Core Course

LS 453—PLANT PHYSIOLOGY [3 credits]

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S No	Topic	Contact Hours
1.	Water relations: Properties of water, Properties of solutions, Cell water potential, Soil-plant-atmosphere continuum	
2.	Photosynthesis: Light absorption, emission, energy transfer, Z-scheme of photosynthesis, electron transfer, photo-phosphorylation, Co2 fixation, C2, C4, CAM plants, Environment and its impact on photosynthesis	
3.	Respiration: Complex-I, complex-II, complex-III, complex-IV, structure and function Oxidative phosphorylation, Cyanide-resistant respiration	
4.	Photo-morphogenesis: Phytochromes, Crypto Chromes, photo-morphogenesis	
5.	Transport processes in plant: Active and passive transport systems, ion channels, driving forces and flow, transport of nutrients across the primary root, transport through sieve element, transport of metabolites from the source to the sink, genetic regulation of transport systems in response to nutrients availability and growth status	
6.	Mineral nutrition and assimilations of inorganic nutrients: Plant microrrhiza association, nitrogen metabolism, sulfur metabolism, phosphate metabolism, calcium metabolism, assimilation of cations, chloride dynamics	
7.	Lipid metabolism in plants: Fatty acid biosynthesis, membrane lipid biosynthesis, lipid desaturation, triacylglycerols, complex lipids, cell wall lipids, alkaloids, ceramides	
8.	Plant Hormones: Introduction and concept, types of growth regulators Auxin: the master growth hormone, Avena coleoptiles bioassay, discovery of auxin, distribution in plants, roles, how auxin works? auxin mutants, auxin perception, auxin binding proteins, signal transduction, auxin-responsive genes/promoters/factors. Model for gene regulation, de-repression of early auxin genes, Acid theory, polar auxintransport-achem.-iosmotic model, commercial uses of auxin	
9.	Gibberellins: Foolish seedling disease, functions of Gas, location, freevs conjugated Gas, how GA works? signal transduction and mechanism of action of Gas taking a-amylase as an example, commercial applications	

10.	Cytokinins: location, functions and mechanism of action, commercial applications	
11.	Ethylene: discovery, locations and functions, mutants, mechanism of actions, applications	
12.	Abscisic acid: a natural stress hormone, discovery, location, functions mutants- VP1, ABA and ABI, mechanism of action	
13.	Programmed cell death: hypersensitive response, functions, relevance with diseases, apoptosis, Caspases, Importance of PCD in plant development, role of PCD, model of PCD	

Suggested reading:

Concerned literature will be given by individual faculty member.