DEPARTMENT OF BOTANY

CURRICULUM PLAN 2026-2027 (ODD SEMESTER)

Dr. Naghma Praween

B. Sc. (Programme) Life Science,

Botany DSC-for LS-III Semester

Paper: Plant Cell and Developmental Biology

Topic	Approximate Schedule (Month wise)	Assignment/Class Test/Presentation	Suggested Reading
Unit 2. Polarity in plant growth 6 hours Growth through primary meristems, and secondary meristems (discuss briefly), Organisation of shoot apex (Tunica-Corpus theory, Waiting meristem theory) and root apex (Körper-Kappe theory) Unit 3. Differentiation of tissues: vegetative organs Structure and functions of tissues (simple and complex), Structure of stem, root, and leaf (dicot and monocot), Brief mentioning of anomalous secondary growth in stem of Salvadora/Bignonia and Dracaena, Epidermal system: classification of stomata (Metcalfe and Chalk), trichomes Unit 6. Development of Embryo and Seed Endosperm structure (Free nuclear,Cellular and Helobial type, one example of each) and functions; development of embryo from zygote in monocot and dicot;	July 2026 August 2026 September 2026 August 2026	Assignment	Vashishta, P.C., Sinha, A.K., Kumar, A. (2022). Botany For Degree Students Pteridophyta, New Delhi,

establishment of apical, basal and radial organisation;development of seed (general account only) **Practical: 1.** To study cytoplasmic streaming in Hydrilla. 2. a. Study of cell organelles through electron micrographs – nucleus, mitochondria,chloroplast, mitochondria, dictyosomes, endoplasmic reticulum b. Study of cell organelles (throughpermanentslides/photographs)– nucleus(Feulgen/acetocarmine staining); mitochondria (Janus green B staining); cell wall (PAS staining) 3. Study of plant cells: types of stomata(through peel mounts), trichomes,sclerenchyma, xylem (through maceration). 4. Study of shoot apical meristem and root apical meristem, parenchyma, collenchyma, phloem, laticifers through permanentslides/micrographs. 5. Study organs structure through temporary preparations-a. Transverse section of dicot stem-Helianthus/Cicer, stem with secondary growth – Helianthus/Cicer etc., Transverse section of monocot stem - Zea mays b. Transverse section of dicot root: primary and with secondary growth-Cicer/Vigna etc., monocot root - Zea mays c. Vertical section of dicot and monocot leaf	September 2026 October 2026 October 2026		Vashistha, B.R., Sinha, A.K., Kumar, A. (2010). Botany For Degree Students, Bryophyta. New Delhi,

6. Study anomalous secondary growth through permanent slides/photomicrographs: Salvadora/ Bignonia, Dracaena 7. Study reproductive structures through photographs/ micrographs/permanent slides/specimens: a. Transverse section of anther with wall layers, secretory and amoeboid tapetum b. Microsporogenesis through micrographs of transverse section anther c. Pollen exine patterns (any four types) d. Types of ovules, associated structure (obturator, aril, caruncle) e. Mature Polygonum type of embryo sac and ultrastructure of egg apparatus 8. Study of pollen viability (TTC/FDA). 9. Calculation of percent pollen germination in any one medium through sitting drop culture/ /Hanging drop culture 10. Dissection of embryo/endosperm from developing seeds.	November 2026		

B.Sc. (Prog) Life Science **Semester-I Plant diversity and Systematics.** **BOT-LS-DSC-1** Practicals: Viruses: EM of TMV and Bacteriophage, Specimens of virus infected plants (any two). 2.Bacteria: EM of a bacterium, types through permanent slides/photographs, specimens of infected plants (any two). 3. Algae: Study of vegetative and reproductive structures of (a) Nostoc (b)Volvox (c) Spirogyra through temporary preparations and permanent slides. 4. Fungi: Study of vegetative and reproductive structures of(a) Rhizopus, (b) Penicillium, and (c) Agaricus through temporary preparations and permanent slides/specimens/photographs. 5. Lichens: Crustose, Foliose and Fruticose (specimens/photographs). 6. Bryophytes: Study of (a) Marchantia morphology of thallus, W.M. rhizoids and scales, V.S. thallus through gemma cup, W.M. gemmae (all temporary slides), V.S. antheridiophore, archegoniophore, L.S.sporophyte (all permanent slides), (b) Funaria: detailed study and classification from W.M. rhizoids, operculum,peristome, spores and permanent slides of archegonia, antheridia and capsule.	August 2026 Septamber 2026 October 2026		Pelczar, M.J. (2001). Microbiology, 5th Edition. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, 4thedition. Vashishta, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta.

7.Pteridophytes: Study of Pteris: T. S. of Rachis, V.S. of Sporophyll and W.M. of sporangium. 8.Gymnosperms: Study of Pinus morphology of long & dwarf shoot, male and female cones specimens) and T.S. of needle (permanent slides only). 9. Herbarium technique (Mounting of a properly dried and pressed specimen of any wild plant on the herbarium sheet with complete herbarium label). 10. Taxonomic study of characters of 1 plant from each of the following families (any four): Malvaceae, Solanaceae, Asteraceae, Fabaceae, and Liliaceae.	November 2026		
B.Sc. Life Sciences Plant Physiology and Metabolism Semester Vth LS-BOT-DSC- 05 **Practicals:** ▪ Determination of osmotic potential of plant cell sap by plasmolytic method. ▪ To study the effect of the environmental factor light on transpiration by excised twig. ▪ Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.	August 2026 September 2026		Taiz, L., Zeiger, E., Moller, I. M., Murphy, A. (2018). Plant Physiology and Development, International 6th edition,

