

M.Sc. Botany (2021 -2022)

Teaching Plan

Semester : I

Major Core I

Name of the Course: Plant Diversity I - Algae, Fungi, Lichens and Bryophytes

Subject Code: PB2011

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. ALGAE – GENERAL CHARACTERS						
	1	General characters of algae including similarities and diversities ; Classification of algae by Fritsch (1954); Thallus organization in algae (Seminar)	4	To identify and categorize algal organisms	Lecture	Through microscopic examination, class test, quiz, diagrammatic representation, Class test
	2	Life-cycle patterns and alternation of generations	3	To understand the different life cycle patterns	Lecture, Illustration	
	3	Detailed study on occurrence, habitat, structure, reproduction and life history of Cyanophyceae and Chlorophyceae	4	To correlate the different algal organisms between the two families	Lecture, Demonstration with live specimens	
II ALGAE – LIFE HISTORY						
	1	Detailed study on occurrence, habitat, structure, reproduction and life-history of	4	To correlate the different algal organisms	Lecture, Demonstration with live specimens	Microscopic Examination, Test and Quiz

		Xanthophyceae, Bacillariophyceae		between the two families		
	2	Phaeophyceae (Seminar), Rhodophyceae (Seminar)	4	To correlate the different algal organisms between the two families	Lecture, Demonstration with live specimens	
	3	Fossil algae	4	To identify the fossil specimens	Lecture, Microscopic Slides	
	4	Economic importance – Role of algae in soil fertility; Algal blooms; symbiotic associations; nitrogen fixation; Pollution indicators; SCP (Seminar)	4	To understand the role of algae in different fields	Lecture	
III FUNGI – GENERAL CHARACTERS AND LIFE HISTORY						
	1	General characters of fungi; Classification of fungi proposed by C.J Alexopoulos and C.W Mims (1979)	4	To identify and categorize the fungal organisms	Lecture	Through microscopic examination and Continuous Internal Assessment I (CIA -I).
	2	Homothallism and Heterothallism in fungi; Parasexuality in fungi (Seminar)	4	To understand the reproduction strategies in fungi	Lecture, PPT	

	3	An overview and life history of Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes. Economic importance of fungi	5	To correlate the different fungal organisms between the classes	Lecture, Microscopic Slides, Live specimens	
--	---	--	---	---	---	--

IV LICHENS

	1	General account of Lichens; Classification by Miller (1984)	4	To identify and categorize lichens	Lecture, PPT	Microscopic examination, test, open book test and quiz
	2	Structure, nutrition and reproduction of the three major groups – Crustose, Foliose and Fruticose; Economic importance of Lichens	5	To interpret the different groups of lichens	Lecture, Microscopic Slides, Live specimens	

V BRYOPHYTES

	1	Classification, Distribution, Origin (including fossil evidence), Primitive and advanced features of Bryophytes	3	To identify and categorize the bryophytes	Lecture, Illustration	Class test, Question and Answer session, Diagrammatic representation, Discussion, Continuous Internal Assessment I (CIA -II).
	2	Evolution of gametophytes and sporophytes; Ecological adaptations; Economic importance (Seminar)	4	To understand the evolution and importance of bryophytes	Lecture, Illustration	
	3	A comparative study of the morphological and anatomical features of Polytrichales, Bryales, Marchantiales, Jungermanniales and Anthocerotales.	4	To correlate the different bryophytes between the orders	Lecture, Microscopic slides, Live specimens	

Course Instructor: Dr. Celin Pappa Rani J

HOD: Dr. C. Jespin Ida

Semester: I

Name of the Course: Microbiology

Major Core II

Subject code: PB2012

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I BACTERIA						
	1	Scope and milestones of Microbiology, General properties of bacteria; Morphology and fine structure of	3	To understand the basic structure of bacteria	Lecture, chart	Microscopic observation, Class Test, Group Presentation

		Bacteria				
	2	Classification of bacteria as per Bergey's Manual of Systematic Bacteriology	3	To categorize the bacterial species	Lecture, PPT	
	3	Bacterial Nutrition, Growth curve; Sterilization and disinfection; Culture media and its types	3	To know the growth dynamics and culture patterns of bacteria	Lecture, Illustration, Hands on training	
	4	Methods of isolation - Pure culture; Identification of bacteria (Seminar)	4	To maintain pure culture and identification of Gram positive and Gram negative bacteria	Lecture, Models	

II VIRUS AND ANTIMICROBIAL DRUGS

	1	General properties of Viruses; (Seminar) Classification and nomenclature; Structure of virus; Cultivation of virus;	4	To categorize viruses and cultivate them	Lecture	Diagrammatic representation, Question – answer session, class test
	2	Morphology of bacteriophages; life cycle – Lytic cycle and Lysogenic cycle	3	To understand the basic structure and life cycle of bacteriophages	Lecture, Charts	
	3	General properties of Actinomycetes and Mycoplasma	4	To know about the characters of Actinomycetes	Lecture	

			and mycoplasma		
4	General characteristics of antimicrobial drugs; Antibacterial drugs – Sulfonamides, Penicillins; Drug resistance	4	To evaluate the different antimicrobial drugs	Lecture, PPT	
III MICROBIAL FLORA OF SOIL, WATER AND MILK					
1	Microbial flora of soil - Significance of soil microorganisms. Microbial flora of municipal water and its Purification	4	To know the significance of bacteria in soil and water	Lecture, Group Discussion	Continuous Internal Assessment I (CIA -I), Multiple choice questions
2	Bacteriological examination of drinking water; Microbial flora of milk - Pasteurization of milk; Phosphatase Tests for grading milk sample (Seminar)	3	To analyze the bacteria present in milk and water	Lecture, Lab test	
3	Food spoilage by bacteria – <i>Clostridium botulinum</i> , (Seminar) <i>Salmonella sps</i> , <i>Shigella sps</i> , <i>Staphylococcus sps</i>	4	To know about the food spoilage organisms	Lecture, PPT	
IV IMMUNOLOGY					

	1	Immunity – Definition and its types; Properties of Antigens; Antibodies – Basic structure and its types	3	To understand the properties of antigens and antibodies	Lecture , PPT	Lab tests, Class test, open book test.
	2	Strength of Antigen - Antibody interactions; Agglutination reactions; Precipitation reactions	3	To learn antigen-antibody interactions	Lecture, Experimental learning	
	3	Cytokines - Properties and attributes; Monoclonal antibody production	3	To know about cytokines and monoclonal antibodies	Lecture, Group discussion	
	4	Immunodiffusion; ELISA (Seminar); Immune response during bacterial (Tuberculosis), parasitic (Malaria) and viral (HIV) infections.	3	To apply the techniques to detect the antigens	Lecture , PPT	

