University of Kerala

Discipline	**BOTANY**				
Course Code	**UK2DSCBOT103**				
Course Title	**REPRODUCTIVE BOTANY AND MICROTECHNIQUE**				
Type of Course	**DSC**				
Semester	**II**				
Academic Level	**200 - 299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	04	03 Hours	-	02 Hours	05 Hours
Pre-requisites	Basic understanding of plant biology at the high secondary school level.				
Course Summary	Reproductive Botany covers the study of plant reproduction, pollination, fertilization, and seed development. Microtechnique involves microscopic methods for studying plant structures and processes.				

Module	Unit	Content	Hrs
I		**Structural organization of flower**	**12**
	1	Anther and Palynology: Development, structure and functions of anther wall- microsporogenesis- structure of pollen grain, pollen wall, MGU (male germ unit); NPC system; Palynology and scope (a brief account)	
II	2	Ovule- development, structure, types- Megasporogenesis – (tenuinucellate and crassinucellate), monosporic, bisporic, and tetrasporic; megagametogenesis - organization and ultrastructure of mature embryo sac.	
III		**Pollination**	**10**
	3	Pollination types - Self-pollination- Cross-pollination- significance and adaptations - entomophily, anemophily,hydrophily & zoophily (birds, squirrels, bats, and snails – one example for each). Advantages & disadvantages of self & cross-pollinations. Contrivances to cross pollination: dicliny, self sterility, dichogamy, heterostyly, and herkogamy with one example each	
IV		**Fertilization**	**08**
	4	Pollen germination- entry of pollen tube - double fertilization and its significance- structure of dicot and monocot embryo; Endosperm- types and functions- Polyembryony (brief account)	
V		**Microtechnique**	**15**

	5	Introduction to microtechnique: killing and fixing Dehydration - agents used - ethyl alcohol.	
	6	Sectioning: hand sections, serial section; Microtome - rotary, sledge (application only).	
	7	Staining technique: principle of staining; stains – Saffranin, hematoxylin, fast green, acetocarmine; vital stains & mordants with examples. Types of staining - single staining, double staining.	
	8	Mounting and mounting media -semi-permanent (glycerine), permanent (DPX, Canada balsam).	
	9	Types of micropreparations-Wholemount, maceration, smear, squash.	

Practical		
	1. Dissect and display parts of different types of flowers. 2. Identification of c.s. of anther, embryo sac, and embryo 3. Identify the different types of ovules 4. Familiarize, with micropreparation, use of stains, fixatives, and mounting media. 5. Preparation of smears and squash (demonstration only) 6. Demonstration of microtome sectioning 7. Preparation of single stained hand sections (permanent demonstration only)	**30**

Suggested Reading

1. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
2. Johri, B.M. l (1984). Embryology of Angiosperms, Springer-Verlag.
3. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms,
4. Vikas PublishingHouse. Delhi. 5th edition.
5. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH
6. Publishing Co. Pvt.Ltd. Delhi.

Web links

1. https://agriculturistmusa.com/plant-e mbryology/
2. http://www.ppup.ac.in/download/econtent/pdf/JNL%20College%20(%20Pallavi%20for%20Botany%20B.Sc%20Part%20II)%20Topic-Plant%20embryology%20part%201.pdf

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Familiarize the techniques for the preservation and processing of tissues	U	PSO-1,2,4

CO-2	Apply practical experience in microtechnique and histochemistry in laboratories	R, U, Ap	PSO-4
Co-3	Understand the morphology and development of reproductive parts	U	PSO-1,2
C0-4	Creates awareness about different types of pollination	C	

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Reproductive Botany and Microtechnique

Credits: 3:0:1 (Lecture:Tutorial:Practical:)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	1	1,2	U	F,C,P	L,T	
2	2	4	R, U, Ap	F, C,P		P
3	3	1,2	U	F,C	L,T	
4	4	1	C		L,T	

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓	✓	✓
CO 3	✓	✓		✓
CO 4		✓		✓