

UNIVERSITY OF KERALA

THIRUVANANTHAPURAM

FOUR YEAR UNDERGRADUATE PROGRAMME SYLLABUS

UoK - FYUGP

(2024 Admission Onwards)



Faculty:	:	Science
BoS:	:	Botany
Subject:	:	Botany

University of Kerala
Senate House Campus, Palayam
Thiruvananthapuram – 695 034,
Kerala, India



University of Kerala

Discipline	BOTANY				
Course Code	UK1DSCBOT102				
Course Title	INTRODUCTORY BOTANY				
Type of Course	DSC				
Semester	I				
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	Basic understanding of plant biology at the higher secondary level				
Course Summary	Students can study plants and their biology, including how they grow and adapt to their environment.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I	An Introduction to the Science of Botany		07
	1	What is Botany? Characteristics of Plants, Levels of biological organization from atom-Molecules - Macromolecule- Organelle - Cell-Tissue- Tissue Systems – Organ - Organism - Population-Community- Ecosystem- Biosphere (Brief account).	
	2	Characteristic features of plant Kingdom - Eukaryotic cell- the important character of the plant cell (Cellulose -cell wall & plastids)- single to multicellular structure - sexual & asexual reproduction- Autotrophic synthesize food by Photosynthesis; Plant kingdom- Classification- Cryptogamae and Phanerogamae.	
II	Why Study Plants?		08
	3	Plants are the foundation of ecosystem-primary producers - Supplying Food and Energy)- Maintains Climatic Conditions - (production of oxygen-removing the carbon dioxide from the surroundings). Biogeochemical Cycles- Aesthetics for Humans- Natural habitat for most organisms.	
	4	Plants around us- Crops (Wheat, Mango) Poisonous (Cerebera, Datura), Weeds (<i>Ageratum sp.</i> , <i>Alternanthera sp</i>) Carnivorous Plants (<i>Dionaea</i> , <i>Nepenthus</i>), Ornamental plants (Orchids, Rose), Wild ornamental plants (<i>Osbeckia Sp.</i> <i>Memecylon</i>), Invasive plants (<i>Sphagneticola trilobata</i> , <i>Mimosa diplotricha</i>), Mistleto (<i>Loranthus</i>), Parasitic plants (<i>Cuscuta</i>).	
	5	Plants Defense– (against herbivorous and animals)- Structural defense – Barrios-cuticle, wax, bark; Adaptations- thorns, prickles, shrinkage (<i>Mimosa</i>), latex, trichomes, crystalliferous cells, and silica cells.)-Biochemical defense (alkaloids, phenolics, terpenes, and flavonoids) (Brief study)	

III	Plant Morphology		08
	6	Roots- types (Tap root, fibrous and adventitious). Stem - types (aerial and underground). Leaf - parts of the leaf; phyllotaxy, types venation. Inflorescence types – Cymose, Racemose, and Special (Cyathium and Hypanthodium). Flower - (Parts, Symmetries, Aestivation Types). Fruit – Simple (Fleshy, Dry) Aggregate, Multiple (Syconous, Sorosis) with two examples. Seed and its Structure (Brief study only).	
IV	Botanical Skills and Techniques		07
	7	Familiarization with Microscopes (Simple and Compound Microscope), and photomicrography. Plant Collection and Preservation: Dry Preservation – Herbarium). Killing and fixing. Purpose and Importance of FAA. Whole mounts and sections – Hand Sectioning – TS and LS. Staining plant tissues: purpose; stains – Safranin, Crystal violet. <i>Learning Activity: Identify and collect any five flowering plants and Prepare herbarium.</i>	
V	Scope of Botany		15
	9	Importance and Scope: Mushroom cultivation, Agriculture, Horticulture - Garden and Nursery Management, Floriculture- cut flower), Integrated Farming, Micro and macro propagation, Bio-pesticides industry, Dye industry, Perfumery industry, Cloth industry, pharmaceutical industry, Cosmetic industry, and Microgreens.	
	10	Teaching and Research, Technical and field level openings, pharmaceutical sector, Agriculture sector, NGOs, BSI, and Entrepreneurship. <i>Activity: Invited talk by Eminent Botanists to make awareness among students about Career and Entrepreneurial Prospects and Opportunities in Botany.</i>	

