UNIVERSITY OF MADRAS
B.Sc. DEGREE PROGRAMME IN PLANT BIOLOGY AND PLANT BIOTECHNOLOGY
SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Course	**PLANT MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY- CELL BIOLOGY, GENETICS AND PLANT BREEDING - PRACTICAL-V**						
Category	Core	**Year**	III	**Credits**	4	**Course Code**	**339C51**
		Semester	V				

Instructional Hours perweek	**Lecture**	**Tutorial**	**Lab Practice**	**Total**
	-	1	5	6

Pre-requisite	Theoretical understanding of plant taxonomy, cell biology and genetics as well as basic laboratory skills for the relevant core course.

Learning Objectives	
C1	To study morphological characters of the families.
C2	Able to describe the plant technically using the floral characteristics.
C3	To preserve the plants and prepare herbarium sheets. To identify the structure of various cell organelles.
C4	To be able to identify the local flora. To understand genetics through problem solving
C5	To understand the economic importance of the plants. To study various plant breeding techniques.

Course outcomes: On completion of this course, the students will be able to:	**Programme Outcomes**
1. Recognize the distinguishing plant morphological characters. 2. Identify the structure of cell organelles and stages of cell division.	K1
3. Identify locally available plants to their respective families.	K2
4. Develop comprehensive skills in field identification, collection of specimens, writing technical description, botanical drawings and herbaria preparation.	K3
5. Construct floral diagram and write floral formula for a given flower.	K4
6. Validate the plant specimen by analyzing and dissecting the vegetative and floral characters. 7. Interpret the given genetic data to develop genetic map based on the principles of Mendelian inheritance and gene interaction.	K5

PLANT MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

EXPERIMENTS

1. Morphology of root, stem and leaf modification, types of inflorescence.
2. Plants of local flora included under theory syllabus and family identification and derivation based on reasoning.
3. Dissection, identification, observation and sketching the floral parts of the plants belonging to the families included in the syllabus.
4. Students must describe the floral parts, draw the L.S., floral diagram and write the floral formula of at least one flower from each family.
5. Twenty (20) Herbarium sheets, field notebook and bonafide record to be submitted.
6. Study the products of plants mentioned in the syllabus of economic botany with special reference to the morphology, botanical name and family.
7. Field trips to places for observation, study and collection of plants prescribed in the syllabus for 2 to 5 days under the guidance of faculties.

CELL BIOLOGY

1. Study of the photomicrographs of cell organelles.
2. Ergastic substances - starch grains, aleurone grains, crystals – cystolith and raphide.
3. Study the polytene and lamp brush chromosome structure through photograph.
4. Identification of different stages of mitosis by using squash and smear techniques – Onion root tip.

GENETICS

1. Genetic problems – test cross, back cross and allelic interaction.
2. Construction of chromosome map – three point test cross
3. Multiple alleles problems.

PLANT BREEDING

1. Emasculation technique.
2. To test the viability of seeds using Tetrazolium chloride.
3. Genetic models of heterosis.
4. Phenotype of heterosis (Maize).

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination Question paper)	Questionsrelatedtotheabovetopics,fromvariouscompetitiveexaminationsUPSC/TRB/NET/UGC–CSIR/GATE/TNPSC/otherstobesolved (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 Texts	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. Nirali Prakashan, 1st Edition. ISBN: 9351642062. 3. Rendle, A.B. 1980. The Classification of Flowering Plants (Vol. I & II), Vikas Students Education. 4. Pandely, B.P. 1987. Taxonomy of Angiosperms. 5. Nordenstam, B., EI Gazaly, G and Kassas, M. 2000. Plant Systematics for 21st Century. Portlant Press Ltd., London.
Reference Books	1. MannJ. Davidson, R.SandJ.B.Hobbs, D.V.Banthorpe, J.B.Harborne. 1994.*Natural Products*.Longman Scientificand Technical Essex. 2. Gopalan,C., B.V.Ramasastri and S.C.Balasubramanian.1985.Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad. 3. Grant, W.E. 1984. Plant Biosystematics. Academic Press, London. 4. Harrison, H.J. 1971. New Concepts in Flowering Plant Taxonomy. Rieman Educational Book Ltd., London. 5. Jones, A.D. and Wilbins, A.D. 1971. Variations and Adaptations in Plant Species. Hiemand& Co. Educational Books Ltd. London. 6. Gupta P.K. 2017. Cell and Molecular Biology (5th ed.), Rastogi Publications, Meerut. 7. Krebs J.E., Goldstein E.S and Kilpatrick S.T. 2017. Lewin's GENES XII (12thed.). Jones & Bartlett Learning. 8. Jackson, S.A., Kianian, S.F., Hossain, K.G and Walling, J.G. 2012. Practical laboratory exercises for plant molecular cytogenetics. In Plant Cytogenetics (pp. 323-333). Springer, New York
Web resources	1. https://www.amazon.in/Practical-Taxonomy-Angiosperms-R-Sinha/dp/9380578210 2. https://www.wileyindia.com/plant-science/practical-taxonomy-of-angiosperms-2ed.html 3. https://www.flipkart.com/practical-taxonomy-angiosperms/p/itm194794e7a76e8 4. https://books.google.co.in/books/about/Plant_Taxonomy.html?id=uWg76rCqA68C 5. https://www.amazon.in/PLANT-TAXONOMY-Sharma/dp/0070141592 6. https://www.kopykitab.com/Economic-Botany-By-Manoj-Kumar-Sharma-eBook.

	7. https://www.amazon.in/Cell-Biology-Dr-Renu-Gupta/dp/8193651219 8. https://www.amazon.in/Practical-Handbook-Genetics-Vikas-Pali/dp/932727248X 9. https://www.amazon.in/Practical-Handbook-Plant-Breeding-Vikas/dp/9327272498

Mapping with Programme Outcomes:

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

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