

Curriculum Planner 2025-26
Dr. Monika Keisham
(Department of Botany, Kalindi College)

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

Semester: VI

Paper: Plant Biochemistry and Metabolism (DSC)

THEORY		
Topic	Essential and Suggested Readings	Approximate schedule (2026)
<p>Unit 1: Concepts in Metabolism 01 Hour Introduction, anabolic and catabolic pathways, coupled reactions</p> <p>Unit 2: Enzymes 04 Hours Structure, classification and mechanism of action, Michaelis-Menten equation (no derivation), enzyme inhibition (competitive, non-competitive and uncompetitive), allosteric regulation and covalent modulation, factors affecting enzyme activity.</p> <p>Unit 3: Carbon Assimilation 07 Hours Concept of light, absorption and action spectra, photosynthetic pigments (no structural details), PSI, PSII antenna molecules and reaction centres, LHC, photochemical reaction, photosynthetic electron transport, photophosphorylation (cyclic and non-cyclic)</p>	<p>Suggested Readings:</p> <ul style="list-style-type: none"> • Taiz, L., Zeiger, E., Moller, I. M., Murphy, A. (2018). <i>Plant Physiology and Development</i>, International 6th edition, Oxford University Press, Sinauer Associates, New York, USA. • Bajracharya, D. (1999). <i>Experiments in Plant Physiology: A Laboratory Manual</i>, Narosa Publishing House, New Delhi. • Hopkins, W. G., Huner, N. P. A. (2009). <i>Introduction to Plant Physiology</i>, 4th edition, Wiley India Pvt. Ltd, New Delhi. <p>Additional Resources:</p> <ul style="list-style-type: none"> • Jones, R., Ougham, H., Thomas, H., Waaland, S. (2013). <i>The molecular life of plants</i>. Chichester, England: Wiley-Blackwell. 	January
<p>Unit 3: Carbon Assimilation 07 Hours Dark reactions: CO₂ reduction in C₃, C₄ pathways and CAM, photorespiration.</p> <p>Unit 4: Carbohydrate Metabolism 02 Hours Metabolite pool and exchange of metabolites, synthesis and degradation of sucrose and starch (no structural details)</p> <p>Unit 5: Carbon Oxidation 06 Hours Glycolysis, fate of pyruvate- aerobic, anaerobic respiration and fermentation, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, Krebs cycle</p>	<ul style="list-style-type: none"> • Kochhar, S.L. & Gujral, S.K. 2020. <i>Plant Physiology: Theory and Applications</i>, 2nd Edition. Cambridge University Press, UK. • Bhatla, S.C., Lal, M.A. (2018). <i>Plant Physiology, Development and Metabolism</i>. Singapore: Springer. 	February

and its regulation, amphibolic role of Krebs cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration		
<p>Unit 6: ATP Synthesis 02 Hours Mechanism of ATP synthesis-substrate level phosphorylation, oxidative and photophosphorylation, chemiosmosis, ATP synthase</p> <p>Unit 7: Lipid Metabolism 04 Hours Triglycerides: synthesis, degradation through alpha and beta -oxidation, glyoxylate cycle</p> <p>Unit 8: Nitrogen Metabolism 04 Hours Nitrate assimilation (NR and NiR), biological nitrogen fixation in legumes (nodulation and role of dinitrogenase) Ammonia assimilation: GS-GOGAT, reductive amination and transamination.</p> <p>Assignment topics given and assessment of submitted assignments Conduction of tests for internal assessment</p>		March-April

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PRACTICAL		
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1. Study the activity of urease and the effect of substrate concentration on its activity. 2. Study the effect of pH on the activity of catalase enzyme. 3. Chemical separation of photosynthetic pigments (liquid-liquid partitioning). 4. Study Hill reaction by dye reduction method.	Bajracharya, D. (1999) Experiments in Plant Physiology. A Laboratory Manual. Narosa Publishing House, New Delhi	January
5. Study the law of limiting factors.		February

<p>6. Compare the rate of respiration in three different parts of a plant. 7. Study the activity of Nitrate reductase in leaves of two different plants.</p>		
<p>8. To study the activity of lipases in germinating oil seeds and explain mobilization of lipids during germination. 9. To study the fluorescence in isolated chlorophyll pigments. 10. To study the absorption spectrum of photosynthetic pigments.</p>		March
<p>11. To study respiratory quotient (RQ). 12. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte. 13. To demonstrate Respiratory Quotient (RQ)</p> <p>Conduction of practical mock exam</p>		April