Department of Botany

Semester : **II**
Name of the Course : **Plant Anatomy and Embryology**
Subject code : **BC1721**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I Meristem and Tissues						
	1	Meristems – Classification based on origin, position and function. Apical organization of shoot and root.	3	To understand the classification of meristem based on origin, position and function.	Lecture Group discussion PPT	Formative assessment Quiz Short Test Multiple choice questions
	2	Structure and function of simple tissue and complex tissue	3	To be familiarize with the different types of tissues	Lecture Illustration Video Clippings	
	3	Primary Structure of Dicot and Monocot Stem and Root; Dicot and Monocot Leaf	3	To compare and contrast the structure of dicot from monocot	Lecture Group discussion PPT	
II Secondary Growth						
	1	Secondary growth in stem and root – Formation of cambial ring, activity of cambial ring, secondary vascular tissue.	3	To recognize the secondary growth in stem and root	Sectioning Lecture PPT	Formative assessment Quiz Assignment
	2	Formation of periderm, lenticels, annual ring, Wood (heartwood and sapwood).	3	To understand the various changes takes place during secondary wood formation	Specimen Lecture PPT	
	3	Anomalous secondary thickening in dicot stem (Boerhaavia) and monocot Stem (Draceana)	3	To distinguish anamolous secondary thickening in dicot and monocot stem	Microscopic Slides Lecture PPT	
III Epidermal Tissues and Nodes						
	1	Epidermal tissue system, trichomes Glandular hairs, cuticle	2	To be familiarize with epidermal outgrowths	Lecture Microslide PPT	Formative assessment Quiz

	2	Stomata and its types	2	To make-out the structure of stomata and its types	Lecture Group discussion Sectioning	Multiple Choice questions Short test
	3	Nodal anatomy types - unilacunar (*Justicea*), trilacunar (*Azadirachta*) and multilacunar (*Aralia*),	3	To categorize the different types of nodes	Lecture Group discussion sectioning	
	4	Hydathodes and Laticifers	2	To know the structure and functions of Hydathodes and Laticifers	Lecture PPT	
IV Embryology						
	1	Structure of anther; Structure of microsporoangium and microsporogenesis	2	To have a knowledge of microsporogenesis	Lecture Microslide	Formative assessment Quiz
	2	Structure of pollen and development of male gametophyte	2	To get an idea about the formation of male gametophyte	Lecture PPT	Multiple Choice Questions Short Test
	3	Structure and types of ovules, megasporangium and megasporogenesis	3	To have a knowledge of megasporogenesis	Lecture PPT Microslide	
	4	Development of female gametophyte.	2	To recognize the development of female gametophyte	Lecture PPT	
V Embryogenesis						
	1	Types of embryo sac – Monosporic – Polygonum type.	3	To detect the different types of embryo sac formation	Lecture Chart	Formative assessment Quiz Short test Assignment Short test
	2	Fertilization	2	To analyze the events of fertilization	Lecture Illustrations Chart	
	3	Endosperm - types- nuclear, cellular and helobial, Ruminate endosperm and perisperm	2	To differentiate the types of endosperm	Lecture PPT Chart	

	4	Development of embryo in dicot (Capsella) and Monocot (Luzula)	2	To assess the development of dicot and monocot embryo	Lecture PPT	

Course Instructor: A. Anami Augustus Arul H.O.D: C.Jespin Ida

Semester **: II**

Name of the Course **: Taxonomy of angiosperms and plant physiology (Allied –I)**
Subject code **: BA1721**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assesment/ Evaluation
I Taxonomy						
	1	Morphology: Root, stem, leaf	3	To identify modifications in root, stem, leaf	Using models Lecture	Multiple choice Quiz Short test Formative assessment
	2	Inflorescence and fruit types	3	To differentiate and classify inflorescence and fruits	Lecture Presentation	
	3	Classification – artificial, natural (Bentham & Hooker's) phylogenetic, Bionomial nomenclature	3	To distinguish the different types of classification	Group discussion Lecture	
II Taxonomy						
	1	Families and their economic importance - Annonaceae, Rutaceae, Lamiaceae,	5	To analyze the floristic features of families under study and impart the economic importance of these families.	Demonstration Lecture	Formative assessment Quiz Short test
	2	Families and their economic importance - Euphorbiaceae and Poaceae.	4	To analyze the floristic features of families under study and impart the economic importance of these families.	Hands on training Lecture	
III Plant Physiology						
	1	Importance of water to	5	To observe	Experiment	Quiz