V PLANT PATHOLOGY

	1	Classification of plant diseases - Symptoms - Infection process - Host parasite interaction - Defense mechanisms in plants	3	To identify the plant pathogens	Lecture	Class tests, Group discussions, Continuous Internal Assessment II (CIA -II).
--	---	--	---	---------------------------------	---------	--

	2	Disease control methods - Physical, chemical, Cultural and Biological - Integrated disease management.	2	To understand the disease control strategies	Lecture, PPT	
	3	Detailed study of the plant diseases- Citrus	3	To know about different plant	Lecture, Video Clippings	
		cancer, White rust disease, Blast of rice, Red rot of Sugercane (Seminar), Little leaf of Brinjal		diseases		

Course Instructor: Dr. J. Albino Wins

HOD: Dr. C. Jespin Ida

Semester : I Major Core III

Name of the Course : Plant Anatomy and Embryology

Subject code : PB2013

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I INTRODUCTION						
	1	Introduction to Developmental Botany- Nuclear- Cytoplasmic interaction	3	To learn the basics of Developmental Botany	Lecture, Charts	Tests, Discussions, Group presentations,

	2	Division-Differentiation-Polarity and Symmetry (Seminar)	3	To differentiate about Polarity and Symmetry	Lecture , Charts	Class test.
	3	Organization of Shoot Apical Meristem (SAM) and Root Apical Meristem (RAM)	3	To understand the organization of SAM and RAM	Lecture, Question – Answer sessions	
	4	Vascular cambium-origin, structure and seasonal activity	3	To know about Vascular cambium	Lecture , PPT	

II COMPLEX TISSUE AND SECONDARY GROWTH

	1	Xylem, Phloem and their elements-primary and secondary structures, phylogenetic trends and specialization of xylem and phloem	4	To differentiate the primary and secondary structures of Xylem and Phloem	Lecture , PPT	Class test, Quiz, Group discussions
	2	Secondary growth-Periderm- structure-development of lenticels (Seminar)	3	To know about the Secondary growth patterns	Lecture, Illustration	
	3	Anomalous secondary growth-Bougainvillea, Bignonia, Achyranthes and Dracaena	4	To differentiate the Anomalous secondary growth of different plants	Lecture , Models	

III WOOD ANATOMY

	1	Wood anatomy-physical, chemical and mechanical properties. Defects in wood-natural defects, knots and defects due to diseases	3	To know the basics of wood anatomy	Lecture	Class tests, Multiple choice questions, Quiz, Continuous Internal Assessment I
--	---	---	---	------------------------------------	---------	--

2	Reaction wood- Tension and Compression wood- Durability of wood (Seminar)	4	To understand about the Reaction wood	Lecture , Models	(CIA -I).
3	Ontogeny of dicot and monocot leaves. Differentiation of epidermis with special reference to stomata and trichomes	4	To differentiate epidermis with stomata and trichomes	Lecture , Charts	

IV MICROSPOROGENESIS AND MEGASPOROGENESIS

1	Microsporogenesis Pollen morphology- pollen wall- pollen development- pollen dimorphism- pollen storage, pollen allergy. - Pollen- Pistil interaction	5	To know about the Basics of Pollen morphology	Lecture, Charts and models	Assignment on different structures of pollen, Class test, Open book test.
	(Seminar)- structure of style- stigma and significance				
2	Megasporogenesis. Different types of embryo sac development- fertilization- barriers of fertilization	5	To evaluate the different types of embryo sacs	Lecture, Group discussions	
3	Self-incompatibility- types, physiology and biochemistry, methods to overcome self-incompatibility	4	To understand about Self-incompatibility	Lecture	

V FERTILIZATION

	1	Fertilization- changes, physiological and biochemical changes during maturation. Seed- seed coat development and specialization	4	To analyze the fertilization changes	Lecture, PPT, Group discussion	Short test, Discussion , Continuou s Internal Assessme nt II(CIA - II).
	2	Endosperm- types- haustoria. Embryogenesis and organogenesis of dicot and monocot embryos	4	To differentiate the different types of endosperm	Lecture , Charts	
	3	Apomixis- Polyembryony- parthenocarpy (Seminar)	4	To evaluate the importance of apomixes, Polyembryon y, parthenocarpy	Lecture , Models	

Course Instructor: Dr. N. Benit

HOD: Dr. C. Jespin Ida

Semester : I Elective I(a)

Name of the Course : Marine Biology

Subject code : PB2014

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I. MARINE HABITAT						
	1	Classification of marine habitat – pelagic – neritic and oceanic province, benthic – zonation – shore environment – muddy, rocky and sandy, waves and tides,	4	To understand the basics of marine habitat	Lecture	Group discussions, Quiz.

		deep sea bottom – pelagic deposits (Seminar)				
	2	Characteristics of marine habitat – physical parameters – temperature, illumination, specific gravity, pressure and buoyancy, ocean current	3	To know about the characteristics of marine habitat e	Lecture , PPT	
	3	Chemical constituents – major and minor constituents, deep sea nodules. Plate tectonics – earthquakes and tsunami.	3	To be able to evaluate the causes and preventive measures of Plate tectonics	Lecture, Charts, Discussion	

II MARINE BIODIVERSITY

	1	Marine biodiversity – phytoplankton – characteristics, sampling and measuring.	4	To understand the basics of Marine biodiversity	Lecture , PPT	Assignments on marine diversity, Group discussions, Quiz
	2	Marine bacteria, marine fungi, seaweeds and sea grasses (Seminar)	3	To evaluate the importance of marine organisms	Lecture, Illustrations	
	3	Energy relationship – primary production, grazing food chain, detritus chain and energy balance sheet	4	To be able to understand the Energy relationship	Lecture , Charts	
	4	Green house effect, Carbon pump	3	To evaluate the impact of Green house effect	Lecture, Illustrations	

III MARINE PRODUCTS						
	1	Marine products – Production and uses of Agar-agar, Alginates, Carrageenan; Marine lipids	4	To produce marine products	Lecture, Illustrations	Class tests, Question – Answer sessions, Continuous Internal Assessment I (CIA - I).
	2	Marine pharmacology – Bioactive compounds from marine organisms	4	To assess bioactive compounds from marine organisms	Lecture, PPT	
	3	Sea grasses – structure, reproduction and ecological roles (Seminar)	4	To know about sea grasses	Lecture, Charts	
IV MICROALGAE						
	1	Culture of microalgae – Open pond method, Photobioreactors, Batch culture, Continuous Culture	4	To acquire skills to culture microalgae	Lecture, PPT	Class tests, Case study on different pollutions in different areas, Open book test.
	2	Maintenance of culture – Stock culture and Sub culture; Commercial cultivation of seaweeds	4	To assess the maintenance of culture	Lecture, Illustration	
	3	Marine pollution – thermal pollution, oil pollution, heavy metal pollution, radioactive pollution ; Eutrophication (Seminar)	4	To analyse the impact of marine pollution	Lecture, Group discussions	
V MANGROVES						
	1	Mangroves - Structure, Reproduction and ecological roles (Seminar)	3	To understand about mangrove ecosystem	Lecture, PPT	Class tests, Question – Answer sessions, Group

