University of Kerala

Discipline	**BOTANY**				
Course Code	**UK2DSCBOT101**				
Course Title	**PLANT WORLD II**				
Type of Course	**DSC**				
Semester	**II**				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	04	03 Hours	-	02 Hours	05 Hours
Pre-requisites	UK1DSCBOT101				
Course Summary	The purpose of this course is to demonstrate that Plant Science students will have met all learning outcomes in the major course, prior to passing to the next semester by observing, critically evaluating and documenting relevant in-class and co-curricular activities. Preparatory work will include observing and learning from a diversity of activities, including theoretical sessions, field observations and laboratory sessions. Career pathways and higher research options will be introduced enabling students to choose pathways to attain their goals.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		**How plants colonised land**?	**04**
	1	Evolution of Tracheary elements, Vascular systems, Stelar evolution, Pollen types, Pollen morphology, Wind pollination and Insect pollination, Seed habit.	
II		**Tracheophytes: Pteridophytes (Non Seed plants)**	**04**
	2	*Psilotum, Nephrolepis, Azolla*: Morphology of Gametophyte and Sporophyte, Structure of Cones.	
III		**Tracheophytes: Gymnosperms & Angiosperms (Seed plants)**	**20**
		Gymnosperms	
	3	*Pinus*: Morphology of Sporophyte and Gametophyte (Pollen grain & Ovule) , Structure of Cones.	
		Angiosperms	
	4	Flowering plant morphology: Root types: Tap root, Fibrous root, Aerial root, Prop root, Stilt root, Velamen root, Pneumatophore, Haustoria. Shoot morphology: Nodes, Internodes, Terminal bud, Axillary bud, Sympodial/Monopodial growth. Stem shapes (Cylindrical, Succulent, Flattened, Winged). Bark: Definition and Types, Emergences (prickles, thorns, tendrils), Pulvinus, Scars.	

		Leaf types: Simple, Compound, Leaf shape: Leaf apex, leaf margins, leaf base. Bsic structure of a flower, Inflorescence types: Study of basic types, Racemose, Cymose (Sub types not required).	
	5	Basic structure of a fruit: Types: Simple, Aggregate, Multiple Pseudocarps. Dicot and monocot embryo, Seed structure and methods of seed dispersal.	
	6	Preservation methods: Preservation using dry & wet methods. Herbarium and use of Formaldehyde.	
IV	**Role of Tracheophytes in Nature**		
	7	Ecological & Economic importance of Pteridophytes, Gymnosperms, Angiosperms.	**02**
V	**Future prospects and Career openings in Plant Sciences**		**15**
	8	Teachers, Garden managers, Plantation Managers, Entrepreneurs, Photographic specialists, Botanical artists, Researchers, Herbarium curators, Bonsai artists, Sustainability managers, Germplasm conservors, Organic farmers, Environmental experts in NGOs, Environmental Impact assessment experts, Biodiversity conservation experts, Plant breeders, Biodiversity activists, Aquascaping experts.	
	Research Institutes		
	9	Students should be familiarised with the work going on in Institutes: Inside Kerala: CSIR Institutes: NIIST, ICAR institutes -CTCRI, CMFRI, KSCSTE: JNTBGRI, KFRI, CWRDM, RGCB, MBGIPS. **Pan INDIA**: CFTRI-Mysore, IARI-PUSA, NBPGR-New Delhi, BSI, IISC-Bangalore, TIFR-Hyderabad, DRDO, BARC-Trombay, NBRI-Lucknow, IIHR-Mysuru. IISR-Kozhikode, ICAR-SBI, Coimbatore, UAS Bangalore. **Private sector**: Mahyco Private Ltd., Biocon, Pharmaceutical firms, Coffee, Tea, Cadbury Plantations, Indo-American hybrid seeds.	

Practicals		
	1. Familiarisation of various stelar types: protostele, actinostele, siphonostele, solenostele (*Marselia* rhizome), dictyostele (*Pteris* petiole), atactostele (Grass stem). 2. Structure of vascular bundles- Collateral, Conjoint (open, closed, concentric, bicollateral) and radial. 3. Maceration of Eupatorium stem to separate and identify Tracheids, Parenchyma, and Vessel members. 4. Measurement of any one vascular element, using a micrometer. 5. Field visits to collect different leaf types & different inflorescence types. Preparation and submission (herbarium) of leaf types and inflorescences. 6. Collection and submission of various seed types. Observing, Recording their surface peculiarities. 7. Pollen surface ornamentation study of 5 plant using light microscopy. 8. Pollen germination study and Pollen viability testing using acetocarmine.	**30**

	9. Preparation of an e-portfolio, detailing the activities performed during the course and submitting for evaluation.	

Suggested Reading

1. The Evolution of Plants, K.J Willis & J C Mc Elwain, Oxford University Press, ISBN 0-19-567604-1.
2. Plant Form. An Illustrated Guide to Flowering Plant Morphology, Adrian D.Bell, Oxford University Press, ISBN 0-19-854279-8.
3. Taylor A. Steeves & Vipen K. Sawhney 2017.Essentials of Developmental Plant Anatomy, Oxford University Press.
4. A Short Guide to Writing about Biology, *Ninth Edition,* Jan A. Pechenik, ISBN 978-0-321-98425-8 (Student Edition).
5. Plant Anatomy, Third Edition. A.Fahn, Pergamon Press. ISBN 0-08-028030-7.
6. Life. The Science of Biology, Twelfth edition.
7. Hirendra Chandra Gangulee, Asok Kumar Kar. 2011, College Botany, Volume II,
8. Web sites of research institutions mentioned in the syllabus.

Course Outcomes

No.	Upon completion of the course, the graduate will be able to,	Cognitive Level	PSO addressed
CO-1	Recognize and appreciate nature, both on campus and at nearby sites.	U	PSO-1,3
CO-2	Summarize key ideas in the plant sciences.	R, U	PSO-2,7,8
CO-3	Understand and evaluate the vast career pathways and opportunities across the agricultural and plant science disciplines.	U,E	PSO-1,10
CO-4	Acquire a broad grasp of current knowledge pathways across the Plant Science discipline.	U, An	PSO-1,3
CO-5	Reflect on how field experiences provide new insights into the plant sciences, and how it can contribute to career pathways and career goals.	E,Ap,An	PSO-4
CO-6	By discovering and critically analysing information, interpreting data and gaining a conceptual grasp of common biological principles, learn to execute the scientific method.	U,Ap,An	PSO-6,7,8,9,10

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

Name of the Course: Plant World II

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

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	1	1,3	R, U	F, C	L, T	P
2	2	2,7,8	R, U	F, C	L, T	P
3	3	1,10	U, E	F, C, P	L, T	
4	4	1,3	R, U,E	F, C	L,T	
5	5	4,10	E, Ap, An	F, C, P	T	P
6	6	6,7,8,9,10	U, Ap, An	C, P, M	T	P

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

Mapping of COs with PSOs and POs :

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO7	PO8	PO9	PO10
CO 1	3	-	3	-	-	-				
CO 2	2	-	-	-	-	-	3	2		
CO 3	2	-	1	-	-	-				3
CO 4	3	-	3	-	-	-				
CO 5	-	-	-	3	-	-				1
CO 6	-	-	-	-	1	2	3	3	3	3

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		✓		✓
CO 5		✓		✓
CO 6			✓	