Practicals		
	Field Activities (Mandatory) 1. Conduct a laboratory visit and submit reports with the support of Geo-tagged photographs. 2. Prepare a report and presentation on Botanists who made significant contributions to Plant science. 3. Collection/ photograph of different shoots with respect to phyllotaxy, shapes, types, leaf margins, leaf apex, and leaf venation. 4. Collection/photographs of different types of inflorescences. 5. Collection/photographs of different types of Fruits.	30

Suggested Reading

1. Acquciah, G. (2004). *Horticulture: Principles and Practices (II Edn)*. Prentice Hall. India
2. Brown, W.(2021). *The Forgotten Botanist: Sara Plummer Lemmon's Life of Science and Art*. Bison Books. ISBN: 9781496222817 (ISBN10: 1496222814)
3. Davis, P. H., & Heywood, V. H.(1963). *Principles of Angiosperm Taxonomy*. Oliver &

Boyd, London.

4. Eames A. J.(1961). *Morphology of Angiosperms*. McGraw Hill, New York.
5. Gangulee, S. C., Das, K. S., Dutta, C. D., & Kar, A. K.(1968). *College Botany Vol. I, II, and III*. Central Education Enterprises.
6. Gifford, E. M., & Foster, A. S.(1988). *Morphology and Evolution of Vascular Plants*.
7. Pallabhi, V., & Gautham, N.(2005). *Biophysics*. Narosa Publishing House, New Delhi.

References

1. Mason K. A., Jonathan B. L., & Susan R. S. (2013). *Biology (IX Edn)*. McGraw Hill.
2. Narayana, P. S., & Pullaiah, T.(2010). *Eminent Indian Botanists: Past and Present Biographies and Contributions*. Regency Publications, Ansari Road, New Delhi- 110002
3. Pandey, R. K., & Ghosh, S. K.(1996). *A Handbook on Mushroom Cultivation*. Emkey Publications
4. Prasad, M. K., & Krishna, P. M.(1986). *Outlines of microtechnique*. Emkay Publishers, New Delhi.
5. Purohit, S. S. (2005). *Plant Tissue Culture*. Student Edition.
6. Rema, L. P.(2006). *Applied Biotechnology*. MJP Publishers.
7. Sharma, R. R.(2005). *Propagation of Horticultural Crops*. Kalyani Publishers.
8. Sharma, V. K. (1991). *Techniques in microscopy and cell biology*. Tata McGraw-Hill, New Delhi.
9. Singh, G. (2012). *Plant Systematics. Theory and Practice. 3rd edition*. Oxford & IBH Pvt. Ltd., New Delhi.
10. Taylor, T. N. (1981). *Paleobotany: An Introduction to Fossil Plant Biology*. McGraw Hill, New York.

Course Outcomes

No.	Upon completion of the course, the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the Level of biological organization of communities and ecosystems and acquire the knowledge of characteristic features of the plant kingdom.	U	PSO-1,2
CO-2	Understand the relevance of the plants in the ecosystem, will develop the ability to identify the diversity of plants around us and the defense mechanism in plants.	R, U	PSO-1,2
CO-3	Understand the morphological features of plants	R, U	PSO-1
CO-4	Develop basic skills required to study Botany in detail and gain a foundational understanding of the basic instruments and techniques used in Botanical studies.	U, Ap	PSO-1, 4

CO-5	The learner will develop evolving abilities and opportunities in diverse themes in botany and gain insights into the potential of personal prosperity and career opportunities in plant science.	U, Cr	PSO-4, 6
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R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Introductory Botany

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	R, U	F,C	LT	
2	2	1,2	R, U	F, C	LT	
3	3	1	R, U	F, C	L,T	
4	4	1,4	U, Ap	C, P	P	P
5	5	1,6	U, Cr	P,M	L,T	P

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		✓		✓
CO 5		✓	✓	✓



University of Kerala

Discipline	BOTANY				
Course Code	UK1DSCBOT104				
Course Title	PLANTS IN DAILY LIFE				
Type of Course	DSC				
Semester	I				
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	No Pre-requisites				
Course Summary	The course 'Plants in Daily Life' explores the diverse roles plants play in our everyday lives, such as nutrition, medicine, industry, and culture. Students learn about the botanical characteristics, innovative uses, and practical applications of various plant species. The course emphasizes the importance of sustainable practices and the conservation of plant resources for future generations.				

