Module for B.Sc. Botany (Honours), 2021-2022

B.Sc. Semester-I (Hons.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
Core TI: Phycology and Microbiology			
Unit 1	Introduction to microbial world	Dr. Ranjan Ghosh	10
Unit 2	Viruses		07
Unit 3	Bacteria		09
Unit 4	Algae	Dr. Debjyoti Das	11
Unit 5	Cyanophyta , Xanthophyta and Bacillariophyta		08
Unit 6	Chlorophyta and Charophyta		08
Unit 7	Phaeophyta and Rhodophyta		10
Core P1: Phycology and Microbiology			
Sl. 1	Electron micrographs/Models of viruses	Dr. Ranjan Ghosh	
Sl. 2	Types of Bacteria to be observed from temporary/permanent slides/photographs.		
Sl. 3	Gram staining and simple staining of bacteria.		
Sl. 4	Endospore staining		
Sl. 5	Study of microorganisms from curd sample by simple staining process		
Sl. 6	Study of vegetative and reproductive structures of *Nostoc, Zygnema*, *Oedogonium, Chara, Vaucheria, Fucus and Polysiphonia,* through electron micrographs, temporary preparations and permanent slides.	Dr. Debjyoti Das	
Core T2: Biomolecules and Cell Biology			
Unit 1	Biomolecules	Mr. Samir Jana	20
Unit 2	Bioenergenetics		04
Unit 3	Enzymes		06
Unit 4	The cell	Mr. Arup Karmakar	04
Unit 5	Cell wall and plasma membrane		04
Unit 6	Cell organelles		16
Unit 7	Cell division		06
Core P2: Biomolecules and Cell Biology			
Sl. 1	Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins	Mr. Samir Jana	
Sl. 2	Study of plant cell structure with the help of epidermal peel mount of Onion/*Rhoeo*.		
Sl. 3	Demonstration of the phenomenon of protoplasmic streaming in *Hydrilla* leaf.		
Sl. 8	Study the phenomenon of plasmolysis and deplasmolysis.		

Sl. 4	Measurement of cell size by the technique of micrometry.	Mr. Arup Karmakar	
Sl. 5	Counting the cells per unit volume with the help of haemocytometer.		
Sl. 6	Study of cell and its organelles with the help of electron micrographs.		
Sl. 7	Cytochemical staining of : DNA- Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique		
Sl. 9	Study different stages of mitosis and meiosis		

B.Sc. Semester-II (Hons.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
Core T3: Mycology & Phytopathology			
Unit 1	Introduction to true fungi)	Dr. Ranjan Ghosh	04
Unit 2	Chytridiomycota and Zygomycota		05
Unit 3	Oomycota		04
Unit 4	Ascomycota		10
Unit 5	Basidiomycota		08
Unit 6	Deuteromycota		03
Unit 7	Allied Fungi		02
Unit 8	Symbiotic associations	Mr. Arup Karmakar	04
Unit 9	Applied Mycology		10
Unit 10	Phytopathology		10
Core P3: Mycology & Phytopathology			
Sl. 1	Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, ascocarps & basidiocarps).	Dr. Ranjan Ghosh	
Sl. 2	*Rhizopus*		
Sl. 3	*Penicillium*		
Sl. 8	*Ascobolus*		
Sl. 4	*Alternaria*		
Sl. 5	*Puccinia*		
Sl. 6	*Agaricus*		
Sl. 7	*Albugo*		
Sl. 9	Lichens		
Sl. 10	Phytopathology		
Core T4: Archegoniate (Bryophyta, Pteridophyta, & Gymnosperm) and Palaeobotany			
Unit 1	Introduction	Dr. Debjyoti Das	04
Unit 2	Bryophytes	Mr. Arup Karmakar	06
Unit 3	Type Studies- Bryophytes		12
Unit 4	Pteridophytes	Dr. Debjyoti Das	06

