Kalindi College

DEPARTMENT OF BOTANY

Curriculum/Teaching Plan (2025-26)

(ODD Semesters : I, III, V)

Dr. Pratibha Thakur

Course : B. Sc. (H) Botany, 3rd year, Sem. V [1st August 2025 – 27th Nov. 2025]
Paper : Reproductive Biology of Angiosperms – DSC-12 – THEORY (NEP)
UPC: 2162013502

Name of Paper : Reproductive Biology of Angiosperms, & Code (2162013502)	Allocation of Lectures	Month wise schedule	References
Unit 1 Introduction : Introduction about Reproductive biology and its scope; significant contributors to the field (SG Nawaschin, Heslop-Harrison, Jensen, Strasburger, P Maheswari, BM Johri, Amici, KR Shivanna); structure of flower.	1 lecture	August 2025	**Suggested readings:** ● Bhojwani S.S., Bhatnagar S.P. & Dantu P.K. (2015). The Embryology of Angiosperms, 6th Edition. By VIKAS PUBLISHING HOUSE. ISBN: 978-93259-8129-4. ● P. Maheshwari, (2004). An introduction to the embryology of Angiosperms. Tata McGraw-Hill Edition, ISBN: 0-07-099434-X. ● Johri, B.M. (1984). Embryology of Angiosperms. Netherlands: Springer-Verlag. ISBN: 13:978-3-642- 69304-5 ● Raghavan, V. (2000). Developmental Biology of Flowering plants. Netherlands: Springer. ISBN: 978-1- 4612-7054-6. ● Shivanna, K.R. (2003). Pollen Biology and Biotechnology. New Delhi, Delhi: Oxford and IBH Publishing Co. Pvt. Ltd. ● Mangla,Y., Khanduri, P., Gupta, C.K. 2022. Reproductive Biology of Angiosperms: Concepts and Methods. Cambridge University Press ISBN 978-1-009-16040-7. ● Tandon R, Shivanna KR, Koul M Reproductive Ecology of Flowering Plants: Patterns and Processes 1st ed. 2020 Edition ISBN 978-9811542091.Springer Verlag ● Kapoor, R., Kaur, I. Koul M.2016. Plant Reproductive Biology and Conservation IK International Publishing House Ltd. India ISBN: 9789382332909 36.
Unit 2 Anther and Pollen : Anther wall: Structure and functions, microsporogenesis, microgametogenesis; Pollen wall: Structure and functions, Number Position Character (NPC), pollen viability and storage, Male Germ Unit (MGU) – structure and significance.	5 lectures	August 2025	
Unit 3 Pistil : General structure and types of pistil and ovules; megasporogenesis (monosporic, bisporic and tetrasporic -*Fritillaria* and *Plumbago* type) and megagametogenesis (details of Polygonum type); Organization and ultrastructure of mature embryo sac; cell specification; Female Germ Unit – structure and significance.	4 lectures	September 2025	
Unit 4 Pollination : Types (Self, cross, geitonogamy, xenogamy), significance; Structure of the stigma and style; Pollen-pistil interactions- capture, adhesion, hydration, pollen tube penetration; Path of pollen tube in the pistil; Role of synergids in pollen tube attraction; Double fertilization; Polytubey block.	4 lectures	September 2025	
Unit 5 Self-Incompatibility : Basic concepts (interspecific, intraspecific, homomorphic, heteromorphic, GSI and SSI); Methods to overcome self-incompatibility (in brief): mixed-pollination, intraovarian and in vitro pollination and fertilization, modification of stigma surface, parasexual hybridization.	4 lectures	October 2025	
Unit 6 Endosperm : Types (2 examples each), development, structure and functions; Genomic imprinting.	2 lectures	October 2025	