Module	Unit	Content	Hrs
I	Plant services to humans in everyday life		06
	1	Introduction to the science of Botany, plant resources in everyday life.	
	2	Role of plants: Air purifier (Photosynthesis); Plants used in rituals/festivals; pollution removal (Phytoremediation), Pollution indicator (lichens), and nutrient source (litter, manure).	
	3	Herbal basket: Following plants to be studied with respect to botanical source, part of the plant used, and medicinal uses: <i>Ocimum sanctum</i> , <i>Adhatoda vasica</i> , <i>Zingiber officinale</i> , <i>Curcuma longa</i> , <i>Aloe vera</i> , <i>Andrographis paniculata</i> , <i>Cymbopogon citratus</i> , <i>Coleus aromaticus</i> , <i>Acorus calamus</i> , <i>Boerhaavia diffusa</i> , <i>Oldenlandia corymbosa</i> .	
II	Plant resources and utilization-I		04
	4	Botany and utility of the following plants: a. Cereals: Rice, Wheat, Maize b. Millets: Ragi, Jowar, and Bajra c. Legumes: Bengal gram, Green gram, Black gram d. Cash crops: Cashew, Sugarcane, and Cocoa e. Non-alcoholic beverages: Tea, Coffee	

		f. Alcoholic beverage: Toddy (Coconut tree), Palm vine (Palm) g. Vegetable Crops: Cabbage, Brinjal	
III	Plant resources and utilization-II		06
	5	Fibers: Cotton, Coir, Banana (Separation, storing, and drying of fibers from Banana leaf sheath). (in brief). Psychoactive drugs from Hemp and poppy and their mode of action. (in brief).	
IV	Utilization of plants in value-added products		14
	6	Herbal Cosmetics- Introduction, scope and advantages over Synthetic Cosmetics- Cosmaceuticals.	
	7	Plants used in Skincare - Aloe, Cucumber, Facewash- Rosewater, Hair wash - Hibiscus and Amla, Face creams - Papaya, Turmeric, Hair dyes - Henna, Indigofera, Hair growth- Eclipta.	
	8	Herbal infusions – Clitoria, Hibiscus, Tulsi, Guava leaf	
	9	Preparation of natural dyes from Marigold, Hibiscus. (Brief account only).	
	10	Plants used for Aromatherapy – Essential oils from Citrus, Sandal, and Lavender.	
V	Modern applications and innovations		15
	11	Innovative uses of plants in fields such as a) Biofuels- plant sources-bio-diesel production process - converting plant materials into biofuels (brief account) b) Phytoremediation- Use of plants to remediate polluted environments - contaminated soil and water bodies. c) Case studies of successful phytoremediation projects targeting different types of pollutants (brief account)	

Practicals		
	- Study and identification of plants mentioned in the floral basket category - Visit to tea and coffee processing unit and report the same - Collect and properly preserve the economically used plants or plant products - Identify the plants of economic importance within the Campus and preparation of a report - To conduct an exhibition of the economically used plants or plant products. - Demonstration on Preparation of herbal dye - Demonstration on the preparation of herbal infusion	30

Suggested Reading

- Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
- Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.

3. Chrispeels, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones & Bartlett Publishers,

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the role of plants in human welfare.	U, An	PSO-1,2
CO-2	Course familiarizes with the use of various plants used by humans for food, fiber, beverages, and medicine.	R, U	PSO-1
CO-3	Gain knowledge about various plants of economic use.	R, U	PSO-2
CO-4	Create awareness on the conservation of medicinal plants and the use of natural plant products as alternatives to synthetic products	R, U, C	PSO-I,4
CO-5	Identify various plant-based industries and their economic significance	R, U, An	PSO-1,8

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

Name of the Course: Plants in Daily Life

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	R,U	F, C	L, T	
2	2	1	R, U	F, C	L, T	
3	3	2	R, U	F, C	L, T	
4	4	1,4,8	R, U, C	F, C,Ap	L, T	P
5	5	1.2.4	R, U, An	F, P, M	L	P