Unit 5	Type Studies- Pteridophytes	Dr. Debjyoti Das	14
Unit 6	Gymnosperms	Mr. Animesh Karmakar	14
Unit 7	Palaeobotany	Dr. Debjyoti Das	04
Core P4: Archegoniate (Bryophyta, Pteridophyta, & Gymnosperm) and Palaeobotany			
Sl. 1	*Riccia*	Dr. Ranjan Ghosh	
Sl. 2	*Marchantia*		
Sl. 3	*Anthoceros*		
Sl. 4	*Pellia, Porella*		
Sl. 5	*Sphagnum*		
Sl. 6	*Funaria*		
Sl. 7	*Psilotum*	Dr. Debjyoti Das	
Sl. 8	*Selaginella*		
Sl. 9	*Equisetum*		
Sl. 10	*Pteris*		
Sl. 11	*Cycas*	Dr. Ranjan Ghosh	
Sl. 12	*Pinus*		
Sl. 13	*Gnetum*		
Sl. 14	Identification-Petrified Fossil (*Calamites* and *Lyginopteris*), Impression Fossil (*Glossopteris*)	Dr. Debjyoti Das	

B.Sc. Semester-III (Hons.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CoreT5: Morphology &Anatomy of Angiosperms			
Unit 1	Morphology Leaves	Dr. Bandana Pradhan	02
Unit 2	Flower		05
Unit 3	Fruits		02
Unit 4	Dispersal of fruits and seeds		02
Unit 5	Introduction and scope of Plant Anatomy	Dr. Debjyoti Das	03
Unit 6	Structure and Development of Plant Body		05
Unit 7	Tissues		10
Unit 8	Apical meristems		12
Unit 9	Vascular Cambium and Wood		12
Unit 10	Adaptive and Protective Systems		07
Core P5: Morphology &Anatomy of Angiosperms			
Sl. 1	Identification with resons: Types of leaves,stipules, tendril, inflorescence, fruits, calyx, corolla, androecium, gynoecium.	Dr. Bandana Pradhan	
Sl. 2	Study of anatomical details through permanent slides/temporary stain mounts/ macerations/ museum specimens with the help of suitable examples.	Dr. Debjyoti Das	

Sl. 3	Apical meristem of root, shoot and vascular cambium.		
Sl. 8	Distribution and types of parenchyma, collenchyma and sclerenchyma		
Sl. 4	Root: monocot, dicot, secondary growth.		
Sl. 5	Stem: monocot, dicot - primary and secondary growth		
Sl. 6	Leaf: isobilateral, dorsiventral, C4 leaves (Kranz anatomy).		
Sl. 7	Adaptive Anatomy: xerophytes, hydrophytes		
Sl. 9	Microscopic Identification: Xylem: Tracheary elements-tracheids, vessel elements; xylem fibres. Wood: tyloses ; heart- and sapwood. Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres. Epidermal system: stomata types; trichomes: non-glandular and glandular. Secretory tissues: cavities, lithocysts and laticifers.		
Core T6: Economic Botany and Pharmacognosy			
Unit 1	Origin of Cultivated Plants	Dr. Ranjan Ghosh	06
Unit 2	Cereals		06
Unit 3	Legumes		06
Unit 4	Sources of sugars and starches		04
Unit 5	Spices		06
Unit 6	Beverages		04
Unit 7	Sources of oils and fats		10
Unit 8	Natural Rubber		03
Unit 9	Drug-yielding plants		08
Unit 10	Timber plants		03
Unit 11	Fibers		04
Core P6: Economic Botany and Pharmacognosy			
Sl. 1	Cereals	Dr. Ranjan Ghosh	
Sl. 2	Legumes:		
Sl. 3	Sources of sugars and starches		
Sl. 4	Sources of oils and fats		
Sl. 9	Fibre-yielding plants		
Sl. 5	Essential oil-yielding plants		
Sl. 6	Rubber		
Sl. 7	Drug-yielding plants		
Sl. 8	Wood		