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Unit 7 Embryo : General pattern and comparison of development of dicot and monocot embryo (initial apical cell and basal cell polarity, globular embryo with radial polarity, mature embryo); Suspensor: structure and functions; Embryo-endosperm relationship; Nutrition of embryo, haustorial systems: Embryo patterning.	4 lectures	October 2025	Additional Resources: ● Shivanna, K.R., Tandon, R. (2020). Reproductive Ecology of Flowering Plants: A Manual. Springer (India) Pvt. Ltd. New Delhi, Heidelberg, New York, Dordrecht, London ● Shivanna, K. R., & Rangaswamy, N. S. (2012). Pollen biology: a laboratory manual. Springer Science & Business Media.
Unit 8 Seed : Structure and importance of seed as diaspore, as storage organ; germination and seedling formation.	2 lectures	November 2025	
Unit 9 Polyembryony and apomixis : Introduction, types, causes and applications.	2 lectures	November 2025	
Unit 10 Applications of Reproductive Biology : Haploid embryos (androgenesis and gynogenesis in brief)- concept and significance; crop productivity and conservation (5-6 points with special reference to reproductive biology).	2 lectures	November 2025	
• Revision • Assignment/Presentation • Mock		November 2025	

Course : B. Sc. (H) Botany, 3rd year, Sem. V [1st August 2025 – 27th Nov. 2025]
Paper : Reproductive Biology of Angiosperms – DSC-12 – PRACTICALS (NEP) Group 1
UPC: 2162013502

Name of Paper : Reproductive Biology of Angiosperms, & Code (2162013502)	Allocation of Lectures	Month wise schedule	References
1. Anther: Wall and its ontogeny (permanent slides/photomicrographs of pollen wall layers: epidermis, middle layer and endothecium can be studied in young anther and mature anther), tapetum (amoeboid and glandular), Microspore mother cell, spore tetrads, uninucleate, bicelled, and dehisced anther; Temporary stained mounts of T.S. anther to study the organization.	2 Practicals	August 2025	
2. Pollen: General morphology, dyad, pseudomonads, polyads, massulae, pollinia (slides/digital resources, fresh material); Ultrastructure of pollen wall (micrograph); Pollen viability: tetrazolium test/FDA; Pollen fertility test: acetocarmine test; Germination: calculation of percentage germination in different media using hanging drop/sitting method. (Suggestion: Standard medium should	2 Practicals	August 2025	

be Brew-Baker & Kwack's medium. Comparison can be made between Brew-Baker & Kwack's medium with calcium/ Boron/ Sucrose and without calcium/ Boron/ Sucrose. This will help students to comprehend the importance of Calcium Sucrose and/or Boron in pollen germination).			
3. Temporary mounts of pollen grains cleared with 1N HCl/KOH to study germ pores; Ultrastructure of male germ unit (MGU) through micrographs.	1 Practical	September 2025	
4. Ovule: Types-anatropous, orthotropous, amphitropous/campylotropous, circinotropous, unitegmic, bitegmic; tenuinucellate and crassinucellate; Special structures: endothelium, obturator, hypostase, caruncle, elaiosomes, and aril (permanent slides/specimens/digital resources).	2 Practicals	September 2025	
5. Female gametophyte: developmental sequence of monosporic embryo sac only; Ultrastructure of Female Germ Unit (transmission electron micrographs of: egg cell, synergid); central cell; antipodals.	1 Practical	September 2025	
6. Pollination Adaptations/Syndrome (1 example of each): Diurnal: (Insect {any 1-2 types} and Bird), Nocturnal (Bat and Moth)); bagging experiment (only demonstration); **project on pollination.	1 Practical	October 2025	
7. Intra-ovarian pollination; Test tube pollination (through digital resources).	1 Practical	October 2025	
8. Endosperm: Dissections of developing seeds for endosperm with free-nuclear haustoria (Suggested material: *Cucumis sativa*, *Grevillea robusta*, *Croton*).	1 Practical	October 2025	
9. Apomixis: Study of organization of aposporous and diplosporous embryo sac using photomicrographs of cleared ovule (DIC and/or confocal generated images).	1 Practical	October 2025	
10. Embryogenesis: Study of development of dicot embryo through permanent slides; dissection of developing seeds for embryos at various developmental stages (Suggested material: Crotalaria, Calendula); Study of suspensor through electron micrographs.	2 Practicals	November 2025	
11. Seed dispersal mechanisms (adaptations through live specimens/e resources: Autochory, Anemochory, Hydrochory, Zoochory, Myrmecochory, describe any 3 of them with 2 examples each), **project on seed dispersal. ** The projects can be on pollination/ seed dispersal or any other topic based on the scope of reproductive biology. It can be a write-up with	2 Practicals	November 2025	

photographs. The students can also make a digital project submission in the form of a documentary of 5-10 min			
• Revision • Project • Mock Practical Exam		November 2025	