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

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	2										
CO 2		1										

CO 3		2										
CO 4	1			4						4		6
CO 5						6						

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	✓	✓	✓	✓



University of Kerala

Discipline	BOTANY				
Course Code	UK1MDCBOT101				
Course Title	LANDSCAPING AND GARDENING				
Type of Course	MDC				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	03	03 Hours	-	-	03 Hours
Pre-requisites	No Pre-requisites				
Course Summary	Through this course, students will acquire knowledge about gardening and landscaping as a growing business venture. They will understand the growing demand in the present day. The course may motivate the students to get into gardening and landscaping startups.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		Introduction to Landscaping and Gardening	08
	1	Importance, Scope, and prospects of landscaping and gardening.	
	2	Designing and Preparation of Landscapes and Gardens. Outdoor and Indoor concept – Functional uses of plants for different purposes.	
	3	Landscape- Principles, Elements, Designs; Types of Landscape– Landscaping Highways, City Parks and Home. (brief study only)	
II		Lawns - preparation and maintenance	08
	4	Lawn – Types of lawn grasses, methods of establishing lawn – Land preparation, planting, mowing, rolling,	
	5	Application of manures and fertilizers, irrigation, weed control, plant protection, and rejuvenation of lawns.	
III		History of gardening trends	08
	6	Types of gardens – Styles in gardening- Characteristics and components of English gardens, Mughal gardens, Japanese gardens, Persian, French and Italian gardens- Popular gardens in India.	
	7	Garden Components – Living components – Non-living components – Enrichment items- Description and uses. Garden enclosures, surfacing materials, roads, and paths, advantages and disadvantages- examples	
		Selection of plants for gardens	12

IV	8	Annuals and herbaceous perennials — Types ,colour schemes, planting designs – Season and methods of planting – Cultural practices.	
	9	Shrubs and Trees – Types, planting, pruning, maintenance, rejuvenation – Trees for landscapes, avenue planting.	
	10	Climber and Creepers – Cacti, succulents – Ferns and palms – planting, care, and management. Learning Activity: 1. Field visit to a well-established nursery to study the techniques of gardening. 2. Virtual visits to two important gardens in the world and submit a report, highlighting its Significance	
V	Specialized Gardens		09
	11	Specialized gardening techniques – Roof Garden, sunken garden, water garden, rock garden. Special requirements, establishment, and maintenance	
	12	Indoor gardening of plants – Function, selection, designs, types of indoor plants- Bonsai (brief account) environmental requirements – Containers and media, method of growing, special care for indoor plants, vertical garden, tray garden, terrarium, etc.	

Suggested Readings

1. Arora, J.S. 1998. Introductory ornamental Horticulture
2. Naik HB, Chandrasekhar SY and Jawaharlal M. Principles of Landscape Gardening. E-book Agrimoon .com
3. Bhattacharjee, S.K. 2004. Landscape Gardening and Design with plants.
4. Bhattacharjee, S..K 2006. Vistas in Floriculture. Pointer publishers
5. Singh,A.K. 2020. Textbook of Floriculture and Landscaping. New India Publishing Agency
6. Bhattacharjee,S.K.(ed). 2006. Advances in Ornamental Horticulture Vol. I to VI. Pointer Publishers, Jaipur.
7. Chadha, K.L. and Choudhury, B. 1992. Ornamental Horticulture in India., ICAR, New Delhi
8. Jindal, S.L. 1987. Flowering shrubs in India. Publications Division, Govt. of India, New Delhi.
9. Swarup.V. 1993. Indoor Gardening, ICAR, New Delhi
10. Kumar, N., 2017, Introduction to Horticulture, Med tech publishers India

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Students will understand the different components of a Garden and the requirement of landscaping.	U	PSO-4

CO-2	Students will familiarise with the important various styles types of Gardens in India and abroad	R, U	PSO-4
CO-3	Students will understand the preparation of Lawn and its maintenance and can apply in home garden	U, Ap	PSO-4
CO-4	Students will be understand the aesthetic significance of various types of plants in landscapes and gardens	U, An	PSO-4
CO-5	Students will be able to understand the aesthetic significance of various special types of gardens and the procedures involved in designing them and based on these information he/she will be able to create new garden designs.	U, Ap, C	PSO-8
CO-6	The course may generate interest in the students to become entrepreneurs in the business of landscaping and gardening	Ap,	PSO-4

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

Name of the Course: Landscaping and Gardening

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

CO No.	CO	PO/P SO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	1	4	U	FC	L,T	
2	2	4	R, U	FC	L,T	
3	3	4	U, Ap	FP		P
4	4	4	U, An	FC		P
5	5	8	U, Ap, C	FC	T	
6	6	4	Ap,	M	T	P

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

Assessment Rubrics:

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Mapping of COs to Assessment Rubrics

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CO 1	✓			✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4	✓			✓
CO 5	✓	✓		✓
CO 6	✓		✓	