Core T7: Genetics			
Unit 1	Mendelian genetics and its extension	Mr. Animesh Karmakar	16
Unit 2	Extrachromosomal Inheritance		06
Unit 3	Linkage, crossing over and chromosome mapping		12
Unit 4	Variation in chromosome number and structure	Mr. Arup Karmakar	08
Unit 5	Gene mutations		06
Unit 6	Fine structure of gene		06
Unit 7	Population and Evolutionary Genetics		06
Core P7: Genetics			
Sl. 1	Meiosis through temporary squash preparation.	Mr. Animesh Karmakar	
Sl. 2	Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square.		
Sl. 3	Chromosome mapping using point test cross data.		
Sl. 4	Pedigree analysis for dominant and recessive autosomal and sex linked traits.		
Sl. 5	Incomplete dominance and gene interaction through seed ratios (9:7, 12:3:1).		
Sl. 6	Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	Mr. Arup Karmakar	
Sl. 7	Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.		
Sl. 8	Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, redgreen, Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe		
SEC T1: Biofertilisers			
Unit 1	General account about the microbes used as biofertilizer	Dr. Bandana Pradhan	04
Unit 2	*Azospirillum:* isolation and mass multiplication		08
Unit 3	Cyanobacteria (blue green algae),		04
Unit 4	Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution,		08
Unit 5	Organic farming		06

B.Sc. Semester-IV (Hons.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
Core T8: Molecular Biology			
Unit 1	Nucleic acids: Carriers of genetic information	Mr. Animesh Karmakar	04
Unit 2	The Structures of DNA and RNA / Genetic Material		10
Unit 3	The replication of DNA	Mr. Arup Karmakar	10
Unit 4	Central dogma and genetic code		02

Unit 5	Transcription		18
Unit 6	Processing and modification of RNA		08
Unit 7	Translation	Mr. Animesh Karmakar	08
Core P8: Molecular Biology			
Sl. 1	Preparation of LB medium and raising *E.Coli*	Mr. Arup Karmakar	
Sl. 2	Demonstration of isolation of genomic DNA from E.Coli.		
Sl. 3	DNA estimation by diphenylamine reagent/UV Spectrophotometry.		
Sl. 4	Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).		
Sl. 5	Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).		
Sl. 6	Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)		
Sl. 7	Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing.		
Core T9: Plant Ecology and Phytogeography			
Unit 1	Introduction	Dr. Debjyoti Das	04
Unit 2	Soil		08
Unit 3	Water		04
Unit 4	Light, temperature, wind and fire		06
Unit 5	Biotic interactions		02
Unit 6	Population ecology		04
Unit 7	Plant communities		08
Unit 8	Ecosystems		04
Unit 9	Functional aspects of ecosystem		08
Unit 10	Phytogeography		12
Core P9 : Plant Ecology and Phytogeography			
Sl. 1	Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.	Dr. Debjyoti Das	
Sl. 2	Determination of pH of various soil and water samples (pH meter and pH paper)		
Sl. 3	Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests		
Sl. 4	Determination of dissolved oxygen of water samples from polluted and unpolluted sources.		
Sl. 5	Ecological adaptations of some species: Ipomoea		

	aquatica stem, Phyllode of Acaccia auriculiformis, Nerium leaf and Vanda root.		
Sl. 6	Determination of minimal quadrat size for the study of Sl. herbaceous vegetation in the collegecampus, by species area curve method (species to be listed)		
Sl. 7	Quantitative analysis of herbaceous vegetation in the college campus for frequency andcomparison with Raunkiaer's frequency distribution law.		
Sl. 8	Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.		
Core T10: Plant Systematics			
Unit 1	Significance of Plant systematics	Dr. Bandana Pradhan	10
Unit 2	Taxonomic hierarchy		04
Unit 3	Botanical nomenclature		08
Unit 4	Systems of classification		10
Unit 5	Biometrics, numerical taxonomy and cladistics		08
Unit 6	Phylogeny of Angiosperms		10
Unit 7	Salient features of the following families……		10
Core P10: Plant Systematics			
Sl. 1	Families: Brassicaceae, Malvaceae, Fabaceae, Apiaceae , Apocynaceae, Asclepiadaceae Asteraceae, Solanaceae, Scrophulariaceae,	Dr. Bandana Pradhan	
Sl. 1	Lamiaceae,Verbenaceae,. Acanthaceae, Rubiaceae, Cucurbitaceae, Euphorbiaceae, Poaceae , Orchidaceae	Mr. Animesh Karmakar	
SEC T2: Mushroom Culture Technology			
Unit 1	Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms .Types of edible mushrooms available in India *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*	Dr. Bandana Pradhan	05
Unit 2	Cultivation Technology		12
Unit 3	Storage and nutrition	Dr. Ranjan Ghosh	08
Unit 4	Food Preparation	Dr. Bandana Pradhan	05

