

**Course Structure FOR
Choice Based Credit System of
B.Sc. (Botany) Program with effect from 2020-21
School of Science, UPRTOU, Prayagraj**

Semester	Course Code	Title of Paper	Credits	Max. Marks
I	UGBY -101	Cytology and Genetic	2	100
	UGBY -101P	Practical Work	2	100
II	UGBY -102	Plant Physiology	2	100
	UGBY -102P	Practical Work	2	100
III	UGBY -103	Plant Diversity-I	2	100
	UGBY -103P	Practical Work	2	100
IV	UGBY -104	Plant Diversity-II	2	100
	UGBY -104P	Practical Work	2	100
	Skill Enhancement Course			
	SBSBY-02	Ecology	4	100
V	Discipline Centric Elective Course			
	DCEBY -105	Embryology and Morphogenesis	2	100
	DCEBY -106	Plant Pathology and Microbiology	2	100
	DCEBY -107P	Practical Work	2	100
VI	Discipline Centric Elective Course			
	DCEBY -108	Molecular Genetics and Biotechnology	2	100
	DCEBY -109	Paleobotany, Palynology and Economic Botany	2	100
	DCEBY -110P	Practical Work	2	100
Total Credit/Max. Marks			36	1500

Syllabus of B.Sc. (Botany)

UGBY -101 Cytology and Genetics

Block-1 Cytology

Unit-1. Cell Structure and cellular organelles- I: Chloroplast, Mitochondria, Ribosome, Nucleolus and Nucleus, Plasma membrane.

Unit-2. Cell Structure and cellular organelles-II: Endoplasmic reticulum, Golgi-body, Lysosome and chromosome.

Unit-3. Cell cycle, Phases, Mitosis, Meiosis.

Block-2 Genetics-I

Unit-4. Pre - Mendelian Genetics and Mendel's laws of inheritance.

Unit-5. Linkage and crossing over

Unit-6. Cytoplasmic inheritance, sex linked and sex determination in plants.

Block-3 Genetics-II

Unit-7. Chromosomal Abberation

Unit-8. Mutation - Gene mutation, Induced mutation.

Unit-9. Genetics in plant improvement

UGBY -102

Plant Physiology and Biochemistry

Block-1 Plant Physiology -I

Unit-1. The concept of diffusion, osmosis, osmotic pressure, imbibition, water potential and factor affecting them.

Unit-2. Water absorption: water absorbing organ, active water absorption theory and passive water absorption theory.

Unit-3. Ascent of sap, concepts, theory of ascent of sap with emphasis on cohesion theory of ascent of sap.

Unit-4. Water loss, stomatal structure, mechanism of stomatal opening and closing, transpiration, guttation, factors controlling transpiration.

Block-2 Plant Physiology -II

Unit-5. Mineral nutrition: essential elements, macro and micro nutrient, role of essential elements, transport of ion across cell membrane , active and passive transport.

Unit-6. Photosynthesis: Basic concept, equation of photosynthesis, evidence for the existence of light and dark reaction, structure of chloroplast, discovery of two light reactions, quantum yield, red drop, Emerson enhancement effect, photo system I & II, dark reaction-the calvin cycle photorespiration and C₄ plants, CAM plant.

Unit-7. Hormones: Discovery and characteristic of plant hormones, role of auxins, giberellin, cytokinin, ethylene, abscisic acid. Flowering harmones, Phytochrome.

Unit-8. Respiration: Aerobic and anaerobic respiration, Glycolysis, TCA cycle, Oxidative phosphorylation.

UGBY -103

Plant Diversity-I

Block-1 Bacteria, Virus, Lichen, Algae and Fungi

Unit-1. Bacteria, virus, and lichen: Bacterial-Cell structure, Reproduction, Economic importance
Virus- Biological status of virus, structure of bacteriophage & TMV, replication. Lichen-
Structure and economic importance of lichen.

