

LESSON PLAN SUBJECT: BOTANY (Theory) SEMESTER- 6, PAPER: BOTN6011 - Botany (Theo): PLANT PHYSIOLOGY		
Unit	TOPIC	Teacher
Unit 1	Plant-water relations: Concept of water potential, Mechanism of water absorption by roots, symplastic and apoplastic movement and aquaporins, root pressure, ascent of sap, mechanism of transpiration, role of blue light in transpiration	Dr. Jiban Kumar Pal
Unit 2	Mineral nutrition: Beneficial elements and their physiological role, macro- and microelements, criteria for essentiality, chelating agents, phytosiderophores, mineral nutrition in hydroponics and aeroponics.	Dr. Jiban Kumar Pal
Unit 3	Physiology of nutrient uptake transport: Transport of ions across cell membrane, passive absorption, simple and facilitated diffusion (carrier and channel proteins), Fick's law, active absorption, proton ATPase pump, electrochemical gradient, ion flux, uniport, co-transport (symport, antiport).	Dr. Jiban Kumar Pal
Unit 4	Physiology of translocation: Phloem translocation, Composition of phloem sap, phloem loading and unloading, Pressure-Flow Model.	Dr. Jiban Kumar Pal
Unit 5	Crop physiology: Physiological basis of crop yield, Source-sink relationship, Ideal plant type (basic concept).	Dr. Sk Aftabul Alam
Unit 6	Hormone physiology: Hormones & Plant growth regulators, Chemical nature (basic structure, precursor) and physiological roles of Auxins, Gibberellins, Cytokinins, Absciscic Acid, Ethylene, Jasmonic Acid and Polyamines.	Dr. Sk Aftabul Alam
Unit 7	Photo-physiology & Physiology of photo-sensory molecules - Photosynthesis <i>vis-à-vis</i> photomorphogenesis (overview), Discovery, chemical nature, mode of action and role of phytochrome, cryptochrome and phototropin; Physiological roles of phytochrome and phototropins.	Dr. Sk Aftabul Alam
Unit 8	Physiology of flowering: Understanding flowering as signaling processes; photoperiodism, CO-FT Model of flowering, vernalization.	Dr. Sk Aftabul Alam
Unit 9	Seed physiology: Seed dormancy -causes and methods to induce and/or overcome dormancy, seed viability and aging, artificial seed.	Dr. Sk Aftabul Alam
Unit 10	Plant system biology: general concept and application.	Dr. Sk Aftabul Alam

LESSON PLAN SUBJECT: BOTANY (Practical) SEMESTER- 6, PAPER: BOTN6011-Botany (Practical), PLANT PHYSIOLOGY		
Sl. No.	TOPIC	Teacher
1	Determination of osmotic potential of plant cell sap by plasmolytic method.	Dr. Jiban Kumar Pal
2	Determination of water potential of potato tuber cells by falling drop method	Dr. Jiban Kumar Pal
3	Comparisons of stomatal index and stomatal frequency from the lower surface of leaves of a mesophyte and a xerophyte.	Dr. Sk Aftabul Alam
4	To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and a xerophyte (lower surface)	Dr. Sk Aftabul Alam
5	To study the effect of different concentrations of ABA on stomatal closure.	Dr. Sk Aftabul Alam
6	To study the effect of light and darkness on seed germination	Dr. Jiban Kumar Pal
7	To study the effect of ethylene on fruit ripening.	Dr. Jiban Kumar Pal
8	To study the effect of auxin and salicylic acid on rooting.	Dr. Jiban Kumar Pal
9	To compare the status of seed aging by a standard biochemical process. (TTC method).	Dr. Sk Aftabul Alam