B.Sc. Semester-V (Hons.)			
CoreT11: Reproductive Biology of Angiosperms			
Unit 1	Introduction of Reproductive Biology	Dr. Debjyoti Das	04
Unit 2	Reproductive development		06
Unit 3	Anther and pollen biology		10
Unit 4	Ovule	Dr. Ranjan Ghosh	10
Unit 5	Pollination and fertilization		06
Unit 6	Self incompatibility		10
Unit 7	Embryo, Endosperm and Seed		10

Unit 8	Polyembryony and apomixis		06
Core P11: Reproductive Biology of Angiosperms			
Sl. 1	Anther	Dr. Debjyoti Das	
Sl. 2	Pollen grains		
Sl. 3	Ovule	Dr. Ranjan Ghosh	
Sl. 4	Female gametophyte through permanent slides/ photographs		
Sl. 5	Intra-ovarian pollination; Test tube pollination through photographs		
Sl. 6	Endosperm		
Sl. 7	Embryogenesis		
Core T12: Plant Physiology			
Unit 1	Plant-water relations	Mr. Samir Jana	10
Unit 2	Mineral nutrition		08
Unit 3	Nutrient Uptake		08
Unit 4	Translocation in the phloem		08
Unit 5	Plant growth regulators	Mr. Arup Karmakar	14
Unit 6	Physiology of flowering		06
Unit 7	Phytochrome , crytochromes and phototropins		06
Core P12: Plant Physiology			
Sl. 1	Determination of isotonic concentration and osmotic pressure of plant cell sap by plasmolytic method.	Mr. Samir Jana	
Sl. 2	Determination of water potential of given tissue (potato tuber) by weight method.		
Sl. 3	Study of the effect of humidity and light on the rate of transpiration in excised twig/leaf		
Sl. 4	Determination of water absorption, retention and transpiration.		
Sl. 5	Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte		
Sl. 6	To study the phenomenon of seed germination (effect of light).		
Sl. 7	To study the effect of different concentrations of IAA on *Avena* coleoptile elongation (IAA Bioassay).		
Sl. 8	To study the induction of amylase activity in germinating barley grains.		
DSE T1: Natural Resource Management			
Unit 1	Natural resources	Dr. Bandana Pradhan	02
Unit 2	Sustainable utilization		08

Unit 5	Biological Resources		12
Unit 6	Forests		60
Unit 7	Energy		06
Unit 8	Contemporary practices in resource management		08
Unit 9	National and international efforts in resource management and conservation		04
Unit 3	Land		08
Unit 4	Water		08
DSE P1: Natural Resource Management			
Sl. 1	Estimation of solid waste generated by a domestic system (biodegradable and non biodegradable) and its impact on land degradation.	Dr. Bandana Pradhan	
Sl. 2	Collection of data on forest cover of specific area.		
Sl. 3	Measurement of dominance of woody species by DBH (diameter at breast height) method.		
Sl. 4	Calculation and analysis of ecological footprint		
Sl. 5	Ecological modeling.		
DSE T2: Plant Breeding			
Unit 1	Plant Breeding	Mr. Animesh Karmakar	10
Unit 2	Methods of crop improvement		20
Unit 3	Quantitative inheritance		10
Unit 4	Inbreeding depression and heterosis		10
Unit 5	Crop improvement and breeding		10

B.Sc. Semester-VI (Hons.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
Core T13:Plant Metabolism			
Unit 1	Concept of metabolism	Mr. Samir Jana	06
Unit 2	Carbon assimilation		14
Unit 3	Carbohydrate metabolism		02
Unit 4	Carbon Oxidation		10
Unit 5	ATP-Synthesis		08
Unit 6	Lipid metabolism	Mr. Arup Karmakar	08
Unit 7	Nitrogen metabolism		08
Unit 8	Mechanisms of signal transduction		04
Core P13: Plant Metabolism			
Sl. 1	Preparation of molar, molal & normal solution	Mr. Samir Jana	
Sl. 2	Chromatographic separation of photosynthetic pigments.		
Sl. 3	Experimental demonstration of Hill's reaction.		
Sl. 4	To study the effect of light intensity on the rate of photosynthesis.		
Sl. 5	Effect of carbon dioxide on the rate of photosynthesis.		