	2	Present status of mangroves with special reference to Pitchavaram	3	To recall the status of mangroves in Pitchavaram	Lecture	discussions, Continuous Internal Assessment II (CIA -II).
	3	Salt marsh plants – Structure, Adaptations and ecological roles; Restoration of mangroves	3	To understand about Salt marsh plants	Lecture, PPT	
	4	Coral reefs – Formation, Types, Ecology, Species interaction and economic importance	3	To assess the importance of Coral reefs	Lecture, Charts	

Course Instructor: Dr.J.Albino Wins

HOD: Dr. C. Jespin Ida

Semester : II Major Core IV

Name of the Course : Plant Diversity II -Pteridophyta, Gymnosperms and Palaeobotany

Subject code : PB2021

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I. PTERIDOPHYTES – INTRODUCTION						
	1	Origin and evolution of vascular plants; Stelar evolution	4	To know the basics of vascular plants	Lecture	Group discussions,
	2	Telome theory; Apogamy and apospory	4	To understand about apogamy and apospory	Lecture, Charts	
	3	Economic importance of	4	To evaluate and categorize	Lecture,	

		Pteridophytes. Classification of pteridophytes by G.M. Smith		pteridophytes	PPT	Question – Answer sessions, Quiz.
II PTERIDOPHYTES – REPRODUCTION						
	1	Range of thallus structure, reproduction and evolution of gametophytes and sporophytes of the following orders: <i>Psilotales</i> , <i>Lycopodiales</i>	4	To evaluate the detailed information about different orders of pteridophytes	Lecture, Microscopic slides, PPT	Short Test, Discussions, Microscopic observation, Quiz
	2	<i>Selaginellales</i> , <i>Isoetales</i> , <i>Equisetales</i> .	5	To correlate the different orders of pteridophytes	Lecture, microscopic slides, live specimens, PPT	
III PTERIDOPHYTES – REPRODUCTION						
	1	<i>Ophioglossales</i> , <i>Osmundales</i> , <i>Filicales</i> and <i>Salviniales</i>	5	To evaluate the detailed information about different orders of pteridophytes	Lecture, microscopic slides, live specimens, PPT	Open Book Test, Microscopic observation, Continuous Internal Assessment I (CIA-I)
	2	Sporangial development - Eusporangiate and Leptosporangiate types, heterospory and origin of seed habit and soral evolution	4	To understand the different forms of sporangia	Lecture, Illustrations	

IV GYMNOSPERMS						
	1	Affinities and evolution of gymnosperms; Classification of gymnosperms (K.R. Sporne, 1965);	4	To evaluate and categorize Gymnosperms	Lecture, PPT	Microscopic observation, Short Test, Online Quiz
	2	General characters - morphological, reproductive characters, phylogeny and interrelationship of the orders - <i>Cycadales</i> , <i>Ginkgoales</i>	4	To understand the general characters of different orders of Gymnosperms	Lecture, Illustration, Permanent slides	
	3	<i>Coniferales</i> and <i>Gnetales</i> .	4	To understand the general characters of different orders of Gymnosperms	Lecture, Illustration, Permanent slides	
V PALAEOBOTANY						
	1	Geological time scale; Methods of fossilization and determination of the geological age of fossils, carbon dating	4	To assess the different methods of fossilization	Lecture, Permanent slides	Microscopic observation, Question –
	2	A brief study of the following fossil Pteridophytes: <i>Rhynia</i> , <i>Lepidodendron</i>	4	To know about the different fossil Pteridophytes	Lecture, Permanent slides	
	3	<i>Sphenophyllum</i>	4	To know	Lecture,	

		and <i>Calamites</i> .		about the different fossil Pteridophytes	Permanent slides, PPT	Answer session, Group Discussion, Continuous Internal Assessment II (CIA-II)
	4	A brief study of the following fossil Gymnosperms: <i>Lyginopteris</i> , <i>Cycadoidea</i>	3	about the different fossil Gymnosperms	Lecture, Permanent slides	
	5	<i>Pentaxylon</i> and <i>Cordaites</i> .	3	about the different fossil Gymnosperms	Lecture, Permanent slides, PPT	

Course Instructor: Dr. J. Celin Pappa Rani

HOD: Dr. C. Jespin Ida

Semester : II Major Core V

Name of the Course : Research Methodology

Subject code : PB2022

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I. RESEARCH – INTRODUCTION						
	1	Research- Objectives of research, Types of research, Significance	2	To know the objectives of research	Lecture, PPT	
	2	Literature collection- Index card, reference card and Abstract card	2	To assess the literature collection	Lecture	
	3	Literature citation- Different systems	3	To evaluate the	Lecture	

		of citing references- Name year system, Citation sequence system and Alphabet number system		Literature citation		Short Test, Quiz, Question – Answer session, Thesis evaluation.
4	Research report, components of a project report, tables, figures, foot note, thesis format, journal format- appendices	3	To understand the components of project report	Lecture, PPT, Models		
5	E- Journal and e-book. Role of supervisors/ Guides in research	3	To understand about E- journal and e- book	Lecture, Models		

II MICROSCOPY

1	Microscopy – Principle, Instrumentation and uses of Light Microscope, Dark-Field Microscope	3	To operate microscope	Lecture, Operating microscopes	Lab test, Diagrammatic representation, Quiz
2	Phase contrast Microscope, Fluorescent Microscope	3	To operate microscope	Lecture, Operating microscopes	
3	Electron Microscope – SEM and TEM, Confocal Microscope	3	To operate microscope	Lecture, Operating microscopes	
4	Micrometry; Photomicrometry	3	To measure microscopic specimens	Lecture, PPT	

III SPECTROPHOTOMETRY & CHROMATOGRAPHY

	1	Spectrophotometer - Principle, Instrumentation and uses of UV- Vis Spectrometry, Atomic Adsorption Spectrometry	4	Able to operate Spectrophotometer	Lecture, PPT, Operating Spectrophotometer	Lab test, Short test, Diagrammatic representation, Continuous Internal Assessment I (CIA-I)
	2	Nuclear Magnetic Resonance Spectrometry, Flame Photometer	3	Able to operate Spectrophotometer	Lecture, Operating instruments	
	3	Chromatography – Affinity Chromatography, Ion exchange chromatography and High Performance Liquid Chromatography	4	Able to perform chromatography	Lecture, Experimental approach	