Unit-2. Morphology and life cycle of algae, unicellular form *Chlamydomonas*, colonial forms *Volvox*,
Filamentous form *Nostoc*, Heterotrichous forms *Ectocarpus*, Thalloid form *Fucus*,
Polysiphonoid form *Polysiphonia*.

Unit-3. Origin and evolution of sex, classification of Algae: Criteria for classification, Economic
importance of Algae, Habitats and distribution- Algae, Aquatic algae: Fresh water, Marine
habitats Special Habitats; Soil and sub aerial algae.

Unit-4. Fungi,: Introduction; Habitats, morphology, nutrition and reproduction, life cycle of
phytophthora, *Rhizopus*, *Puccinia*, *Cercospora*, Economic importance of fungi.

Block-2 Bryophytes and Pteridophytes

Unit-5. Bryophytes: Introduction, General characteristics, adaptation to land habit, morphology,
anatomy and reproduction of Hepaticosida *Riccia*, *Marchantia*, *Pellia*, Anthocerosida
Anthoceros, *Bryopsida-Sphagnum*.

Unit-6. Bryophytes: Evolution of sporophytes in bryophytes. Importance and bio-functional uses of
bryophytes (Food, Medicine, Ecological Services, Industrial and Research work)

Unit-7. Pteridophytes: General characteristics, and Life cycle of pteridophytes, Relationship with
other groups, stellar structure and evolution, Fern as a system for experimental studies,
apogamy and apospory

Unit-8. Pteridophytes: morphology, anatomy and life cycle of *Rhynia*, *Lycopodium*, *Selaginella*,
Equisetum, and *Marsilea*.

UGBY -104

Plant Diversity-II

Gymnosperms and Angiosperms

Block-1 Gymnosperms

Unit-1. Introduction, characteristics, classification and economic importance of gymnosperm.

Unit-2. *Cycas*: Structure and reproduction (life cycle)

Unit-3. *Pinus*: Structure and reproduction (life cycle)

Block-2 Plant Anatomy

Unit-4. Tissue system (angiosperm)- simple tissue, complex tissue.

Unit-5. Root: Primary and secondary structure of root

Unit-6. Stem: Primary and secondary structure

Unit-7. Anomalous secondary growth in *Bignonia* and *Boerhaavia* (dicot-stem), *Dracaena*
(Monocot-stem)

Block-3 Plant Taxonomy

Unit-8. History of Economic botany with special reference to India, Bentham and Hookers system of
classification.

Unit-9. Details account of following families: Dicot-Family- Asteraceae, Ranunculaceae Brassicaceae,
Solanaceae, Malvaceae, Mimosoideae, Caesalpinioideae, Papilionoideae, Monocot-Family-
Liliaceae, Orchidaceae, Poaceae

SBSBY-02

Ecology

Block-1 Ecology-I

Unit-1. Introduction of Ecology

Unit-2. Structure and function of ecosystem: Biotic and Abiotic components, Food chain, Food web, Pyramid, and Energy flow in ecosystem, Biogeochemical cycle.

Unit-3. Ecological succession,: Basic concept, succession in water and land (hydrosere and xerosere)

Unit-4. Pollution: Definition, types of pollution: Air pollution, water pollution, Noise pollution, control of pollution.

Block-2 Ecology-II

Unit-5. Ecological adaptation in plant-hydrophytic and xerophytic adaptation.

Unit-6. Edaphic factors: Definition and composition of soil, soil profile, soil erosion, soil conservation.

Unit-7. Phyto-geography: major plant community of world, soil, climate and vegetation of India.

Unit-8. Environmental education.

DECBY-105

Embryology and Morphogenesis

Block-1 Embryology-I

Unit-1. Introduction

Unit-2. Life cycle of angiosperm: structure of flower; process of reproduction.

Unit-3. Microsporogenesis: Microsporogenesis and male gametophytes; microsporangium anther wall and sporogenous tissue. Microsporogenesis-Cytokinesis, pollen tetrads. Male gametophyte- Structure of pollen grains, development of male gametophyte.

