

**COURSE OUTCOME
BOTANY DEPARTMENT
NORTH LAKHIMPUR COLLEGE (AUTONOMOUS)**

Semester	Course	Code of Paper	Title of Paper	Course Outcome
I	Core Course I	Theory BOT-CC-T4-101	Phycology and Microbiology	<p>Unit 1-Introduction to microbial world: Gives an idea of microbial nutrition, growth, metabolism and economic importance.</p> <p>Unit 2-Viruses: Gives an idea on discovery, classification and replication of viruses.</p> <p>Unit3-Bacteria: Gives an idea on discovery, characteristics, classification and reproductive methods.</p> <p>Unit4-Algae: Ability to know characteristics, thallus organization, cell structure and classification.</p> <p>Unit 5-Cyanophyta and Xanthophyta: Ecology and occurrence, structure and reproduction of Nostoc and Vaucheria.</p> <p>Unit 6-Chlorophyta and Charophyta: Gives an idea of Ecology, occurrence, structure and reproduction of Chlorophycean algae and Chara.</p> <p>Unit 7-Phaeophyta and Rhodophyta: Occurrence, structure and reproduction of brown and red algae.</p>
		Practical BOT-CC-P2-101	Phycology and Microbiology	<p>Algae-Gives an idea on reproductive parts of different algae</p> <p>Bacteria-Gives idea on isolation techniques of Bacteria.</p> <p>Virus-Gives an idea on diverse type of Virus and Bacteria (model)</p>

	Core Course II	Theory BOT-CC-T4-102	Biomolecules and Cell Biology	<p>Unit 1- Biomolecules: Gives an idea on types and significance of chemical bonds, thorough knowledge on biomolecules.</p> <p>Unit 2-Bioenergetics: Knowledge on the Law of Thermodynamics, ATP structure and role.</p> <p>Unit 3-Enzymes: Structure, classification and theories.</p> <p>Unit 4-The Cell: Gives an idea on structure and function.</p> <p>Unit 5-Cell wall and Plasmamembrane: Deals with the chemistry, structure and function of plant cell wall and cell membrane.</p> <p>Unit 6-Cell organelles: Gives an idea on the structure and function of different plant cell organelles.</p> <p>Unit 7-Cell division: Deals with the phases of cell cycle.</p>
		Practical BOT-CC-P2-102	Biomolecules and Cell Biology	Qualitative Test of Biomolecules. To study the cell structure, Cell division stage. Gives an idea of the cell organelles.

II	Core Course III	Theory BOT-CC-T4-201	Mycology and Phycology	<p>Unit 1-Introduction to true Fungi-Gives an idea of thallus organization, cell wall composition and affinities with plant and animals.</p> <p>Unit 2-Chytridiomycota and Zygomycota-Ability to gain knowledge on Synchytrium and Rhizopus.</p> <p>Unit 3-Ascomycota-Deals with characteristics, life cycle to fungi of the group.</p> <p>Unit 4-Basidiomycota-Deals with characteristics, life cycle of Basidiomycetes Fungi.</p> <p>Unit 5-Allied Fungi-Gives an idea of Slime Mlds.</p> <p>Unit 6-Oomycota-Gives an idea on life cycle of Phytophthora, Albugo.</p> <p>Unit 7-Symbiotic association- Deals with Mycorrhiza, Lichen etc.</p> <p>Unit 8-Applied Mycology-Gains Knowledge on application of Fungi.</p> <p>Unit 9-Phytopathology-Gives an idea of disease causing microorganisms of plants.</p>
	Core Course III	Practical BOT-CC-P2-201	Mycology and Phycology	<p>Gives knowledge on vegetative and reproductive structure of different fungi.</p> <p>Gives knowledge on the disease causing microorganisms.</p> <p>Gives knowledge on Lichen and Mycorrhiza.</p>

	Core Course IV	Theory BOT-CC-T4-202	Archegoniate	<p>Unit 1- Introduction: Gives idea of unifying features of Archegoniate</p> <p>Unit 2-Bryophytes: Deals with the characters of Bryophytes</p> <p>Unit 3-Type studies – Bryophytes: Gives a thorough knowledge on different genus of Bryophytes starting from <i>Riccia</i> to <i>Funaria</i></p> <p>Unit 4-Pteridophytes: Deals with the characters of early land plants</p> <p>Unit 5-Type studies- Pteridophytes: Gains a thorough knowledge on different genera of Pteridophytes starting from <i>Psilotum</i> to <i>Pteris</i></p> <p>Unit 6-Gymnosperms: Gives knowledge on morphology, anatomy and reproduction of some important genera of Gymnosperms with reference to their ecological and economical importance</p>
		Practical BOT-CC-P2-202	Archegoniate	<p>Gets on idea of vegetative and reproductive structure of Bryophytes.</p> <p>Gets an idea of vegetative and reproductive structures of Pteridophytes</p> <p>Gets an idea of vegetative and reproductive structures of Gymnosperms</p>
Semester III	Core Course V	Theory BOT-CC-T4-301	Anatomy of Gymnosperms	<p>Unit 1-Introduction and scope of Plant Anatomy: Gains idea on application of Anatomy.</p> <p>Unit 2-Structure and Development of Plant Body: Gives idea on different plant tissues and tissue systems.</p> <p>Unit 3-Tissues: Gives idea on different types of tissues present in plants.</p> <p>Unit 4- Apical Meristem: Gets an idea on different theories of tissues. Structure of tissues in dicot and monocot leaf, stem and root</p> <p>Unit 5-Vascular Cambium and Wood: Gives idea on Secondary</p>