IV CENTRIFUGATION & ELECTROPHORESIS

	1	Centrifugation – Principles of sedimentation, Types of rotors, Differential centrifugation, Density gradient centrifugation, Ultracentrifuge	4	Able to operate centrifuge	Lecture, Experimental approach	Lab test, Group
	2	Electrophoresis – Agarose gel electrophoresis (AGE), Sodium Dodecyl Sulphate- Polyacrylamide Gel Electrophoresis	4	Able to perform electrophoretic analysis	Lecture, Experimental approach	

		(SDS-PAGE)				discussion, Diagrammatic representation, Open book test.
	3	PCR – Principle and technique.	2	To understand and perform PCR	Lecture, Experimental approach	
	4	Cryobiology – Lyophilization and its application in Biology	3	To know about the importance of Cryobiology	Lecture, PPT	
V BIOSTATISTICS						
	1	Data collection and Analysis of data – Mean, Medium, Mode, Standard deviation, Standard error	4	To analyse and interpret different data	Lecture, Problem solving methods	Problem Solving Tests, Objective type test, Continuous Internal Assessment I (CIA-II)
	2	Student ‘T’ test, Chi – square test	2	To solve statistical data problems	Lecture, Problem solving methods	
	3	Correlation, Regression	2	To solve and correlate statistical data	Lecture, Problem solving methods	
	4	ANOVA, SPSS	3	To solve statistical data	Lecture, Problem solving methods	

Course Instructor: Dr. J. Albino Wins

HOD: Dr. C. Jespin Ida

Name of the Course : Cell Biology and Biomolecules

Subject code : PB2023

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I CELL ORGANELLES						
	1	Cell Type: History and origin. Difference between Prokaryotic and Eukaryotic cell	2	To know the difference between Prokaryotic and Eukaryotic cell	Lecture	Short test, Group discussions, Microscopical Observations
	2	Plasma Membrane: History, Ultrastructure, and chemical composition of plasma membrane (Lamellar-models, micellar models and fluid mosaic model). Functions of plasma membrane	4	To understand the structure and importance of plasma membrane	Lecture, model, PPT	
	3	Mitochondria: History and structure of mitochondria, biogenesis and functions of mitochondria (Respiratory chain complex and Electron transport mechanism).	4	To understand the structure and functions of mitochondria	Lecture, model, PPT	

II CHROMOSOME AND CELL DIVISIONS

	1	Endoplasmic Reticulum, Ribosome, Golgi Bodies: History, structure, functions and importance. Lysosomes, Centrioles, Microtubules: History, structure, functions and Importance	4	To know the structure and functions of Endoplasmic Reticulum, Ribosome, Golgi Bodies, Lysosomes, Centrioles, Microtubules.	Lecture, PPT, Video clippings	Class test, Open Book Test, Group discussion
	2	Nucleus: History, structure, functions and importance; Chromosomes: History, types and functions of chromosomes. Giant chromosomes, Polytene chromosome and Lamp brush chromosome	5	To learn about nucleus and chromosome,	Lecture, PPT, Experimental Approach	
	3	Cell Division: Mitosis (cell cycle stages, cytokinesis) Meiosis (reproductive cycle stages, synoptonemal complex, recombination nodules). Comparison	3	To differentiate mitosis and meiosis	Lecture, PPT, Experimental Approach	

		between meiosis and mitosis				
III CARBOHYDRATES						
	1	Carbohydrates - structure and properties of Monosaccharides - ring structure. Oligosaccharides - sucrose and maltose	6	To know about the structure and properties of biomolecules – Monosaccharides and Oligosaccharides.	Lecture, PPT	Class Test, Open Book Test, Group discussion, Continuous Internal Assessment I (CIA-I)
	2	Polysaccharides - starch, cellulose, pectin and agar - Glycosidic linkage formation	4	To understand the structure and properties of biomolecules - Polysaccharides	Lecture, Charts	
	3	Structure and properties of amino acids and proteins – Denaturation and renaturation of proteins.	5	To evaluate the importance of proteins and to assess the difference between Denaturation and renaturation.	Lecture, PPT	
	4	Purification of proteins	4	To enhance the skill in purifying proteins	Lecture, Experimental approach	
IV LIPIDS						
	1	Lipids- Classification- Structure and properties- Triglycerides, compound lipids- phospholipids-	3	To understand the structure and properties of lipids	Lecture, PPT	

		cholesterol				Class Test, Question – Answer session.
	2	Structure- Biosynthesis of DNA and RNA	2	To evaluate the difference between the biosynthesis of DNA and RNA	Lecture, Video clippings	
	3	Secondary metabolites- Alkaloids, Glycosides, Steroids and Terpenoids. Vitamins	4	To assess the importance of Secondary metabolites	Lecture, Models	
V ENZYMES						
	1	Enzyme - Nomenclature and classification - IUB system – properties, Active site	4	To categorize enzymes	Lecture, PPT	Class test, Group discussion, Continuous Internal Assessment II (CIA-II)
	2	Mechanism of enzyme action (Fisher's Lock and Key model and Koshland's Induced fit model) - Activation energy	3	To understand the mechanism of enzyme action	Lecture, Video clippings	
	3	Enzyme regulation - activators and inhibitors - coenzymes. Isoenzymes	3	To critically analyse the regulation of enzymes	Lecture, PPT	

Course Instructor: Dr. N. Benit

HOD: Dr. C. Jespin Ida

Semester : II

Elective II(a)

Name of the Course : Herbalism

Subject code : PB2024

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I TRADITIONAL MEDICINE						
	1	Medicinal Botany – Definition – Aim and Scope – History – Importance – Present status and future prospects of medicinal crops	4	Able to understand the importance of medicinal crops	Lecture	Short test, Group discussions.
	2	Traditional systems of medicine – Siddha, Ayurveda and Unani	4	To know the different traditional systems of medicine	Lecture, PPT	
	3	Conservation of Medicinal plants – in situ and ex situ; Herbal gardens	4	To understand the conservation strategies	Lecture, Visit to herbal garden	
II CULTIVATION OF MEDICINAL PLANTS						
	1	Study the following plants with reference to their habitat, systematic position, morphology, useful parts, cultivation of <i>Aloe vera</i> , <i>Ocimum</i> ,	4	Able to cultivate medicinal plants	Lecture, PPT, Visit to botanical garden	