Sl. 6	To compare the rate of respiration in different parts of a plant.		
Sl. 7	RQ of different respiratory substrate of germinating seeds.		
Sl. 8	Seed Viability Test by TTC.		
Sl. 9	Demonstration of absorption spectrum of photosynthetic pigments.		
Core T14: Plant Biotechnology			
Unit 1	Plant Tissue Culture	Dr. Bandana Pradhan	16
Unit 2	Recombinant DNA technology	Mr. Arup Karmakar	12
Unit 3	Gene Cloning		10
Unit 4	Methods of gene transfer		08
Unit 5	Applications of Biotechnology	Dr. Ranjan Ghosh	14
Core P14: Plant Biotechnology			
Sl. 1	(a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc	Mr. Arup Karmakar	
Sl. 2	Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.		
Sl. 3	Construction of restriction map of circular and linear DNA from the data provided.		
Sl. 4	Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.		
Sl. 5	Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs.		
Sl. 6	Isolation of plasmid DNA.		
Sl. 7	Restriction digestion and gel electrophoresis of plasmid DNA.		
DSE T3: Industrial & Environmental Microbiology			
Unit 1	Scope of microbes in industry and environment	Dr. Ranjan Ghosh	06
Unit 2	Bioreactors/Fermenters and fermentation processes		12
Unit 3	Microbial production of industrial products		12
Unit 4	Microbial enzymes of industrial interest and enzyme immobilization		08
Unit 5	Microbes and quality of environment	Dr. Debjyoti Das	06
Unit 6	Microbial flora of water		08
Unit 7	Microbes in agriculture and remediation of contaminated soils		08
DSE P3: Industrial & Environmental Microbiology			
Sl. 1	Principles and functioning of instruments in microbiology laboratory	Dr. Ranjan Ghosh	
Sl. 2	Hands on sterilization techniques and preparation of culture media.	Dr. Debjyoti Das	

DSE T4: Research Methodology			
Unit 1	Basic concepts of research	Dr. Debjyoti Das	10
Unit 2	General laboratory practices	Mr. Samir Jana	12
Unit 3	Data collection and documentation of observations	Mr. Animesh Karmakar	06
Unit 4	Overview of Biological Problems	Dr. Debjyoti Das	06
Unit 5	Methods to study plant cell/tissue structure	Dr. Bandana Pradhan	06
Unit 6	Plant microtechniques	Dr. Ranjan Ghosh	12
Unit 7	The art of scientific writing and its presentation	Mr. Arup Karmakar	08
DSE P4: Research Methodology			
Sl. 1	Experiments based on chemical calculations.	Mr. Samir Jana	
Sl. 2	Plant microtechnique experiments.	Dr. Ranjan Ghosh	
Sl. 3	The art of imaging of samples through microphotography and field photography.	Mr. Animesh Karmakar	
Sl. 4	Poster presentation on defined topics.	Mr. Arup Karmakar	
Sl. 5	Technical writing on topics assigned.	All Teachers	

Module for B.Sc. Botany (Hons.) Generic Elective, 2021-2022

B.Sc. Semester-I (GE)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1A T1: Plant Biodiversity [Microbes, Algae, Fungi, Archegoniate			
Unit 1	Microbes	Mr. Arup Karmakar	04
Unit 2	Algae	Dr. Debjyoti Das	04
Unit 3	Fungi	Dr. Ranjan Ghosh	04
Unit 4	Introduction to Archegoniate	Dr. Bandana Pradhan	05
Unit 5	Bryophytes		02
Unit 6	Pteridophytes	Dr. Debjyoti Das	04
Unit 7	Gymnosperms	Mr. Animesh Karmakar	04
CC-1A P1: Plant Biodiversity [Microbes, Algae, Fungi, Archegoniate]			
Sl. 1	EMs/Models of viruses	Dr. Ranjan Ghosh	
Sl. 2	Types of Bacteria from temporary/permanent slides/photographs		
Sl. 3	Gram staining & simple staining process		
Sl. 4	Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs), *Oedogonium, Oscillatoria,* through temporary preparations and *Fucus & Polysiphonia* - Specimen and permanent slides	Dr. Debjyoti Das	
Sl. 5	*Rhizopus and Penicillium*	Dr. Ranjan Ghosh	
Sl. 6	*Alternaria*		
Sl. 7	*Puccinia*		
Sl. 8	*Agaricus*		
Sl. 9	Lichens		
Sl. 10	Mycorrhiza		
Sl. 11	*Marchantia*	Dr. Bandana Pradhan	
Sl. 12	*Funaria*		
Sl. 13	*Selaginella*	Dr. Debjyoti Das	
Sl. 14	*Pteris*		
Sl. 15	*Cycas*	Mr. Animesh Karmakar	
Sl. 16	*Pinus*		