▪ To study the activity of catalase and study the effect of pH on the activity of enzyme. ▪ To Study Hill's reaction. ▪ To study the effect of light intensity on O_2 evolution in photosynthesis. ▪ Comparison of the rate of respiration in any two parts of a plant. ▪ To separate photosynthetic pigments by paper chromatography. ▪ Bolting / Effect of auxins on rooting. ▪ To demonstrate the delay of senescence by cytokinins/ effect of ethylene on fruit ripening 20. To study the phenomenon of seed germination (effect of light and darkness). 21. To demonstrate Respiratory Quotient (RQ) **B.Sc. (Hons) Botany Cell Biology: Organelles and Biomolecules BOT-DSC-2** **Unit 2: The Cell** Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory). **Unit 3: Cell Wall and Plasma Membrane** Chemistry, structure and function of Plant Cell Wall. Singer and Nicolson's fluid mosaic model of cell membrane.	October 2026 November 2026 August 2026 September 2026		Kochhar, S.L. & Gujral, S.K. 2020. Plant Physiology: Theory and Applications, 2nd Edition. Cambridge University Cooper, G.M., Hausman, R.E. (2019). The Cell: A Molecular

Unit 4: Cell Organelles: Structure and function of the following Organelles **Nucleus**: Structure and function (nuclear envelope, nuclear pore complex, nuclear lamina); types of chromatins; nucleolus. **Chloroplast and Mitochondria**: Structural organization; Function; Semi- autonomous nature of mitochondria and chloroplast. **Endomembrane system**: Endoplasmic Reticulum – Structure and function of RER and SER, protein folding, processing in ER, export of proteins and lipids; Golgi Apparatus - Organization, protein glycosylation, protein sorting and export from Golgi Apparatus. Introduction to post-translational modifications.	October 2026		Approach, 7th edition. Campbell, P.N., Smith, A.D. (2011). *Biochemistry Illustrated*, 4th edition. London, Iwasa, J, Marshall, W. (2020). Karps's Cell Biology, 9th edition, New Jersey, U.S.A.:

Plant Pathology BOT-DSE-05 **DISCIPLINE SPECIFIC ELECTIVES** **Unit 1: Introduction** Definition of disease and its components (disease pyramid); Classification of diseases (on the basis of pathogens; geographical distribution; extent of occurrence); History and significance of Phytopathology (with special reference to India); Eminent plant pathologists and their contributions (Anton de Bary; E.J. Butler; Louis Pasteur; PMA Millardet; E.F. Smith; Adolf Mayer; K.C. Mehta, J.F. Dastur; B.B. Mundkur; R.N. Tandon). **Unit 2: Basic concepts of Plant Pathology** Definitions (Pathogenesis; Pathogen; symptoms; etiology); Types of pathogens and their Symptoms (Fungus, Oomycetes, Bacteria, Virus, Nematode, Phytoplasma); Koch's Postulates; Disease cycle (Components) - Epidemiology and forecasting of Plant diseases. **Unit 3: Host- -Pathogen relationship** How pathogens attack plants (brief concept on mode of penetration; post-penetration and colonization). Plant defence mechanisms (Constitutive and induced, structural and	August 2026 September2026 October 2026	Assignment	Agrios, G.N. (2005) *Plant Pathology* 5 th edition 8. Sharma, P.D. (2014) *Plant Pathology* Rastogi Publications . Singh, R.S. (2018) *Plant Diseases*. 10th Edition Medtech, New Delhi. ● Ownley, Bonnie and Trigiano, Robert N. (2017).

biochemical). **Unit 4: Fungal diseases** 40Causal Organism, Symptoms, Disease Cycle and control: Powdery mildew of Pea; Ergot of Rye; Apple scab, Early blight of potato, red rot of sugarcane, Black, Yellow and Brown rust of Wheat; Smut of Barley (Loose and Covered Smut). **Unit 5: Oomycete Diseases** Causal organism, symptoms, disease cycle and control: Late Blight of Potato; White Rust of Crucifers; Downy mildew of Grapes. **Unit 6: Bacterial Diseases** General symptoms; Disease cycle and Control measures - Citrus canker; Angular leaf spot of Cotton. **Unit 7: Viral Diseases** General symptoms; Mode of transmission and Control measures-Tobacco mosaic disease; Vein Clearing of Bhindi **Unit 8: Nematode Diseases** General symptoms, Disease cycle and Control measures-Root knot disease of Brinjal. **Unit 9: Plant Disease Control** Plant quarantine and its significance; Methods of disease control: Physical (Heat treatment, drying, radiation and regeneration); Chemical methods (foliar spray; dust, seed treatment; soil treatment; treatment of wounds). Types of fungicides - Inorganic (Bordeaux mixture, Fixed copper; Sulphur, Lime Sulphur); Organic (Di thiocarbamates, quinones); Systemic	November 2026		Plant Pathology: Concepts and Laboratory Exercises, 3rd Edition. Singh, R.S. (2018) *Plant Diseases*. 10th Edition Medtech, New Delhi.

fungicides and their mode of action (Oxathiin, Strobilurins, Benzimidazole, Pyrimidine). Cultural practices (Host eradication, sanitation, crop rotation, Polythene traps, Mulches) Biological Control (Antibiosis, hyper - parasitism, Hypovirulence, Predation, Induced systemic Resistance). **Unit 8: Plant Disease Control** Quarantine, Cultural practices, Physical methods, Chemical methods, biological control (Antibiosis, Hyper-parasitism, Hypovirulence, Predation, Induced Systemic Resistance)			