		<i>Zingiber</i>				Question – Answer session, Group discussion
	2	<i>Catharanthus roseus,</i> <i>Phyllanthus amarus,</i>	4	Able to cultivate medicinal plants	Lecture, PPT	
	3	<i>Emblica</i> and <i>Azadirachta.</i>	4	Able to cultivate medicinal plants	Lecture, PPT	
III OIL EXTRACTION						
	1	Methods of extraction of oil in the following plants – Eucalyptus, Cymbopogan	3	Able to understand the extraction procedures	Lecture, Video clippings	Short test, Multiple choice questions, Continuous Internal Assessment I (CIA-I)
	2	Rose and Santalum	3	Able to understand the extraction procedures	Lecture, Video clippings	
	3	Extraction procedures for active principles – Withaonalides, Hyocyanine, Vinblastine	4	Able to understand the extraction procedures	Lecture, Video clippings	
IV PHARMACOGNOSY						
	1	Pharmacognosy – Definition, Classification of drugs – Morphological, Taxonomical, Pharmacological and Chemical	4	To understand the basics of Pharmacognosy	Lecture	Group discussions, Short test,
	2	Collection and Processing of crude drugs – Antichemical, Phytochemical	5	Able to assess the processing of crude drugs	Lecture, Charts	

	3	Antimicrobial and Chemical	4	To evaluate the antimicrobial and chemical properties of drugs	Lecture, Charts	Open book test
V WHO GUIDELINES						
	1	Screening and WHO standardization of crude drugs (WHO guidelines)	3	To evaluate the standardization of crude drugs	Lecture, PPT	Multiple choice questions, Group discussions, Continuous Internal Assessment II (CIA-II)
	2	Physicochemical (Ash and Extraction values)	3	To assess the Physicochemical parameters	Lecture, Video clippings	
	3	Fluorescence analysis – Qualitative and Quantitative analysis	4	To differentiate Qualitative and Quantitative analysis	Lecture	
	4	Basic chromatographic and Spectroscopic analysis of crude drugs	3	To evaluate the analysis of crude drugs	Lecture, Video clippings	

Course Instructor: Dr. N. Benit

HOD: Dr. C. Jespin Ida

Semester : **III** **Major Core VII**
Name of the Course : **Taxonomy of Angiosperms**
Subject code : **PB2031**

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I CLASSIFICATION						
	1	Aim and scope of plant taxonomy – Taxonomic tools, Systems of angiosperm classification; Linnaeus, Bentham and Hooker and Engler and Prantle, Merits and demerits of these classification	3	To categorize the classification of plant taxonomy	Lecture , PPT	Short test, Group discussions, Question – Answer session.
	2	Taxonomic literatures –	3	To be aware of	Lecture,	
		floras, revisions, manuals, monographs and check lists		taxonomic literatures	Models	
	3	Identification and preparation of intended keys and bracketed keys	3	To be able to identify and prepare keys	Lecture , Models	
	4	Herbarium techniques (Seminar) – Types and functions of herbarium; Digital Herbarium	3	To know the different herbarium techniques	Lecture , Charts	
II NOMENCLATURE						
	1	Botanical nomenclature – ICN, Principles and Role of ICN, Rules – principle of priority, rejection of names, limitations in the principle of priority, typification, author citation, effective and valid publications	4	To understand the role and principle of ICN	Lecture	Short test, Assignment to learn the molecular tools, Quiz.
	2	Taxonomical Evidences - Numerical taxonomy, chemotaxonomy, cytotoxonomy, and	4	To be able to evaluate the importance of	Lecture , PPT	

		phytotaxonomy		taxonomical evidences	
	3	Molecular tools used in taxonomy (Seminar)	4	To critically analyze plants with molecular tools	Lecture, Video clippings

III FAMILY DESCRIPTION

	1	Systematic position, diagnostic features, distribution, description and economic importance of Capparidaceae, Polygalaceae	3	To diagnose the features of different families		Quiz, Dissect and Display, Class test, Continuous Internal Assessment I (CIA -I).
	2	Caryophyllaceae, Tiliaceae	3	To diagnose the features of different families	Lecture , PPT , Field visit	
	3	Zygophyllaceae (Seminar)	2	To diagnose the features of the family	Lecture , PPT, Field visit	

IV FAMILY DESCRIPTION

	1	Systematic position, diagnostic features, distribution, description and economic importance of	3	To diagnose the features of	Lecture, PPT ,	Quiz, Dissect and Display,
		Rhamnaceae, Sapindaceae		different families	Field visit	Class test
	2	Passifloraceae, Sapotaceae	3	To diagnose the features of different families	Lecture , PPT , Field visit	
	3	Oleaceae, (Seminar) Boraginaceae	3	To diagnose the features of different families	Lecture , PPT , Field visit	

	4	Scrophulariaceae, Bignoniaceae	3	To diagnose the features of different families	Lecture, PPT, Field visit	
V FAMILY DESCRIPTION						
	1	Systematic position, diagnostic features, distribution, description and economic importance of Verbenaceae, Nyctaginaceae	3	To diagnose the features of different families	Lecture, PPT, Field visit	Quiz, Dissect and Display, Class test, Continuous Internal Assessment II (CIA -II).
	2	Aristolochiaceae, Casuarinaceae	3	To diagnose the features of different families	Lecture, PPT, Field visit	
	3	Orchidaceae, Commelinaceae	3	To diagnose the features of different families	Lecture, PPT, Field visit	
	4	Araceae, Cyperaceae	3	To diagnose the features of different families	Lecture, PPT, Field visit	

Course Instructor: Ms. N. Benit

HOD: Dr. C. Jespin Ida

Semester : III Major Core VIII

Name of the Course : Genetics and Molecular Biology

Subject code : PB2032

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I GENETICS						

1	Contribution of Gregor Johann Mendel, T.H. Morgan, Karl Landsteiner; Mendel's law of heredity – Monohybrid and Dihybrid cross (Seminar)	3	To differentiate monohybrid and dihybrid crosses and solve the problems	Lecture , Problem based learning	Class test, Group Discussion, Quiz.
2	Gene interaction – Dominant epistasis (12:3:1), Recessive epistasis (9:3:4), Duplicate recessive genes (9:7), Duplicate dominant genes (15:1)	3	Able to solve the problems in gene interaction	Lecture , Problem based learning	
3	Sex determination in plants - theories of sex determination; Sex linked characters (Seminar)	3	To distinguish the sex linked characters	Lecture , PPT	
4	Linkage and crossing over, construction of chromosome map, and three point cross	2	To learn about crossing over and mapping	Lecture , PPT	