B.Sc. Semester-II (GE)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1B T2: Plant Ecology, Morphology & Taxonomy			
Unit 1	Introduction	Dr. Debjyoti Das	02
Unit 2	Ecological factors		10
Unit 3	Plant communities		06
Unit 4	Ecosystem		08
Unit 5	Phytogeography		04
Unit 6	Morphology	Mr. Animesh Karmakar	04
Unit 7	Introduction to plant taxonomy		02
Unit 8	Identification		04
Unit 9	Taxonomic Evidences		05
Unit 10	Taxonomic hierarchy	Dr. Bandana Pradhan	02
Unit 11	Botanical nomenclature		05
Unit 12	Classification		04
Unit 13	Workout		04
CC-1B P2: Plant Ecology, Morphology & Taxonomy			
Sl. 1	Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.	Dr. Debjyoti Das	
Sl. 2	Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.		
Sl. 3	Ecological adaptations of some species: *Ipomoea aquatica* stem, *Nerium* leaf and *Vanda* root.		
Sl. 4	Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)		
Sl. 5	Quantitative analysis of herbaceous vegetation in the		
Sl. 6	Study of vegetative and floral characters of the following families……	Mr. Animesh Karmakar	

B.Sc. Semester-III (GE)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1C T3 - Genetics and Plant Breeding			
Unit 1	Heredity	Mr. Animesh Karmakar	20
Unit 2	Sex-determination and Sex-linked Inheritance		04
Unit 3	Linkage and Crossing overm		08
Unit 4	Mutations and Chromosomal Aberrations		06
Unit 5	Plant Breeding	Mr. Arup Karmakar	04
Unit 6	Methods of crop improvement		10

Unit 7	Inbreeding depression and heterosis		04
Unit 8	Crop improvement and breeding		04
CC-1C P3 Genetics and Plant Breeding			
Sl. 1	Mendel's laws through seed ratios. Laboratory exercises in probability and chi- square.	Mr. Animesh Karmakar	
Sl. 2	Incomplete dominance and gene interaction through seed ratios (9:7, 12:3:1,).		
Sl. 3	Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs		
Sl. 4	Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge		
Sl. 5	Hybridization techniques - Emasculation, Bagging (For demonstration only).	Mr. Arup Karmakar	
Sl. 6	Induction of polyploidy conditions in plants (For demonstration only).		

B.Sc. Semester-IV (GE)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
DSE-1D T4: Plant Physiology & Metabolism			
Unit 1	Plant-water relations	Mr. Samir Jana	08
Unit 2	Mineral nutrition		08
Unit 3	Translocation in phloem		06
Unit 4	Photosynthesis		12
Unit 5	Respiration		06
Unit 6	Enzymes		04
Unit 7	Nitrogen metabolism		04
Unit 8	Plant growth regulators		06
Unit 9	Plant response to light and temperature		06
DSC-1D P4: Plant Physiology & Metabolism			
Sl. 1	Determination of osmotic potential of plant cell sap by plasmolytic method.	Mr. Samir Jana	
Sl. 2	To study the effect of two environmental factors (light and humidity) on transpiration by excised twig.		
Sl. 3	Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.		
Sl. 4	Demonstration of Hill reaction.		
Sl. 5	To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.		
Sl. 6	Comparison of the rate of respiration in any two parts of a plant.		

