

Curriculum Planner 2025-26 (odd semester)

Dr. Kalpana Kumari

(Department of Botany, Kalindi College)

Course: B. Sc. Botany (H) 3rd Year

Semester: V

Paper: Plant Physiology (DSC)

| THEORY | | |
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| Topic | Essential and Suggested Readings | Approximate schedule (2025) |
| <p>Unit 1: Plant-water relations 04 Hours Water potential and its components, water absorption by roots, water movement via symplast, apoplast and aquaporins, root pressure, guttation, ascent of sap, cohesion-tension theory, transpiration, factors affecting transpiration, anti-transpirants</p> <p>Unit 2: Mineral nutrition 04 Hours Essential and beneficial elements, macro- and micro-elements, criteria for essentiality, roles of essential elements, chelating agents, phytosiderophores, mineral nutrition in hydroponics and aeroponics.</p> | <p>1. Hopkins, W. G., Huner, N. P. A. (2009). Introduction to Plant Physiology, 4th edition. New Delhi, Delhi: Wiley India Pvt. Ltd.</p> <p>2. Taiz, L., Zeiger, E., Moller, I. M., Murphy, A. (2018). Plant Physiology and Development, 6th edition. New York, NY: Oxford University Press, Sinauer Associates.</p> <p>3. Kochhar, S.L., Gujral, S.K. (2020). Plant Physiology: Theory and Applications. New Delhi, Delhi: Foundation Books, 2ndEdn. Cambridge University Press India Pvt, Ltd.</p> <p>Additional Resources: ● Bajracharya, D. (1999). Experiments in Plant Physiology: A Laboratory Manual. New Delhi, Delhi: Narosa Publishing House. ● Bhatla, S.C., Lal, M.A. (2018). Plant Physiology, Development and Metabolism. Singapore: Springer Nature, Singapore Pvt. Ltd.</p> | August |
| <p>Unit 3: Nutrient uptake 05 Hours 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)</p> <p>Unit 4: Translocation in the phloem 03 Hours Composition of phloem sap, phloem loading and unloading, Pressure-Flow Model, source sink relationship</p> | | September |
| <p>Unit 5: Plant growth regulators 08 Hours Chemical nature (basic structure, precursor), physiological roles, bioassays and applications of Auxins, Gibberellins, Cytokinins, Absciscic Acid, Ethylene; Other growth regulators - Jasmonic Acid, Brassinosteroids, Nitric Oxide. Mechanism of action of Auxin. Introduction to interactions among plant growth regulators.</p> <p>Assignment topics given</p> | | October |

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| and assessment of submitted assignments | | |
| <p>Unit 6: Physiology of photo-sensory molecules 03 Hours Discovery, chemical nature, mode of action and role of phytochrome, cryptochrome and phototropin in photomorphogenesis</p> <p>Unit 7: Physiology of flowering 02 Hours Concept of florigen, photoperiodism, CO-FT Model of flowering, vernalization.</p> <p>Unit 8: Seed dormancy 01 Hour Seed dormancy -causes and methods to induce and/or overcome dormancy Conduction of tests for internal assessment</p> | | November |

Course: B. Sc. Life Sc. (P) 3rd Year

Semester: V

Paper: Plant Physiology and Metabolism (DSC)

| PRACTICAL | | |
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| Topic | Essential and Suggested Readings | Approximate schedule (2025) |
| <p>1. Determination of osmotic potential of plant cell sap by plasmolytic method.</p> <p>2. To study the effect of the environmental factor light on transpiration by excised twig.</p> <p>3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.</p> <p>4. To demonstrate Respiratory Quotient (RQ)</p> | <p>Bajracharya, D. (1999) Experiments in Plant Physiology. A Laboratory Manual. Narosa Publishing House, New Delhi</p> | August |
| <p>5. To study the activity of catalase and study the effect of pH on the activity of enzyme.</p> <p>6. To Study Hill's reaction.</p> <p>7. To study the effect of light intensity on O₂ evolution in photosynthesis.</p> | | September |