		plant life - imbibition, diffusion,osmosis and plasmolysis. Absorption of water - passive and active mechanisms		the water relationship in plant	Lecture	Short test Formative assessment
	2	Ascent of sap, transpiration – types	2	To analyze the ascent of sap and types of transpiration	Experiment Video Clippings	.
	3	Brief note on stomatal movement.	2	To infer the stomatal movement	Lecture	
IV Plant Physiology						
	1	Photosynthesis: photosynthetic apparatus, Mechanism of photosynthesis, Pigment systems, light dependent reactions - C_3 Cycle	7	To know the mechanism of photosynthesis	Lecture, Group discussion, Video Clippings	Formative assessment Group test Quiz
	2	Factors affecting photosysnthesis.	2	To Know the factors affecting photosynthesis	Lecture PPT	
V Plant Physiology						
	1	Respiration: Types - aerobic (glycolysis, Kreb's cycle and oxidative phosphorylation) Anaerobic (fermentation)	5	To understand the respiratory processes carried out by plants	Lecture, Illustration	Formative assessment Short test Multiple choice
	2	Factors affecting respiration	2	To observe the various factors affecting respiration	Demonstrration Lecture	
	3	Plant growth - Growth hormones – physiological role of auxins and Gibberellins	2	To interpret the role of growth hormones in plants	Flow Chart Lecture	

Course Instructor: A. Anami Augustus Arul H.O.D: C.Jespin Ida

Semester : **II**
Name of the Course : **Eco- Friendly Technology (NMEC)**
Subject code : **BNM172**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. Mushroom						
	1	Historical background, Nutritional value of mushroom	3	To Know the nutritive value of mushroom	Lecture	Formative assessment
	2	Differentiation of edible and poisonous mushroom Distribution of edible mushrooms , present status of mushroom cultivation in India	3	To understand the methods of identifying edible and poisonous mushroom	Lecture Video clippings,	Assignment Short test Quiz, Depiction of models
	3	Cultivation methods Control of pathogens, Cultivation of *Pleurotus*	2	To be familiarize with various methods of Cultivation of common mushrooms	Lecture Illustrations hands on training	
	4	Harvesting methods	1	To know the novel methods of harvesting	Lecture PPT presentation	
II.Vermicompost						
	1	Importance of vermicomposting, Requirements of vermicomposting	2	To realize the importance of vermicomposting	Lecture	Group discussion Formative assessment Quiz Assignment
	2	Mechanism of vermicomposting – flowchart, Vermiculture	3	To understand easily the mechanism of vermicomposting – flowchart,	Lecture, PPT, group discussion	
	3	Preparation of vermibed, Innoculation of earthworm feeding and watering the vermibed	3	To know the various steps involved in vermicompost	Lecture, PPT, group discussion	
	4	Methods of vermicomposting, Biological characteristics of Vermicompost	1	To know the various steps involved in	Lecture, PPT, group discussion	

				vermicompost		
III Fermentation						
	1	Bioreactors -types, models and designs,	1	To compare the different models of bioreactors	Lecture, models	Group discussion Assessing their Practical knowledge Assignment Formative assessment Assessing group project
	2	Formulation of feed stock, sterilization, isolation and selection of microorganisms	3	To know the principles of sterilization	Demonstration	
	3	Role of microorganisms in fermentation, Culture of microorganisms in the bioreactor	2	To compare the role of microorganisms in fermentation	Lecture	
	4	Brief account of various fermentation products, Production of alcoholic beverages - a general account	1	To understand the production of alcoholic beverages	Lecture, models	
	5	Production of Wine , Production of Vinegar in Small scale and in large scale	2	To understand the production of wine & vinegar	Industrial visit, group discussion	
IV Biofuel Technology						
	1	General account of biogas, Characteristic features of biogas	1	To know the importance of biogas	Lecture	Formative assessment Assignment Quiz
	2	Structure of biogas plant, Biogas - KVIC model - construction and working mechanism	3	Te understand the working mechanism of biogas plant	Lecture, Model	
	3	Importance of solar energy - Advantages and disadvantages, Solar cooker - importance and operation mechanism	3	To know the importance of solar energy	Lecture	
	4	Solar lamps, Solar water heater - construction and advantages	2	To compare the construction and advantages of solar lamps & solar water heater	Lecture	
V Fibre Technology						
	1	Banana fibre quality and importance	2	To know the importance of fibre	Lecture	Short test Formative assessment

	2	Processing of Banana fibre. Different steps involved in processing	2	To understand the various steps involved in processing of Banana	Lecture, Assignment	Quiz
	3	Collection and Storage of fibre, Cutting, Slicing, arranging and slitting	2	To be aware of the post processing steps in banana processing	Lecture,PPT presentation	
	4	Separation of fibre ,Drying, Packing and Marketing	1	To be aware of the post processing steps in banana processing	Lecture	
	5	Uses of Banana fibre, Craft articles made out of Banana fibre, Palm and *Cyperus*	2	To get hands on training on making craft articles from Banana fibre, Palm and *Cyperus*	Lecture, hands on training	