II DNA AND GENETIC DISEASES

1	Mutation – Types of mutation, Molecular mechanism of mutation DNA- types (A, B, C & Z), Watson and Crick model of DNA, viral DNA, bacterial DNA	3	To differentiate the different types of DNA and assessing the mutations	Lecture , Charts	Diagrammatic representation, Short test.
2	Mitochondrial (Seminar) and Chloroplast DNA	2	To distinguish Mitochondrial and Chloroplast DNA	Lecture , Models	
3	Dissociation and re-association kinetics of DNA; cot value and its significance	3	To evaluate the dissociation and re-association	Lecture	

				kinetics of DNA		
	4	DNA replication of prokaryotes and eukaryotes	2	To understand the replication process	Lecture , Video clippings	
	5	Genetic diseases – Sickle cell anemia, Cystic fibrosis, Duchennes muscular dystrophy	3	To identify and critically analyse genetic diseases	Lecture, Video clippings	
III GENETIC ENGINEERING						
	1	Damage and DNA repair mechanism – photo reactivation – excision repair - mismatch repair	3	To understand the repair mechanisms	Lecture , PPT	Short test, Question – Answer session, Group discussion, Continuous Internal Assessment I (CIA -I).
	2	Genetic recombination - generalised and site specific; Lysogenic and lytic cycle;	3	To analyse the recombination patterns	Lecture , Models	
	3	Bacterial Transformation, Transduction and Conjugation	3	To understand the basics of gene transfer	Lecture , PPT	
	4	Super vectors - BAC, YAC	3	To differentiate the different super vectors	Lecture , Charts	
IV TOOLS IN GENETICS						
	1	RNA – types; Transcription - Initiation, elongation, termination, post transcriptional events	3	To differentiate the types of RNA	Lecture	Quiz, Group discussions
	2	Genetic code, Wobble hypothesis; Translation – steps in translation	3	To understand the process of	Lecture , PPT	

			Translation	
3	Molecular tools for studying genes – northern blotting, southern blotting,, (Seminar)	3	To acquire skills to operate molecular tools	Lecture, Operating the instruments
4	Western blotting FISH	3	To acquire skills to operate molecular tools	Lecture , PPT
V GENOMICS				

	1	Fine structure of the gene; Transposons – Tn3, Tn5	3	To differentiate the types of transposons	Lecture, PPT	Multiple Choice Questions, Group discussions, Continuous Internal Assessment II (CIA - II).
	2	Gene regulations in Prokaryotes -Operon concept – lac operon, trp operon, Gene regulation in Eukaryotes Steps in gene cloning; Pros and Cons in gene cloning	3	To understand the concepts of operon	Lecture, PPT	
	3	Construction of genomic library; Construction of cDNA library	3	To construct the gene libraries	Lecture, Video clippings	
	4	Gene silencing; Human Genome Project (Seminar)	3	To evaluate the human genome project	Lecture, Video clippings	

Course Instructor: Dr. J. Albino Wins

HOD: Dr. C. Jespin Ida

Course Instructor: Dr. Bojaxa A Rosy

H.O.D: C. Jespin Ida

Semester : III
Name of the Course : Forestry
Subject code : PB2034

Elective III(b)

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I TYPES OF FOREST						
	1	Forest – definition, role of forest; forest as a balanced ecosystem	3	To understand the role of forest	Lecture	Short test, Quiz, Group discussion.
	2	Types and distribution of (Champion and Seth's classification)	3	To categorize the types of forests	Lecture , PPT	
	3	Forest types in Tamilnadu (Seminar)– evergreen forest, deciduous and scrub jungle	3	To categorize the types of forests in Tamilnadu	Lecture , PPT	
II FOREST MANAGEMENT						
	1	Forest management and conservation	3	Able to understand the conservation strategies	Lecture	Assignment on forest mensuration, Quiz.
	2	Regeneration; tending operations; sustainable utilization of forest resources – forest organizations	4	To assess the utilization of forest resources	Lecture	
	3	Forest mensuration and remote sensing	3	To know the concept of remote sensing	Lecture , PPT	
	4	Methods of measuring diameter, girth, height, and volume of trees	3	Differentiate the different methods of forest mensuration	Lecture, Video clips	

	5	Geographic information systems for management (GIS) (Seminar)	3	To understand the concepts of GIS	Lecture	
III FOREST UTILIZATION						
	1	Forest utilization – harvesting, conservation, storage and disposal of wood in forest; major and minor forest products	3	To evaluate the utilization of forest	Lecture , PPT	Short test, Quiz, Continuous Internal Assessment I (CIA -I).
	2	Forest based	3	To assess the	Lecture,	

		industries – paper and pulp industry, resin tapping and turpentine manufacture		importance of forest based industries	Powerpoint	
	3	Forest education in India (Seminar)	3	To know about forest education	Lecture	
IV FOREST DEGRADATION						
	1	Forest degradation – damage caused by fire, climatic factors and injuries by insects, plants, animals, and diseases	3	To understand the causes of forest degradation	Lecture , PPT	Quiz, Discussions
	2	Activities of man including encroachment and shifting cultivation	3	To know about the encroachment	Lecture	
	3	Measures to protect the forest damage caused by various factors (Seminar)	3	To assess the protective measures	Lecture , Charts	
V AGROFORESTRY						
	1	Agroforestry – objectives, advantages and disadvantages	3	To understand the basis of Agroforestry	Lecture	Quiz, Group Discussions, Continuous Internal Assessment II (CIA - II).
	2	Energy plantations; recreational forestry	2	To assess the energy plantations	Lecture , PPT	

3	Role of botanical gardens, zoos, national parks and sanctuaries in recreation	3	To evaluate the role of botanical gardens	Lecture , PPT
4	Conservation of wild life (Seminar)	3	To acquire skills in conserving wild life	Lecture , Video clippings
5	Social forestry	2	To evaluate the impact of social forestry	Lecture , PPT

Course Instructor:Dr.J. Celin Pappa Rani

HOD: Dr. C. Jespin Ida

Semester: IV **Major Core IX**
Name of the Course: Plant Physiology
Subject Code: PB2041

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
I ABSORPTION						
	1	Physico-chemical properties of water - water potential; Mechanism of absorption of water - active and passive transport - Apoplast and symplast concept	4	To understand the mechanism of active and passive transport of water	Lecture, PPT, Video clippings	Class test, quiz, microscopic evaluation
	2	Transpiration - Stomatal mechanism. Antitranspirants	3	To know the basics of transpiration	Lecture, PPT, microscopic observation	
	3	Ascent of sap – SPAC; Mineral nutrition - criteria for essentiality. Macro and micro nutrients, their role and deficiency symptoms	4	To evaluate the role of micro and macronutrients in plants	Lecture, experimental approach	
	4	Absorption of solutes - passive, active diffusion and facilitated diffusion	4	To differentiate passive and active absorption of solutes	Lecture, video clippings	
	5	Hydroponics –	2	To develop	Lecture,	

		Nutrient Film Technique (NFT)		hydroponic technique	PPT, Garden visit	
II PHOTOSYNTHESIS						
	1	Properties of light - Interaction between radiant energy and phosphorescence	2	To correlate different radiations of light	Lecture,	Online Quiz, Group discussions, Class test
	2	Photosynthetic apparatus and thylakoid organization; Two pigment systems - Light harvesting systems. Reaction center, P680, P700, water oxidation complex	3	To understand the structure and organization in thylakoid	Lecture, PPT	
	3	Electron transport system - cyclic - non cyclic – photophosphorylation	3	To differentiate cyclic and noncyclic phosphorylation	Lecture, video clippings	
	4	Photosynthetic carbon reduction pathways in C3, C4 and CAM plants Photorespiration and its significance	4	To categorize different carbon reduction pathways	Lecture, PPT	