LESSON PLAN SUBJECT: BOTANY (Theory) SEMESTER- 6, PAPER: BOTN6012 - Botany (Theo): METABOLISM		
Unit	TOPIC	Teacher
Unit 1	Enzymology: Enzymes Classification (IUBMB); Structure and properties of enzymes; mechanism of enzyme catalysis kinetics and enzyme inhibition, allosteric enzyme, isozymes.	Dr. Sk Aftabul Alam
Unit 2	Photosynthetic metabolism: Chemistry of photosynthetic pigments (chlorophyll a and chlorophyll b, xanthophyll, carotene), Z-scheme of photosynthesis and light trapping mechanisms and consequences, Metabolism of C3 pathway, Synthesis and degradation of sucrose and starch, Metabolism of C4 and CAM pathways and their significance (no chemical structures), Metabolism of C2 pathway and its role. Metabolite pool and exchange of metabolites.	Dr. Sk Aftabul Alam
Unit 3	Respiratory metabolism: Glycolysis, TCA cycle, ETC, Basic differences in animal and plant respiration, Cyanide resistant respiration (Basic concept).	Sujit Pal
Unit 4	Nitrogen metabolism: Chemistry of Biological nitrogen fixation in legumes (nodulation and role of dinitrogenase), Nitrate assimilation (NR and NiR), Ammonia assimilation: GS-GOGAT pathway, Reductive amination and transamination.	Sujit Pal
Unit 5	Stress responses: Abiotic and biotic stresses (types); Plant responses to drought; ROS, RNS and their physiological role.	Dr. Majusha Sarkar
Unit 6	Plant cell signalling: Basic concept, Receptors and their basic types, basic modules of plant signal transduction and response.	Dr. Majusha Sarkar
Unit 7	Secondary metabolism & Plant defence chemicals: Major types, chemistry and formation of major defence chemicals (secondary metabolites); physiological roles of defence chemicals.	Dr. Majusha Sarkar
Unit 8	Plant metabolomics: General concept and its applications.	Dr. Majusha Sarkar

LESSON PLAN SUBJECT: BOTANY (Practical) SEMESTER- 6, PAPER: BOTN6012 - Botany (Practical): METABOLISM		
Sl. No.	TOPIC	Teacher
1	To Study Hill's reaction.	Dr. Sk Aftabul Alam
2	To study the effect of light intensity on O ₂ evolution during photosynthesis.	Dr. Sk Aftabul Alam
3	To study the activity of catalase	Dr. Majusha Sarkar
4	To study induction of alpha-amylase activity in germinating barley grains.	Dr. Majusha Sarkar
5	To study the effect of temperature and pH on the activity of enzyme (catalase).	Dr. Majusha Sarkar
6	To separate amino acids by paper chromatography.	Dr. Majusha Sarkar
7	To study the delay of senescence by cytokinins.	Sujit Pal
8	To study germination of photoblastic and non-photoblastic seeds	Sujit Pal
9	To compare Respiratory Quotient (RQ) of germinating starchy, fatty and proteinaceous seeds.	Sujit Pal

LESSON PLAN
SUBJECT: BOTANY (Theory)
SEMESTER- 6, PAPER: BOTN6013 - Botany (Theo): Ecology

Unit	TOPIC	Teacher
Unit 1	Basic concepts and definitions: ecology, landscape, habitat, ecozones, biosphere, ecosystems, ecosystem stability, resistance and resilience; autecology; synecology; major terrestrial biomes.	Sujit Pal
Unit 2	Ecological amplitude; Liebig's Law of the Minimum; Shelford's Law of Tolerance; phenotypic plasticity; ecotypes; ecoclines; acclimation; ecological niche; types of niches: fundamental niche, realized niche; niche breadth; niche partitioning; niche differentiation.	Sujit Pal
Unit 3	Concept of population; characteristics of population: density, dispersion, natality, mortality, phenology, density-dependence; population dynamics (concept only).	Sujit Pal
Unit 4	Community structure and organization: physiognomy, species associations, biomass, stability, keystone species, ecotone and edge effect. Species interactions: mutualism, commensalism, amensalism, predation, competition, parasitism, mimicry, herbivory. Ecological succession: Concept of pioneer species, seral stages and climax community: primary and secondary successions with examples, models and types of successions.	Subir Samanta
Unit 5	Ecosystem types, structure and function; ecosystem productivity and models of energy flow; food chain, food web; grazing and detritus pathway of energy flow; ecological pyramids: pyramids of number, biomass, and energy.	Subir Samanta
Unit 6	Carbon cycle; nitrogen cycle; hydrological cycle; nutrient cycle models, retranslocation; biotic accumulation; ecosystem losses; nutrient supply and uptake; decomposition and nutrient release; nutrient budget, Carbon budget and nutrient conservation strategies.	Subir Samanta
Unit 7	Concept of exotic and invasive plants; characteristics of invaders; stages of invasion; mechanisms of invasions; invasive pathways; impacts of invasion on ecosystem and communities; economic costs of biological invasions.	Dr. Sayani Biswas
Unit 8	Biodiversity- concept, types, threats; Conservation- Types; Biodiversity treaties (CBD, CITES, Ramsar Convention), Rio summit, Kyoto Protocol; Mega-diversity countries, Global organization for Biodiversity Conservation: IUCN, TRAFFIC, WWF- activities.	Dr. Sayani Biswas
Unit 9	Concept, types (Air pollution, Water Pollution, Noise pollution), pollutants and their effects on plants and agriculture. Green house effects, Global warming, Ozone layer depletion, Sea level rise.	Dr. Sayani Biswas