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B.Sc. Semester-I (Prog.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1A T1: Plant Biodiversity [Microbes, Algae, Fungi, Archegoniate			
Unit 1	Microbes	Mr. Arup Karmakar	04
Unit 2	Algae	Dr. Debjyoti Das	04
Unit 3	Fungi	Dr. Ranjan Ghosh	04
Unit 4	Introduction to Archegoniate	Dr. Bandana Pradhan	05
Unit 5	Bryophytes		02
Unit 6	Pteridophytes	Dr. Debjyoti Das	04
Unit 7	Gymnosperms	Mr. Animesh Karmakar	04
CC-1A P1: Plant Biodiversity [Microbes, Algae, Fungi, Archegoniate]			
Sl. 1	EMs/Models of viruses	Dr. Ranjan Ghosh	
Sl. 2	Types of Bacteria from temporary/permanent slides/photographs		
Sl. 3	Gram staining & simple staining process		
Sl. 4	Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs), *Oedogonium, Oscillatoria,* through temporary preparations and *Fucus & Polysiphonia* - Specimen and permanent slides	Dr. Debjyoti Das	
Sl. 5	*Rhizopus and Penicillium*	Dr. Ranjan Ghosh	
Sl. 6	*Alternaria*		
Sl. 7	*Puccinia*		
Sl. 8	*Agaricus*		
Sl. 9	Lichens		
Sl. 10	Mycorrhiza		
Sl. 11	*Marchantia*	Dr. Bandana Pradhan	
Sl. 12	*Funaria*		
Sl. 13	*Selaginella*	Dr. Debjyoti Das	
Sl. 14	*Pteris*		
Sl. 15	*Cycas*	Mr. Animesh Karmakar	
Sl. 16	*Pinus*		

B.Sc. Semester-II (Prog.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1B T2: Plant Ecology, Morphology & Taxonomy			
Unit 1	Introduction	Dr. Debjyoti Das	02
Unit 2	Ecological factors		10
Unit 3	Plant communities		06
Unit 4	Ecosystem		08
Unit 5	Phytogeography		04
Unit 6	Morphology	Mr. Animesh Karmakar	04
Unit 7	Introduction to plant taxonomy		02
Unit 8	Identification		04
Unit 9			05
Unit 10	Taxonomic hierarchy	Dr. Bandana Pradhan	02
Unit 11	Botanical nomenclature		05
Unit 12	Classification		04
Unit 13	Workout		04
CC-1B P2: Plant Ecology, Morphology & Taxonomy			
Sl. 1	Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.	Dr. Debjyoti Das	
Sl. 2	Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.		
Sl. 3	Ecological adaptations of some species: *Ipomoea aquatica* stem, *Nerium* leaf and *Vanda* root.		
Sl. 4	Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)		
Sl. 5	Quantitative analysis of herbaceous vegetation in the		
Sl. 6	Study of vegetative and floral characters of the following families……	Mr. Animesh Karmakar	

B.Sc. Semester-III (Prog.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
CC-1C T3 - Genetics and Plant Breeding			
Unit 1	Heredity	Mr. Animesh Karmakar	20
Unit 2	Sex-determination and Sex-linked Inheritance		04
Unit 3	Linkage and Crossing overm		08
Unit 4	Mutations and Chromosomal Aberrations		06
Unit 5	Plant Breeding	Mr. Arup Karmakar	04
Unit 6	Methods of crop improvement		10

Unit 7	Inbreeding depression and heterosis		04
Unit 8	Crop improvement and breeding		04
CC-1C P3 Genetics and Plant Breeding			
Sl. 1	Mendel's laws through seed ratios. Laboratory exercises in probability and chi- square.	Mr. Animesh Karmakar	
Sl. 2	Incomplete dominance and gene interaction through seed ratios (9:7, 12:3:1,).		
Sl. 3	Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs		
Sl. 4	Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge		
Sl. 5	Hybridization techniques - Emasculation, Bagging (For demonstration only).	Mr. Arup Karmakar	
Sl. 6	Induction of polyploidy conditions in plants (For demonstration only).		
SEC T1 Biofertilizers			
Unit 1	General account about the microbes used as biofertilizer	Dr. Bandana Pradhan	04
Unit 2	*Azospirillum:* isolation and mass multiplication		08
Unit 3	Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation		04
Unit 4	Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield		08
Unit 5	Organic farming		06