III RESPIRATION & NITROGEN METABOLISM						
	1	Respiration - Glycolysis – Anaerobic (Fermentation) and Aerobic (Kreb’s cycle)	3	To understand aerobic and anaerobic respiration	Lecture, Chart	Class test, diagrammatic representation, Continuous Internal Assessment I(CIA-I)
	2	Electron transport system and oxidative phosphorylation – mechanism, Energetics - Respiratory inhibitors - Cyanide resistant respiration; Integration of metabolic pathways	5	To know the basics and energetic mechanism of electron transport system	Lecture, PPT, Chart	
	3	Nitrogen Metabolism – Sources of nitrogen. Biological nitrogen fixation – symbiotic and asymbiotic, Nitrate and Ammonia assimilation (GS-	5	To learn nitrogen metabolism in plants	Lecture, Video clippings	

		GOGAT pathway)				
IV PLANT GROWTH REGULATORS						
	1	Plant growth regulators and elicitors: Physiological effect and mechanism of action of auxin, gibberellins, cytokinins, Ethylene, abscissic acid, morphactins, brassinosteroids	5	To know the basics of plant growth regulators and elicitors	Lecture, Chart	Class test, Group discussion, multiple choice questions, assignment on plant growth hormones
	2	Photomorphogenesis – phytochrome mediated photoresponses, Physiology of flowering; Fruit ripening	5	To learn about photomorphogenesis	Lecture, PPT	
V STRESS PHYSIOLOGY						
	1	Physiology of senescence and abscission; Biological clock	4	To understand the process of ageing in plants	Lecture, Video clippings	Class test, Online quiz, Continuous
	2	Stress physiology – biotic and abiotic stress- salinity stress, drought stress, water stress, freezing stress, radiation stress, and	4	To categorize different stress factors	Lecture, PPT	

		heavy metal stress, Stress proteins in plants – stress resistance mechanism				Internal Assessment II(CIA-II)
--	--	---	--	--	--	--------------------------------------

Course Instructor: Dr. N. Benit

HOD: Dr. C. Jespin Ida

Semester:
X

IV

Major Core

Name of the Course: Plant Ecology and Phytogeography

Subject Code: PB2042

Number of hours per week	Number of credits	Total number of hours	Marks
6	5	90	100

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I HABITAT ECOLOGY						
	1	Habitat Ecology - Freshwater and Marine water ecology (ecosystems), Wetlands and their Characteristics – Classification of Wetlands and Examples	3	To know the basics of habitat ecology	Lecture, PPT	Group discussion, Class test.
	2	Succession - Causes of succession,	3	To learn the different parameters of	Lecture, Charts	

		Types of succession; Process of succession; Concept of Climatic Climax		succession		
	3	Hydrosere; Xerosere; Applications of ecology	3	To correlate and categorize hydrosere and xerosere	Lecture, PPT	

II ECOSYSTEM

	1	Structure of Ecosystem; Productivity of ecosystem; Food chains in ecosystem; Ecological Pyramids; Energy flow in ecosystem	3	To learn the basics of ecosystem	Lecture, Charts	Online quiz, Group discussion, Assignment on biogeochemical cycle
	2	Biogeochemical cycle – Water cycle, Gaseous cycle (Carbon cycle, Oxygen cycle, Nitrogen cycle); Sedimentary cycle	4	To correlate the different biogeochemical cycle	Lecture, PPT	
	3	Ecological Genetics of Population – Ecads, Ecotypes, Ecoclines, Ecospecies, Population Ecology -	4	To understand the characteristics and structure of population ecology	Lecture, Charts, PPT	

		Characteristics of a population; Population Structure – Population Dispersal and interactions among population				
III PHYTOGEOGRAPHY						
	1	Phytogeography: Definition and Principles of Phytogeography, Distribution – Wides, Endemics and Discontinuous species; Theories of Discontinuous distribution; Factors affecting distribution of species	4	To learn the basics of Phytogeography	Learn, PPT	Group discussions, Class test, Continuous Internal Assessment I (CIA-I)
	2	Climate of India; Vegetation of India	3	To understand the climatic condition and vegetation of India	Lecture, Video clippings	
	3	Global environment changes – Global warming and Ozone depletion; Bioremediation	3	To know about the global environmental changes	Lecture, PPT	

	4	Biofouling, Biofilm and Biocorrosion, Carbon sequestration method, Carbon trading	4	To categorize Biofouling, Biofilm and Biocorrosion	Online quiz, Online assignments	
--	---	---	---	--	---------------------------------	--

IV CURRENT PRACTICES IN CONSERVATION

	1	Current practices in conservation: Habitat or Ecosystem Approaches - Species-based Approaches - Social Approaches: Chipko Movement	4	To understand the basics of conservation	Lecture, Field visit	Class test, assessing the report of Field visit
	2	In-situ conservation – Afforestation, Social Forestry, Agroforestry, Botanical gardens, Zoos	3	To categorize different in situ conservation methods	Lecture, PPT, Field visit	
	3	Biosphere Reserves, National Parks, Sanctuaries, Protected Area Network, Sacred Groves and Sthalavrikshas	4	To categorize different in situ conservation methods	Lecture, PPT, Field visit	
	4	Ex-situ conservation:	4	To correlate the different ex situ	Lecture, PPT	

		Cryopreservation, Gene Banks, Seed Banks, Pollen Banks, Sperm Banks, DNA Banks		conservation methods		
--	--	--	--	----------------------	--	--

V PROTECTION OF SPECIES

	1	Status and protection of species in National and International levels	3	To differentiate national and international level of species protection	Lecture	Continuous Internal Assessment II (CIA-II), Seminar, Online
	2	Role of CITES and IUCN – Convention on Biological Diversity (CBD)	3	To understand the role of different treaties in species protection	Lecture, PPT	
	3	Nagoya Protocol – Man and Biosphere Programme (MAB)	2	To understand the role of different treaties in species protection	Lecture, PPT	

	4	Policies implemented by MoEF for biodiversity conservation – Salient features of Biological Diversity Act 2002 – Ecosystem restoration	3	To know about the policies for conservation	Lecture, PPT	assignment
--	---	--	---	---	--------------	------------

Course Instructor: Dr. J. Celin Pappa Rani

HOD: Dr. C. Jespin Ida

Semester:

IV

Major Core XI

Name of the Course:

Biotechnology and Bioinformatics

Subject Code:

