice CO2 Compare and list the legal rights provided to women, children, Dalits, minorities and physically challenged as per human rights and Indian constitution CO3 Stay as a responsible citizen and raise voice for any violence against women CO4 analyze the prospects and challenges in mass media role of media in CO5 assess the influence of new media on children and youth and use them to inculcate communal harmony and social justice CO6 frame their own personal values based on social ethics to moderate the social issues and lead a secular society
	Naan Mudhalvan		2	2	

Semester – V B. Sc. Botany

Part - III	Core - V: Cell Biology and Embryology of Angiosperms	CMBO51	4	5	On completion of this course, students will be able to: CO1 study the structure of Prokaryotic and Eukaryotic cells. CO2 understand the ultrastructure of cell organelles and function. CO3 help the students to study the Morphological nature of Flower. CO4 aid the students to understand how the zygote is formed in plants. CO5 make the students to understand about the Seed and Fruit Development.
	Core - VI: Morphology and Taxonomy of Angiosperms	CMBO52	4	5	On completion of this course, students will be able to: CO1 study the morphological modifications in plants. CO2 help the students to understand the Systems of classification of plants. CO3 understand the detailed study of the following families and their economic importance: Nymphaeaceae, Annonaceae, Rutaceae, Caesalpinaceae, Cucurbitaceae and Apiaceae. CO4 study about the detailed study of the following families and their economic importance Rubiaceae, Sapotaceae, Convolvulaceae, Asclepiadaceae and Lamiaceae. CO5 make the students to understand detailed study of the following families and their economic importance Amaranthaceae, Euphorbiaceae, Liliaceae, Arecaceae and Poaceae.
	Core - VII: Biochemistry and Bioinformatics	CMBO53	4	5	On completion of this course, students will be able to: CO1 make the students aware about the basic chemical structure and basic instruments. CO2 study the structure and properties of carbohydrates. CO3 help the students to understand the properties of proteins CO4 study about the basics of enzyme function and its application. CO5 make the student's familiar with the bioinformatics tool and data bases for screening big data corresponding to the living organisms and its applications in genetic diversity, heredity and forensics. Also in the modeling of macromolecules and drug designs strategies.
	Elective – I: Plant Ecology and Phytogeography	CEBO51	4	5	On completion of this course, students will be able to: CO1 enable the students to understand biotic and abiotic factors in various ecosystems and vegetation. CO2 study the concept and types of ecosystem and adaptations CO3 help the students to analyze the vegetation by quadrant method CO4 study about the Biosensors and Bio indicators. CO5 Make the students to understand the principles of continental drift and endemism and to know about the vegetation in Tamil Nadu and uses of Remote Sensing.
	Major Practical -V: Cell Biology,	CMBOP5	2	2+2	On completion of this course, students will be able to: CO1 study the morphological modifications in plants.

	Embryology, Morphology and Taxonomy of Angiosperms - Practical				<p>CO2 help the students to understand the Systems of classification of plants.</p> <p>CO3 understand the detailed study of the following families and their economic importance: Nymphaeaceae, Annonaceae, Rutaceae, Caesalpiniaceae, Cucurbitaceae and Apiaceae.</p> <p>CO4 study about the detailed study of the following families and their economic importance Rubiaceae, Sapotaceae, Convolvulaceae, Asclepiadaceae and Lamiaceae.</p> <p>CO5 make the students to understand detailed study of the following families and their economic importance Amaranthaceae, Euphorbiaceae, Liliaceae, Arecaceae and Poaceae.</p>
	Major Practical –VI: Biochemistry, Bioinformatics and Elective – I Practical	CMBOP6	2	2+2	<p>On completion of this course, students will be able to:</p> <p>CO1 make the student's familiar with the bioinformatics tool and data bases for screening big data corresponding to the living organisms and its applications in genetic diversity, heredity and forensics. Also in the modeling of macromolecules and drug designs strategies.</p> <p>CO2 study about the basics of enzyme function and its application.</p> <p>CO3 help the students to analyze the vegetation by quadrant method</p> <p>CO4 study about the Biosensors and Bio indicators.</p> <p>CO5 Make the students to understand the principles of continental drift and endemism and to know about the vegetation in Tamil Nadu and uses of Remote Sensing.</p>
	Skill Based Common: Personality Development	CCSB51	2	2	
Semester – VI B. Sc. Botany					
Part - III	Core – VIII: Genetics, Evolution and Biostatistics	CMBO61	4	5	<p>On completion of this course, students will be able to:</p> <p>CO1 impart an insight into the principles of heredity and the mendelian concepts.</p> <p>CO2 understand the patterns of inheritance in different organisms and the modes of linkages and crossing over.</p> <p>CO3 study about the basics of genetic material and their expression in the determination of sex and other characteristics.</p> <p>CO4 contrast and relate the theory of evolution and its applications.</p> <p>CO5 develop skills in biostatistics and its applications.</p>
	Core – IX: Plant Physiology	CMBO62	4	5	<p>On completion of this course, students will be able to:</p> <p>CO1 understand the relationship between water and plant cells.</p> <p>CO2 transport water and food materials throughout the body of the plant.</p> <p>CO3 study about the various pathways for training to the photosynthetic activity and respiration.</p> <p>CO4 understand in detail about the growth of the plant and the influence of plant growth regulators on</p>