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| 8. Comparison of the rate of respiration in any two parts of a plant. | | October |
| 9. To separate photosynthetic pigments by paper chromatography. | | |
| 10. Bolting / Effect of auxins on rooting. | | |
| 11. To demonstrate the delay of senescence by cytokinins/ effect of ethylene on fruit ripening. | | November |
| 12. To study the phenomenon of seed germination (effect of light and darkness). | | |
| Conduction of practical mock exam | | |

Course: B. Sc. Botany (H) 3rd Year
Semester: V
Paper: Plant Physiology (DSC)

| PRACTICAL | | |
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| Topic | Essential and Suggested Readings | Approximate schedule (2025) |
| 1. Determination of osmotic potential of plant cell sap by plasmolytic method. | Bajracharya, D. (1999) Experiments in Plant Physiology. A Laboratory Manual. Narosa Publishing House, New Delhi | August |
| 2. Determination of water potential of potato tuber cells by weight method. | | |
| 3. Determination of water potential of potato tuber cells by falling drop method. | | |
| 4. Study of effect of light on the rate of transpiration in excised leafy twig. | | September |
| 5. Calculation of stomatal index and stomatal frequency from the lower surface of leaves of a mesophyte and a xerophyte. | | |
| 6. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and a xerophyte (lower surface). | | |

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| 7. To study the effect of different concentrations of ABA on stomatal closure. | | October |
| 8. To study the effect of light and dark on seed germination. | | |
| 9. To study induction of amylase activity in germinating barley grains. | | |
| 10. To study the effect of ethylene on fruit ripening. | | November |
| 11. To study the effect of auxin on rooting. Conduction of practical mock exam | | |

Course: B. Sc. Botany (H) 1st Year

Semester: I

Paper: Cell Biology: Organelles and Biomolecules (DSC)

| PRACTICAL | | |
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| Topic | Essential and Suggested Readings | Approximate schedule (2025) |
| 1. Study of cell and its organelles with the help of electron micrographs and other digital resources. (Weeks: 02) 2. Study of plant cell structure with the help of epidermal peel mount of <i>Allium/Rhoeo/Crinum</i> . (Week: 01) 3. Microchemical tests for carbohydrates (reducing, non-reducing sugars and starch), lipids and proteins. (Weeks: 02) | <ul style="list-style-type: none"> • Hardin, J. and Lodolce, J.P. (2022). Becker's World of The cell, 10th edition, Pearson • Berg, J.M., Tymoczko, J.L., Stryer, L. (2011). Biochemistry. New York, NY: W. H. Freeman and Company. • Campbell, N. A. (2020). Biology: A Global Approach, 12th Edition, Pearson • Campbell, P.N., Smith, A.D. (2011). Biochemistry Illustrated, 4th edition. London, UK: Churchill Livingstone. Suggested readings: • Cooper, G.M., Hausman, R.E. (2019). The Cell: A Molecular Approach, 7th edition. Sinauer/OUP. • Iwasa, J, Marshall, W. (2020). Karp's Cell Biology, 9th edition, New Jersey, U.S.A.: John Wiley & Sons. • Majumdar, R., Sisodia, R. (2019). Laboratory Manual of Cell Biology, with reference to Plant Cells. New Delhi, Delhi: Prestige Publication. • Nelson, D.L., Cox, M.M. (2021). Lehninger Principles | August |
| 4. Separation of chloroplast pigments by paper chromatography/ Thin Layer Chromatography. (Weeks: 02) 5. Separation of amino acids by paper chromatography. (Weeks: 02) | | September |
| 6. Study the effect of organic solvent and temperature on membrane permeability. (Weeks: 02) 7. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf. (Weeks: 01) | | October |
| 8. Demonstration of the phenomenon of plasmolysis and deplasmolysis. (Weeks: 01) 9. Demonstration of separation of biomolecules by dialysis. (Weeks: 02) Conduction of practical mock exam | | November |

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| | <p>of Biochemistry, 8th edition. New York, NY: W.H. Freeman and Company. • Raven, F.H., Evert, R.F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H.Freeman and Company. • Tymoczko, J.L., Berg, J.M., Stryer, L. (2012). Biochemistry: A short course, 2nd edition. New York, NY: W.H. Freeman and Company.</p> | |
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