LESSON PLAN
SUBJECT: BOTANY (Practical)
SEMESTER- 6, PAPER: BOTN6013 - Botany (Practical): Ecology

Sl. No.	TOPIC	Teacher
1	Determination of minimum area of a quadrat in a herbaceous plant community by species area curve	Dr. Sayani Biswas
2	Determination of relative frequency and relative density of a herbaceous plant community	Subir Samanta
3	Measurement of temperature, turbidity/penetration of light, determination of pH, salinity and Dissolved Oxygen content (Winkler's method)	Sujit Pal
4	Determination of different plant life forms following Raunkiaer's concept.	Subir Samanta

LESSON PLAN SUBJECT: BOTANY (Theory) SEMESTER- 6, PAPER: BOTN6014 - Botany (Theo): PLANT SYSTEMATICS		
Unit	TOPIC	Teacher
Unit 1	Concept of Taxonomy, Systematics and Biosystematics; Contribution in Taxonomy by Parasara, Charaka, Theophrastus, Linnaeus, Adanson, de Candolle, Bessey and M.W. Chase. Contribution of W. Roxburgh, N. Wallich Indian and J.D. Hooker in Plant Taxonomy.	Dr. Manjusha Sarkar
Unit 2	Field inventory, Herbarium Techniques, Roles of Herbarium and Virtual Herbarium in Plant Taxonomy, Important herbaria and botanic gardens of the world and India; E-flora; traditional taxonomic literature (Floras, Manuals, Icones, Monographs, Revisions, Journals); Cybertaxonomy of the world related to plant identification; Authentication of unknown specimens.	Dr. Manjusha Sarkar
Unit 3	Evidence from Cytology (Cytotaxonomy), Phytochemistry (Chemotaxonomy) [Alkaloids, Phenolics, Glycosides, (in brief)] and molecular data (Molecular Taxonomy) (cp. DNA, mtDNA, nuclear DNA, PCR amplification, sequence data analysis); Palynology, with examples from each on application in resolving taxonomic problems.	Dr. Manjusha Sarkar
Unit 4	Principles and rules of ICN/ICBN; Major Articles; Ranks and names of the Taxa; Principle of priority and its limitations; Concept of Nomenclatural Type and typification, Author citation, Valid publication, Rejection of names; Nomenclature of cultivated plants (ICNCP); Nomenclature of hybrids (Nothotaxa).	Dr. Manjusha Sarkar
Unit 5	Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological & evolutionary)	Dr. Sayani Biswas
Unit 6	Classifications - Bentham and Hooker's (up to series with characters), Cronquist's system of classification (upto sub-class) and Angiosperm Phylogeny Group (APG IV) classification (major clades).	Dr. Sayani Biswas
Unit 7	Terms and concepts (apomorphy and plesiomorphy, homology and analogy, parallelism and convergence, monophyly, paraphyly, polyphyly; Major clades and ANA grades).	Dr. Sayani Biswas
Unit 8	Principles, Methodology, Unit characters (Characters and character states); OTUs, Character weighing and Coding; Cluster analysis; Phenogram analysis	Dr. Sayani Biswas
Unit 9	Principles, Methodology, Morphocline; EUs, Character weighing and Coding; Monophyly determination, Cladogram.	Dr. Sayani Biswas
Unit 10	Theories of Angiosperm evolution (Euanthial theory and Pseudanthial theory)	Dr. Jiban Kumar

LESSON PLAN SUBJECT: BOTANY (Practical) SEMESTER- 6, PAPER: BOTN6014 - Botany (Practical): PLANT SYSTEMATICS		
Sl. No.	TOPIC	Teacher
1	Field trips in different Phytogeographical regions and/ or Visit to any herbaria and/ or Botanical Garden	Dr. Manjusha Sarkar + Dr. Sayani Biswas
2	Description of taxa using Botanical terms as much as possible and identification of the families/natural orders according to Bentham and Hooker's classification and compare the placement of family with APG IV System (Only placement of family according to APG IV system to be mentioned)	