UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN BOTANY

SYLLABUS WITH EFFECT FROM 2023-2024

LABORATORY COURSE-II COVERING PAPERS, IV, V AND VI

Title of the Course		**LABORATORY COURSE-II**					
Paper Number		**CORE VII**					
Category	Core	**Year**	I	**Credits**	4	**Course Code**	423C2D
		Semester	II				
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**		
		4	-	4	8		
Pre-requisite		Theoretical understanding of plant taxonomy, ecology and phytogeography, plant anatomy and embryology as well as basic laboratory skills for the relevant core course.					
Learning Objectives:							
C1		Understand and develop skill sets in plant morphological, floral characteristics and artificial key preparation.					
C2		Expedite skilled workers to carry out research in frontier areas of plant science.					
C3		Classify meristems and identify their structures, functions and roles in monocot and dicot plants growth and secondary growth of woody plants					
C4		Learn the importance of plant anatomy in plant production systems.					
C5		Know about different vegetation sampling methods.					

UNIT	EXPERIMENTS
I	**TAXONOMY AND ECONOMIC BOTANY OF ANGIOSPERMS** Description of a species, based on virtual herbarium and live specimens of the families mentioned in the theory. Study the products of plants mentioned in the syllabus of economic botany with special reference to the morphology, botanical name and family. Prepare an artificial key. Solving nomenclature problems. **Field trip:** A field trip at least 3-4 days to a floristically rich area to study plants in nature and field report submission of not less than 20 herbarium sheets representing the families studied.
II	**ANATOMY** 1. Collection and selection of specimen for anatomical sectioning. 2. Fixation and fixatives. 3. Stains and staining. 4. Micrometry - i) Ocular ii) Stage. 5. Camera lucida - i) Prism type ii) Mirror type 6. Wood maceration technique. 7. Vein clearing technique procedure. 8. Nodal anatomy - Sections of uni, tri and multilacunar nodes. 9. Study of stomatal types in plant leaves.

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	10. Anamolous secondary thickening in stem: i) *Aristolochia*. ii) *Nyctanthes* iii) *Dracaena*. 11. Techniques in making temporary and permanent microscopic preparations. Submission of not less than 5 permanent slides (wood section, free hand, peeling, maceration, clearing).
III	**EMBRYOLOGY** 1. Observation of T.S. of anther. 2. Observation of ovule types. 3. Observation of mature embryo sacs. 4. Dissection and observation of embryos (globular and cordate embryos). 5. Study of pollen morphology 6. Study of in vitro pollen germination. 7. Observation of endosperm types.
IV	**ECOLOGY** 1. Determination of the quantitative characters of a plant community by random quadrat method (abundance, density, dominance, species diversity, frequency) in grazing land, forests. 1. Estimation of above ground and below ground biomass in a grazing land employing minimum size of quadrat. 2. To determine soil moisture, porosity and water holding capacity of soil collected from varying depth at different locations. 3. Determination of pH of soil and water by universal indicator (or) pH meter. 4. Determination of dissolved oxygen. 5. Estimation of carbonate. 6. Estimation of bicarbonate. **Spotters:** 1) Conservation programmes 2) Histogram showing Raunchier normal frequency diagram 3) Food web 4) Secchi disk 5) Wind mill 6) Anemometer 7) Rain gauge 8) Hydrograph 9) Greenhouse effect 10) Acid rain 11) Ozone depletion 12) World - Hot spots 13) National parks 14) Biosphere reserves 15) Intellectual Property Rights-Copy rights, Trade mark

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V	**PHYTOGEOGRAPHY, CONSERVATION BIOLOGY & INTELLECTUAL PROPERTY RIGHTS** 1. Mapping of world vegetation 2. Mapping of Indian vegetation. 3. Remote sensing – Analyzing and interpretation of Satellite photographs-Vegetation/ weather. 4. Visit to remote sensing laboratory (at Anna University, Regional Meteorological Centre at Numgambakkam).

Course outcomes: CO	**On completion of this course, the students will be able to:**	**Programme outcomes**
CO1	To gain recent advances in plant morphological and floral characteristics.	K1
CO2	Understand about different floral characteristics and artificial key preparation which employed for plant identification and conservation.	K2
CO3	Recall or remember the information including basic and advanced in relation with plant anatomy and embryology.	K4 & K5
CO4	Apply their idea on sectioning and dissection of plants to demonstrate various stages of plant development.	K3
CO5	Know about different vegetation sampling methods.	K3

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Gokhale, S.B., Kokate, C.K. and Gokhale, A. 2016. Pharmacognosy of Traditional Drugs. NiraliPrakashan, 1st Edition. ISBN: 9351642062.
3. Joshi, S.G. 2018. Medicinal Plants. Oxford & IBH Publishing C., Pvt., Ltd., New Delhi. ISBN: 9788120414143.
4. Cutler, D.F., Botha, C.E.J., Stevenson, D.W., and William, D. 2008. Plant anatomy: an applied approach (No. QK641 C87). Oxford: Blackwell, UK.
5. Sundara, R. S. 2000. Practical manual of plant anatomy and embryology. Anmol Publ. PVT LTD, New Delhi.
6. Panshin, A.J and C. de Zeeuw.1980.Textbook of wood technology. Structure, identification and uses of the commercial woods of the United States and Canada. Fourth Edition. New York: McGraw-Hill Book Company.
7. Sharma, H.P. 2009. Plant Embryology: Classical and Experimental, Bombay Popular Prakashan, ISBN-8173199698, 9788173199691.

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Reference books:

1. Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & Wiley Publications.
2. Mann J. Davidson, R.S and J.B. Hobbs, D.V. Banthorpe, J.B. Harborne.1994. *Natural Products*. Longman Scientific and Technical Essex.
3. Gopalan, C., B.V. Ramasastri and S.C. Balasubramanian. 1985. Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad.
4. Harborne. J.B. 1998. Phytochemical methods. A guide to modern techniques of Plant Analysis, Chapman and Hall publication, London.
5. Traditional plant medicines as sources of new drugs. P.J Houghton in Pharmacognosy.Trease and Evan's.16 Ed .2009.
6. Sundara Rajan, S, 2003. Practical Manual of Plant Anatomy and Embryology 1st ed, Anmol Publications, ISBN-812610668.
7. Katherine Esau. 2006. Anatomy of Seed Plants. 2nd edition, John Wiley and Sons.

Web resources:

1. https://www.kobo.com/gr/en/ebook/phytochemistry-2
2. https://www.amazon.in/Textbook-Pharmacognosy-Phytochemistry-Kumar-Jayaveera-ebook/dp/B06XKSY76H
3. https://www.amazon.in/Computational-Phytochemistry-Satyajit-Dey-Sarker-ebook/dp/B07CV96NZJ
4. https://studyfrnd.com/pharmacognosy-and-phytochemistry-book/
5. https://www.worldcat.org/title/textbook-of-pharmacognosy-and-phytochemistry/oclc/802053616
6. https://www.worldcat.org/title/phytochemistry/oclc/621430002

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	S	3	3
CO2	3	3	2	3	3	2	1	2	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	1	2	3
CO5	3	2	2	3	3	3	3	2	3	3

S-Strong (3) M-Medium (2) L-Low(1)

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