				Growth in Plants. Unit 6-Adaptive and Protective Systems: Gives an idea on anatomical adaptation of Hydrophytes and Xerophytes.
		Practical BOT-CC-P2-301	Anatomy of Gymnosperms	Gets idea on dicot and monocot stem. Tissue differentiation in dicot and monocot root, leaf. Gets idea on adaptive anatomical peculiarities of Xerophytes and Hydrophytes.
	Core Course VI	Theory BOT-CC-T4-302	Economic Botany	Unit 1-Origin of cultivated plants: Gives idea on origin and major plant introduction. Unit 2-Cereals: Gives ideas on major cereal crops Wheat, Rice and Millet. Unit 3-Legume: Gives ideas on Legumes. Unit 4-Sources of Sugars and Starch: Gains ideas on morphology and processing of Sugarcane and Potato. Unit 5-Spices: Gains knowledge of some important Spices like Fennel, Saffron, Clove etc. Unit 6-Beverages: Gets ideas on Tea and Coffee cultivation. Unit 7-Sources of oils and fats: Give ideas on oil and fat yielding plants. Unit 8-Natural Rubber: Gets ideas on tapping and processing of rubber. Unit 9-Drug yielding plants: Gets ideas on medicinal plants. Unit 10-Timber plants: Gets ideas on several economically important plants. Unit 11-Fibres: Gets knowledge on fibre yielding plants.
		Practical BOT-CC-P2-302	Economic Botany	Gains knowledge on habit, characters and identification of economically important plants.

	Core Course VII	Theory BOT-CC-T4-303	Genetics	<p>Unit 1-Modern Genetics and its extension: A thorough knowledge on the history of Genetics.</p> <p>Unit 2-Extrachromosomal variation: Gives ideas on chloroplast and mitochondrial mutation.</p> <p>Unit 3-Linkage, crossing over and gene mapping: Gives ideas on linkage, crossing over and gene mapping.</p> <p>Unit 4-Variation in chromosome number and structure: Gives ideas on polyploidy and chromosomal aberration.</p> <p>Unit 5-Gene mutation: Gives a thorough knowledge on types of mutation.</p> <p>Unit 6-Fine structure of gene: Knowledge on classical Vs molecular concept of gene.</p> <p>Unit 7-Population and evolutionary genetics: Earn knowledge on Allele frequency, genetic variation and speciation.</p>
		Practical BOT-CC-P2-303	Genetics	Gains knowledge on cell division, Mendel's Law and different human genetic traits.
IV	Core Course VIII	Theory BOT-CC-T4-401	Molecular Biology	<p>Unit 1-Nucleic Acids: Carrier of genetic information: Gives knowledge on historical perspective and DNA.</p> <p>Unit 2-The structures of DNA and RNA/Genetic material: Gives ideas on DNA, RNA structure mitochondrial and chloroplast DNA.</p> <p>Unit 3-The replication of DNA: Gives ideas on DNA synthesis.</p> <p>Unit 4-Central dogma and genetic code: Gives ideas on key experiments establishing the central dogma and genetic code.</p> <p>Unit 5-Transcription: Gives ideas on synthesis of mRNA.</p> <p>Unit 6-Processing and modification of RNA: Gives ideas on concept of introns and exons and RNA editing and mRNA transport.</p>

				Unit 7-Translation: Gives ideas on Ribosome activation and protein synthesis.
		Practical BOT-CC-P2-401	Molecular Biology	Gains knowledge on DNA isolation and estimation.
	Core Course IX	Theory BOT-CC-T4-402	Plant Ecology and Biogeography	<p>Unit 1-Introduction: Gives ideas on concept and levels of organization.</p> <p>Unit 2-Soil: Gives idea on importance concept and formation of soil.</p> <p>Unit 3-Water: Gives idea on importance and types of water.</p> <p>Unit 4-Light, temperature, wind, fire: Adaptations of plants is studied.</p> <p>Unit 5-Biotic interactions: Gives ideas on basic source of energy and nutritional variation.</p> <p>Unit 6- Population Ecology: Gives ideas on Ecological speciation.</p> <p>Unit 7-Plant communities: Imparts knowledge on habitat and types and succession of plants.</p> <p>Unit 8-Ecosystem: Imparts knowledge on trophic organization.</p> <p>Unit 9-Functional aspects of ecosystem: Gives knowledge on principles and production of energy flow.</p> <p>Unit 10-Phytogeography: Gives knowledge on phytogeographical divisions and vegetation.</p> <p>Unit 11-Conservation ecology: Imparts knowledge on biodiversity and conservation processes.</p>
		Practical BOT-CC-P2-402	Plant Ecology and Biogeography	Imparts practical knowledge on Frequency, Density and Abundance of herbaceous vegetation, study on chemical characteristics of soil.