Unit-4. Megasporangium: Megasporangium and female gametophyte-1. Megasporangium - type of ovule, development of ovule, parts of ovule, 2. Megasporogenesis, Female gametophyte (Embryosac) structure of embryosac and types.

Block-2 Embryology-II

Unit-5. Pollination- Anther dehiscence, types of pollination, agents and types of cross pollination; artificial pollination.

Unit-6. Fertilization- Germination of pollen grain, Growth of pollen tube, Entry of pollen tube into Ovule and Embryosac, Movement of sperm towards egg and polar nuclei. pollination and fertilization.

Unit-7. Endosperm- Types of endosperm, Nuclear types, Cellular types, Helobial types, Function of endosperm, morphological nature of endosperm, embryogenesis – Development of dicot and mono-cot embryo, nutrition of embryo.

Unit-8. Polyembryony: Origin of polyembryony, causes of polyembryony and role of polyembryony in breeding. apomixis; Types of apomixes and its significance.

Block-3 Morphogenesis

Unit-9. Morphogenesis and Factors Affecting Morphogenesis

Unit-10. Polarity: Symmetry, Totipotency

DECBY-106

Plant Pathology and Microbiology

Block-1 Plant Pathology

Unit-1. Introduction of plant pathology

Unit-2. Symptoms of Disease caused by fungi, bacteria and virus.

Unit-3. Control of plant disease: various methods used for disease control

Unit-4. Dissemination of Pathogen, Epidemiology and disease forecasting

Unit-5. Disease of plant: White Rust of Crucifer, wilt of arhar, damping off, Late Blight of potato, Early Blight of Potato, Black Rust of wheat, Tikka Disease of Groundnut Loose smut of wheat.

Block-3 Microbiology

Unit-6. Water (Sewage) Microbiology- What is sewage, various process of treatment of sewage.

Unit-7. Soil Microbiology: Humus, Role of microbes in various cycles: Nitrogen, Carbon, Phosphorous and sulphur in soil.

Unit-8. Dairy microbiology

DECBY-108

Molecular Genetics and Biotechnology

Block-1 Molecular Genetics-I

Unit-1. DNA and RNA as genetic material

Unit-2. DNA structure, types and replication, types of RNA, Genetic code and its properties.

Unit-3. Gene expression: Transcription and Translations in prokaryotes and eukaryotes

Block-2 Molecular Genetics-II

Unit-4. Gene regulations: operon concept, lactose operon and transposons.

Unit-5. Recombinant DNA technology (Genetic engineering): Introduction, tools and techniques of transfer of gene in plant (Transgenic plant).

Unit-6. Monoclonal antibodies, DNA-probe and DNA finger printing.

Block-3 Biotechnology

Unit-7. Introduction and techniques of tissue culture

Unit-8. Culture of different tissue: Meristem culture, Anther culture, Pollen culture, Protoplast culture, Embryo cultures.

Unit-9. Application of biotechnology in human welfare with special reference to agriculture

DECBY-109

Paleobotany, Palynology and Economic Botany

Block-1 Paleobotany and Palynology

Unit-1. Introduction, techniques to study fossil, Geological time scale

Unit-2. Kinds of fossils, form-genera, Organ-genera, Reconstruction of fossil.

Unit-3. Palynology and its scope; Pollen units, Pollen preparation, acetolysis method.

Block-2 Economic Botany-

Unit-4. Spices and Flavoring Materials: Ginger, Turmeric, Clove, Saffron, Coriander; Botanical description, cultivation and uses.

Unit-5. Beverages: Tea and Coffee; Botanical description, cultivation and uses.

Unit-6. Fibres: Jute, Flax, Hemp, Coir, Cotton; Botanical description, cultivation and uses.

Unit-7. Forest Products: Wood, Rubbers, Gum and Resines; botanical description, cultivation and uses.

Unit-8. Medicinal Plants: Rauwolfia, Belladonna, Quinine, Opium, Ephedrine; botanical description, cultivation and uses.