Course Instructor: A.R. Florence H.O.D: C.Jespin Ida

Semester : **IV**
Name of the Course : **Plant Ecology and Phytogeography**
Subject code : **BC1741**

Teaching Plan

Unit	**Modules**	**Topics**	**Lecture hours**	**Learning outcome**	**Pedagogy**	**Assessment/ Evaluation**
1. Soil						
	1	Importance, Origin, Formation of soil	3	To understand the importance, origin and formation of soil	Lecture	Formative assessment Group discussion

	2	Types and Profile of soil	3	To Know the types and Profile of soil	Lecture, images	Short test Assignment
	3	Composition of soil, Physical, chemical and biological components of soil	3	To be familiarize with the Composition and components of soil	Lecture	
	4	Role of climate in soil development.	2	To know the novel methods of harvesting	Lecture Video clippings	
II. Water						
	1	Importance of water, States of water in the environment	2	To realize the importance and States of water	Lecture	Quiz, Evaluation, Assignment Quiz
	2	Precipitation types (rain, fog, snow, hail, dew)	2	To categorize the Precipitation types	Lecture Video clippings	
	3	Atmospheric moisture; Water in soil; Water table	4	To identify the Atmospheric moisture; Soil Water; Water table	Lecture,	
	4	Water bodies: Aquifers Water shed management.	3	To know the Water bodies and Water shed management	Lecture, group discussion	Assignment
III. Ecological groups						

	1	Morphological, anatomical and physiological adaptations of hydrophytes	3	To understand the special structures produced by plants to adapt water habitats.	Lecture Classroom Discussion	Diagrammatic assessment Assessing their Practical knowledge
	2	Morphological, anatomical and physiological adaptations of xerophytes	4	To identify the xerophytes and study their anatomical and physiological adaptations	Lecture with blackboard	
	3	Morphological, anatomical and physiological adaptations of halophytes	4	To learn the modifications made by plants to adapt high salinity.	Lecture Classroom Discussion	
	4	Study of vegetation by quadrat and transect method.	4	To analyse the vegetation by quadrat and transect method.	Field study	
IV. Ecosystem						
	1	Fresh water (pond ecosystem) and marine ecosystem	2	To understand the producers, consumers and decomposers of these ecosystems.	Lecture with blackboard	Formative assessment Class test
	2	Trophic organization, basic source of energy, autotrophy and heterotrophy	2	Know the behavior of organisms in each trophic level of an ecosystem.	Lecture with blackboard	

	3	Food chains and food webs, ecological pyramids	4	Learn the predators and preys and their interconnections in an ecosystem.	Lecture with charts	Quiz
	4	Plant interactions- symbiosis, commensalism and parasitism	2	Understand the relationship between plant and other organisms.	Lecture with PPT	
V. Phytogeography						
	1	Principles of phytogeography	2	Know the pattern and process in plant distribution.	Lecture with blackboard	Short test Choose the correct answer Formative assessment
	2	Types of plant distribution – continuous, discontinuous and endemic.	4	Understand the different types of distribution of plants.	Lecture PPT	
	3	Plate tectonics, continental drift, theory of land bridges, age and area hypothesis.	5	Learn about the movements of continents.	Lecture PPT	
	4	Centers of origin of cultivated crops.	2	Know about the origin of crops	Lecture PPT	

Course Instructor: Bojaxa A.Rosy H.O.D: C.Jespin Ida

Semester : **IV Major Elective-II (a)**

Name of the Course : **Biological Resources**

Subject code : **BC1742**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. **Biofertilizers**						
	1	Introduction, Scope and importance of biofertilizers.	2	To Know the importance of biofertilizers.	Lecture	Formative assessment
	2	Mass production and uses of Bacterial Fertilizer (*Rhizobium)*	3	To understand the methods of Mass production of *Rhizobium*	Lecture Video clippings,	Assignment
	3	Mass production and application of *Nostoc*	2	To be familiarize with various methods of Mass production of *Nostoc*	Lecture Illustrations	Short test
	4	Mass production and application of *Azolla*	2	To know the novel methods of mass production of	Lecture PPT presentation	assessing their creative knowledge
	5	Mass production and application of vermicompost.	3	To know the various steps involved in vermicompost	Lecture, PPT, demonstration	Assessing their practical knowledge
II. Single Cell Protein and Mycoprotein						
	1.	Sources of single cell protein, Nutritive value of single cell protein.	2	To recall the sources and Nutritive value of single cell protein.	Lecture' Images	Formative assessment
	2.	Mass Cultivation of *Spirulina*.	2	To understand the Mass production of *Spirulina*.	demonstration	Assessing their practical knowledge
	3.	Mushroom Cultivation- *Pleurotus* and *Agaricus*,	4	To develop the Mass cultivation of *Pleurotus* and *Agaricus* mushroom	demonstration	Field visit