	Core Course X	Theory BOT-CC-T4-403 Practical BOT-CC-P2-403	Plant Systematics	<p>Unit 1-Significance of Plant Systematics: Gives knowledge on plant identification and classification.</p> <p>Unit 2-Taxonomic hierarchy: Imparts knowledge on basic concept of taxa.</p> <p>Unit 3-Botanical Nomenclature: Gives ideas on principles, rules ranks and names.</p> <p>Unit 4-Systems of classification: Imparts knowledge on contribution of Taxonomists and Systems of Classification.</p> <p>Unit 5-Biometrics, Numerical Taxonomy and Cladistics: Gives knowledge on characters, variation, OTUs etc.</p> <p>Unit 6-Phylogeny of Angiosperms: Gives ideas on origin and evolution of Angiosperms.</p>
			Plant Systematics	Gives ideas on the vegetative and floral characters of the plants and also gets ideas on preparation of Herbarium.
V	Core Course XI	Theory BOT-CC-T4-501	Reproductive Biology of Angiosperms	<p>Unit 1-Introduction: Gives knowledge on the history of embryology.</p> <p>Unit 2-Reproductive development: Imparts knowledge on floral morphology and development.</p> <p>Unit 3-Anther and pollen biology: Gives ideas on development structure of Anthers.</p> <p>Unit 4-Ovule: Gives ideas on ovule development and structure of ovule.</p> <p>Unit 5-Pollination and Fertilization: Imparts knowledge on Types and Significance of Pollination.</p> <p>Unit 6-Self incompatibility: Gives ideas on basic concept of self incompatibility.</p> <p>Unit 7-Embryo, Endosperm and Seed: Imparts knowledge on structures, types and development of embryo,</p>

				endosperm and seed. Unit 8-Polyembryony and Apomixis: Gives idea on classification, causes and application of polyembryony and apomixis.
	Core Course XII	Practical BOT-CC-P2-501	Reproductive Biology of Angiosperms	Gives practical knowledge on germination of pollen grains, structure of Anther and Ovary.
		Theory BOT-CC-T4-502	Plant Physiology	Unit 1-Gives ideas on water potential, absorption and transpiration. Unit 2-Mineral Nutrition: Gives knowledge on significance of mineral elements. Unit 3-Nutrient uptake: Gives ideas on the uptake of mineral elements from soil. Unit 4-Translocation in phloem: Gives ideas on the path of organic solute translocation through phloem. Unit 5-Plant growth regulators: Gives ideas on different roles of hormones. Unit 6-Physiology of flowering: Gives idea on how flowering takes place in plants. Unit 7-Growth and development: Gives idea on the different phases of growth.
		Practical BOT-CC-P2-502	Plant Physiology	Gets practical knowledge on the different physiological processes of plants.
VI	Core Course XIII	Theory BOT-CC-T4-601	Plant metabolism	Unit 1-Concept of metabolism: Gives ideas on anabolism and catabolism, Unit 2-Carbon assimilation: Gives an idea on the process of manufacture of food matters by plants. Unit 3-Carbohydrate metabolism: Give idea on synthesis and degradation of sucrose and starch. Unit 4-Carbon oxidation: Gives ideas on the detailed processes of respiration. Unit 5-ATP synthesis: Gets knowledge on the mechanism of

				ATP synthesis. Unit 6-Lipid metabolism: Gives a thorough knowledge on synthesis and breakdown of triglycerides. Unit 7-Nitrogen metabolism: Gives an idea on nitrogen fixation, nitrate and ammonia assimilation
		Practical BOT-CC-P2-601	Plant metabolism	Gives idea on the physiological and metabolic processes of plants.
	Core Course XIV	Theory BOT-CC-T4-602	Plant Biotechnology	Unit 1-Introduction: Gives knowledge on the aims objectives and scope of biotechnology. Unit 2-Plant tissue culture: Gives ideas on the technique of plant tissue culture, application and conservation. Unit 3-Recombinant DNA technique: Imparts knowledge on restriction enzymes and cloning vectors. Unit 4-Gene cloning: Imparts knowledge on recombinant DNA, PCR mediated gene cloning, genomic construction etc. Unit 5-Method of gene transfer: Gives ideas on direct gene transfer, selection and transgenics. Unit 6-Application of Biotechnology: Imparts knowledge on transgenic plants, Industrial enzymes and genetically engineered product.
		Practical BOT-CC-P2-602	Plant Biotechnology	Imparts practical knowledge on preparation of MS medium, isolation of plasmid DNA, sterilization and inoculation method.