B.Sc. Semester-IV (Prog.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
DSE-1D T4: Plant Physiology & Metabolism			
Unit 1	Plant-water relations	Mr. Arup Karmakar	08
Unit 2	Mineral nutrition		08
Unit 3	Translocation in phloem		06
Unit 4	Photosynthesis		12
Unit 5	Respiration		06
Unit 6	Enzymes		04
Unit 7	Nitrogen metabolism		04
Unit 8	Plant growth regulators		06
Unit 9	Plant response to light and temperature		06
DSC-1D P4: Plant Physiology & Metabolism			

Sl. 1	Determination of osmotic potential of plant cell sap by plasmolytic method.	Mr. Samir Jana	
Sl. 2	To study the effect of two environmental factors (light and humidity) on transpiration by excised twig.		
Sl. 3	Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.		
Sl. 4	Demonstration of Hill reaction.		
Sl. 5	To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.		
Sl. 6	Comparison of the rate of respiration in any two parts of a plant.		
SEC-2 (Theory): Nursery & Gardening			
Unit 1	Nursery	Mr. Animesh Karmakar	04
Unit 2	Seed		06
Unit 3	Vegetative Propagation	Dr. Bandana Pradhan	06
Unit 4	Gardening		08
Unit 5	Sowing/raising of seeds and seddlings		06

B.Sc. Semester-V (Prog.)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
DSE T1 Cell and Molecular Biology			
Unit 1	Techniques in Biology	Mr. Arup Karmakar	08
Unit 2	Cell as a unit of Life		02
Unit 3	Cell Organelles		20
Unit 4	Cell Membrane and CellWall		06
Unit 5	Cell Cycle		06
Unit 6	Genetic material		06
Unit 7	Transcription (Prokaryotes and Eukaryotes)		06
Unit 8	Regulation of gene expression		06
DSE P1 Cell and Molecular Biology			
Sl. 1	To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs	Mr. Arup Karmakar	
Sl. 2	Study of the photomicrographs of cell organelles		
Sl. 3	To study the structure of plant cell through temporarymounts.		
Sl. 7	Study of plasmolysis and deplasmolysis on *Rhoeo* leaf.		
Sl. 8	Measure the cell size (either length or breadth/diameter) bymicrometry.		

Sl. 6	Demonstration of dialysis of starch and simple sugar.		
Sl. 4	Study ofmitosis andmeiosis (temporarymounts and permanent slides).		
Sl. 5	Study the effect of temperature, organic solvent on semi permeablemembrane		
Sl. 9	Study the structure of nuclear pore complex by photograph (from Gerald Karp)Study of special chromosomes (polytene&lampbrush) either by slides or photographs.		
Sl. 10	StudyDNApackaging bymicrographs		
Sl. 11	Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome		
SEC T5 Medicinal Botany			
Unit 1	History, Scope and Importance of Medicinal Plants.	Dr. Bandana Pradhan	10
Unit 2	Conservation of endangered and endemic medicinal plants.		10
Unit 3	Ethnobotany and Folk medicines		10

B.Sc. Semester-VI (Programme)			
Unit	**Topic**	**Name of the Teachers**	**No. of Lectures**
DSE-1B (Theory): Economic Botany and Biotechnology			
Unit 1	Origin of Cultivated Plants	Dr. Ranjan Ghosh	04
Unit 2	Cereals		04
Unit 3	Legumes		06
Unit 4	Spices		06
Unit 5	Beverages		04
Unit 6	Oils and Fats		04
Unit 7	Fibre Yielding Plants		04
Unit 8	Introduction to biotechnology	Dr. Debjyoti Das	02
Unit 9	Plant tissue culture		08
Unit 10	Recombinant DNA Techniques	Dr. Ranjan Ghosh	18
DSE-1B (Practical): Economic Botany and Biotechnology			
Sl. 1	Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton,Groundnut through specimens, sections andmicrochemical tests	Dr. Ranjan Ghosh	
S. 2	Familiarizationwith basic equipments in tissue culture.		
Sl. 3	Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryoculture;micropropagation.		
Sl. 4	Study ofmolecular techniques: PCR, Blotting techniques,AGE and PAGE.		

SEC-4: (Theory): Mushroom Culture Technology			
Unit 1	Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*.	Dr. Bandana Pradhan	05
Unit 2	Cultivation Technology		12
Unit 3	Storage and nutrition		08
Unit 4	Food Preparation		05