PB2043

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I RESTRICTION ENZYMES & LIBRARY CONSTRUCTION						
	1	Nomenclature, classification and properties of restriction enzymes	3	To know the basics of restriction enzymes	Lecture, chart	Group Discussion, online quiz, Seminar
	2	Types of cloning vectors – Plasmids, Cosmids, ssDNA phages, Ti plasmid	3	To categorize different cloning methods	Lecture, PPT	
	3	Yeast vectors – YIP, YEP, YRP and YAC ;	3	To differentiate yeast vectors	Lecture, PPT	

		shuttle vectors				
	4	Construction of genomic library; Construction of cDNA library	3	To construct genomic and cDNA library	Lecture, Video clippings	

II PLANT TISSUE CULTURE

	1	Plant tissue culture – laboratory organization; sterilization of explants; MS media composition and preparation of media	4	To construct plant tissue culture laboratory	Lecture, Video clippings	Class test, Online Assignment
	2	Meristem culture; suspension culture; protoplast culture and somatic hybridization	3	To learn different culture methods	Lecture, video clippings	
	3	Production of haploid plants, Somatic embryogenesis	3	To learn different culture methods	Lecture, video clippings	
	4	Synthetic seed production Transgenic plants – Bt cotton, Golden rice	3	To know about transgenic plants	Lecture, video clippings	

III INDUSTRIAL BIOTECHNOLOGY

	1	Industrial Biotechnology – Fermentor design	2	To design industrial fermentor	Lecture, PPT	
--	---	---	---	--------------------------------	-----------------	--

	2	Immobilization of enzymes; Production of ethanol, acetic acid	3	To understand the production of alcohol and acids	Lecture, video clippings, Industrial Visit	Class Test, Assessment of Industrial Visit Report, Continuous Internal Assessment I (CIA-I)
	3	Production of citric acid, Vitamin B ₁₂	2	To understand the production of antibiotics and vitamins	Lecture, Video Clippings	
	4	Biosafety – possible dangers of GEOs; biosafety guidelines; physical and biological containments, Process of patenting application	4	To differentiate the different containments and know about patenting process	Lecture	

IV PHARMACEUTICAL BIOTECHNOLOGY

	1	Edible vaccines, Plantibodies; Gene therapy – types of gene therapy,	3	To understand the basics of vaccines and gene therapy	Lecture	Online Assignment, Group Discussion
	2	Production of monoclonal antibodies and its application	3	To learn the techniques for producing MAb	Lecture, Video Clippings	
	3	Production of DNA vaccine; Production of subunit vaccine	3	To differentiate the different vaccine production	Lecture, Video Clipping	
	4	Nanotechnology – nanomaterials,	3	To know the concepts of	Lecture, PPT	

		Synthesis of nanodrugs		nanotechnology		
V BIOINFORMATICS						
	1	The internet, World Wide Web, search engines	3	To understand the basics of internet and search engines	Lecture	Seminar, Continuous Internal Assessment II (CIA-II)
	2	Primary nucleotide sequence databases - Genbank, DDBJ;	3	To know the concept of Primary nucleotide sequence databases	Lecture, Video Clippings	
	3	Primary protein sequence databases - NCBI, PIR, EMBL; Sequence Analysis - Pair-wise alignment	3	To learn the techniques of Primary protein sequence databases	Lecture, Video Clipping	
	4	BLAST & FASTA types; Multiple sequence alignment; CADD.	3	To differentiate BLAST and FASTA	Lecture, PPT	

Course Instructor: Dr. J. Albino Wins

HOD: Dr. C. Jespin Ida

Semester: IV

Elective IV(a)

Name of the Course: Phytochemistry and Pharmacognosy

Subject Code: PB2044

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I PHYTOCHEMISTRY						
	1	Phytochemistry - Definition, history, principles.	4	To understand the basics of phytochemistry	Lecture, PPT	Quiz, Online Assignment
	2	Secondary metabolites - definitions, classification	3	To differentiate primary and secondary metabolites	Lecture, PPT	
	3	Secondary metabolites - occurrence and distribution in plants, their functions, chemical constituents.	2	To know about the chemical constituents of secondary metabolites	Lecture	
	4	Alkaloids, Terpenoids, Flavonoids, Steroids, and Coumarins.	3	To characterize the different phytoconstituents	Lecture, PPT	
II ISOLATION OF BIOMOLECULES						
	1	Techniques for isolation of medicinally important Biomolecules -	3	To learn the different techniques for isolating biomolecules	Lecture, Model	

		solvent extraction, steam distillation,				Group Discussion , Class Test
2	Soxhlet extraction; Purification, concentration,	3	To know the techniques for extraction and purification	Lecture, PPT		
3	Determination and quantification of compounds (TLC, Column, HPLC).	3	To understand the principle and techniques of chromatography	Lecture		
4	Characterization of phytochemicals by spectroscopic methods.	4	To characterize the phytochemicals by spectroscopic methods.	Lecture, Video Clippings		

III BIOSYNTHETIC PATHWAYS AND APPLICATION

1	Biosynthetic pathways of secondary compounds: Shikimic Acid pathway; Mevalonic Acid Pathway	3	To categorize the different biosynthetic pathways	Lecture, PPT	Class Test, Online Quiz , Continuou s internal assessment
2	Pathways for commercially important phytochemicals:Forskolin, taxol and Vinca alkaloids	4	To correlate the different pathways for commercially important phytochemicals	Lecture, PPT	
3	Applications of phytochemicals in medicine and pharmaceutical industries	3	To understand the applications of phytochemicals in medicine and pharmaceutical industries	Lecture, Video Clippings	

	4	Applications of phytochemicals in food , flavor and cosmetic industries.	4	To understand the applications of food , flavor and cosmetic industries.	Lecture, PPT	I(CIA –I)
--	---	--	---	--	--------------	-----------

IV HERBALISM AND ETHNOBOTANY

	1	Herbs and healing; Historical perspectives local, national and global level	3	To know about the historical perspectives of herbalism	Lecture, PPT	Class test, Group Discussion , Open book test
	2	Herbal cultures: origin and development of human civilizations	4	To know about different herbal cultures	Lecture, Video Clippings , Preparati on of wine	
	3	Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.	3	To learn about the usage of natural products against human diseases.	Lecture, Video Clippings	

V ANALYTICAL PHARMACOGNOSY						
	1	Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs	4	To learn about drug adulteration and its evaluation	Lecture, PPT	Question and Answer session, Continuous internal assessment II(CIA –II)
	2	Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds)	3	To know about the phytochemical screening methods	Lecture, PPT	
	3	Medicinal plant banks, micropropagation of important species (<i>Wihania somnifera</i> , <i>Azadirachta indica</i> and <i>Ocimum sanctum</i> - Herbal foods-future of pharmacognosy)	4	To analyze the micropropagation techniques of medicinal plants	Lecture, Video Clippings	

Course Instructor: Dr. J. Celin Pappa Rani

HOD: Dr. C. Jespin Ida