					its growth. CO5 know about the sea dormancy its application and photo periodic effects.
Core – X: Microbiology	CMBO63	4	4	4	On completion of this course, students will be able to: CO1 understand the history of microbiology bacterial classification culture of bacteria and its predictive techniques. CO2 study about virus, virions prions and why rights and their diseases in plants. CO3 know about the importance of microbes in food as well as their pathogenic effects CO4 realize the need for gene transfer and its mechanism; also to know about different microscopy and its techniques. CO5 know about identification of recombinants marker systems and blotting techniques.
Elective – I: Horticulture and Plant Breeding	CEBO61	4	4	4	On completion of this course, students will be able to: CO1 know about the different types of horticulture and its uses. CO2 understand different propagation techniques and its steps and procedure. CO3 learn and work with the different garden tools and components CO4 Realize and revitalize the hybridization techniques both in theory and practical CO5 apply mutation in the breeding of plants and to create various resistant varieties
Elective – II: Plant Biotechnology and Genetic Engineering	CEBO63	4	4	4	On completion of this course, students will be able to: CO1 study about the various techniqueS pertaining to the plant tissue culture CO2 Understand the various applications of plant tissue culture in the production of hybrids as well as its aid in the preservation of indigenous species CO3 know about the various enzymes and vectors used in the genetic engineering techniques CO4 know about the various techniques involved in gene cloning and the use of polymerized chain reaction. CO5 relate and criticize the different applications of GMOs and few of its examples
Major Practical – VII: Genetics,Evolution, Biostatistics and Elective – I Practical	CMBOP7	2	2+1	2+1	On completion of this course, students will be able to: CO1 impart an insight into the principles of heredity and the mendelian concepts. CO2 understand the patterns of inheritance in different organisms and the modes of linkages and crossing over. CO3 study about the basics of genetic material and their expression in the determination of sex and other characteristics. CO4 learn and work with the different garden tools and components CO5 Realize and revitalize the hybridization techniques both in practical

	Major Practical - VIII: Plant Physiology - Practical	CMBOP8	2	2	On completion of this course, students will be able to: CO1 Understand the various functions of the plants. CO2 Know the mechanisms of the various activities. CO3 Relates the role of phytohormones on growth and development of plants. CO4 study about the various pathways for training to the photosynthetic activity and respiration. CO5 understand in detail about the growth of the plant and the influence of plant growth regulators on its growth.
	Major Practical - IX: Microbiology and Elective II- Practical	CMBOP9	2	2+1	On completion of this course, students will be able to: CO1 impart knowledge of Bacteriology and Virology including classification, structure, multiplication, transmission, food borne pathogens, water borne pathogens and microbial control. CO2 give the students broad theoretical knowledge in industrial microbiology and agricultural microbiology. CO3 know about the importance of microbes in food as well as their pathogenic effects CO4 realize the need for gene transfer and its mechanism; also to know about different microscopy and its techniques. CO5 know about identification of recombinants marker systems and blotting techniques.
Semester – I Allied Botany					
Part - III	Elective-I: Allied Botany I	FEBO11	3	4	On completion of this course, the students will Programme be able to: CO1 Increase the awareness and appreciation of human friendly algae and their economic importance. CO2 Develop an understanding of microbes and fungi and appreciate their adaptive strategies. CO3 Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. CO4 Compare the structure and function of various cell organelles. CO5 Understand the core concepts and fundamentals of genetics an plant biotechnology
	Lab Course: Elective-I- Lab on Allied Botany	FEBOP1	2	2	On completion of this course, the students will be able to CO1 Gain knowledge on the internal organization of various plant groups CO2 Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. CO3 Analyse the ultra-structure of different cell organelles CO4 Understand the fundamental concepts of Genetics CO5 Apply the methods in plant tissue culture
Semester – II Allied Botany					
Part - III	ELECTIVE : ALLIED BOTANY-	FEBO21	3	4	On completion of this course, the students will be able to CO1 Understand the fundamental concepts of morphology

	II				CO2 Analyze and recognize the different families of flowering plants CO3 Understand the internal organization and tissue components of vegetative parts CO4 Know the structure of anther, Classify the types of ovule and the method of fertilization in angiosperms CO5 Understand the mechanism of photosynthesis and respiration in plants
	ALLIED BOTANY PRACTICALS	FEBOP2	2	2	On completion of this course, the students will be able to CO1 Identify the type of phyllotaxy and inflorescence types. CO2 Develop critical understanding on the floral features of angiosperm families through floral dissection CO3 Demonstrate simple experiments related to photosynthesis and respiration CO4 Understand the internal organization of vegetative parts of the plant CO5 Comprehend the structure of anther and ovule.