	4.	Nutritional values and value added products.	2	To know the Nutritional values and value added products.	Lecture with images	Assignment
III Forest resources						
	1	Forest cover, forest resources	2	To study the Forest cover and forest resources	Video clippings	Group discussion
	2	Utility and Values of forests	2	To learn the uses and values of forests	Lecture, PPT	Assignment
	3	Commercial benefits, ecological benefits and aesthetic benefits of forests	3	To know the various benefits of forests	Lecture	Assessing their forest knowledge
IV Biofuels						
	1.	Introduction and Importance of biofuel	1	To understand the various sources of biofuels and its Importance	Lecture	Formative assessment
	2.	Biodiesel Production – *Pongamia* and *Jatropa*.	2	To practice the production of Biodiesel from plants	Lecture with PPT	Group discussion
	3.	Alcohols – the liquid fuel- ethanol production.	2	To know the liquid fuel produced from ethanol	Lecture with Video clippings	Short test
	4.	Gaseous fuels: Biogas production and Hydrogen fuel.	3	To develop biogas fuel from organic wastes and study the hydrogen fuel.	Lecture with demonstration	Assessing their forest knowledge
V. Biopesticides:						
	1	Introduction of biopesticides, desirable qualities of biopesticides.	2	To realize the importance of biopesticides	Lecture	Group discussion
	2	Microbial Pesticides – fungi,viruses and bacteria.	2	To understand the activity of Microbial Pesticides	Lecture, PPT,	Formative assessment, Quiz

	3	Advantages and disadvantages of Microbial Pesticides,	2	To know the various steps involved in vermicompost	Lecture, PPT,	Short test
	4	Application of Biopesticides.	2	To apply biopesticides to various plants	Lecture, group discussion	Short test

Course Insructor: A. R.Florence H.O.D: C.Jespin Ida

Semester **: IV**

Name of the Course **: Cell Biology and Plant Anatomy (Allied)**
Subject code **: BA1742**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assesment/ Evaluation
I Cell						
	I	Cell - Prokaryotic and Eukaryotic; Structure of plant cell	3	To differentiate Prokaryotes from Eukaryotes	Lecture with PPT illustration	Short test Multiple choice questions Quiz
	2	Chemical composition and functions of Plasma membrane	3	To evaluate the functions of plasma membrane	Lecture and discussion	
	3	Study of Chloroplast and Mitochondria	3	To compare the structure and functions of Chloroplast and Mitochondria	Lecture with Chart	
II Cell and Cell Cycle						
	1	Non living inclusions – starch grains, Aleurone grain, Cystolith and raphide	3	To know the non-living inclusions of plant cell	Lecture with PPT illustration	Multiple choice questions Group test Quiz
	2	Ultrastructure and functions of nucleus.	3	To analyse the importance of nucleus	Group discussion Lecture	
	3	Cell division – cell cycle Mitosis and	3	To Compare thevarious stages of	Chart models Lecture	

		meiosis - significance.		mitotic and meiotic cell division in plant and to learn about cell cycle		
III Anatomy :Tissues						
	1	Meristems – Classification	2	To identify the different types of meristems	Presentation Lecture	Short test Quiz Multiple choice Formative Assessment
	2	Structure and functions of simple simple tissues – parenchyma Collenchyma, sclerenchyma	3	To cite structure and functions of simple tissues	Small group discussion	
	4	Structure and functions of complex tissues – xylem and phloem.	4	To know the complexity of xylem and phloem.	Experiments Lecture PPT	
IV Anatomy: Primary structure						
	1	Primary Structure of dicot and monocot stem and root.	5	To compare and contrast the internal structure dicot and monocot stem	Demonstration Lecture	Formative assesment Quiz Group Discussion
	2	Primary Structure of dicot and monocot root	4	To compare and contrast the internal structure dicot and monocot root	PPT Lecture	
V Anatomy: Leaf, Secondary Thickening						
	1	Internal structure of dicot leaf, monocot leaf	4	To compare the anatomy of monocot and dicot leaf	Hands on training PPT	Formative assessment Quiz Slip test
	2	Normal Secondary Thickening of dicot stem	5	To realize the formation of phellogen and Cambial ring	Chart Lecture	

Course Insructor: Sr. Leema Rose H.O.D: C.Jespin Ida