CHRIST COLLEGE (AUTONOMOUS), IRINJALAKUDA

BOTANICAL DIVERSITY

Programme	B. Sc.				
Course Title	**Plant Ecology, Conservation & Plant Interactions**				
Type of Course	**Minor**				
Semester	**I**				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	-				
Course Summary	This course offers basic knowledge related to the relationships between plants and their environment, the importance of conservation efforts and the interactions between different plant species.				

Course Outcomes (CO): After completing the Course, the student should be able to:

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools
CO1	Explain the ecological relationships between plants and the environment	U	C	Test/Assignments/Field study
CO2	Explain the importance of biodiversity, causes for loss and its consequences	U	F	Test/Assignments/Field study
CO3	Summarize the significance of conservation practices	U	C	Test/Assignments/Group project
CO4	Explain various interactions that occur among plant species	U	C	Test/Assignments/Field study
CO5	Apply conservation strategies suitable for neighbouring ecosystems and develop the skills necessary to contribute to the conservation and sustainable management of plant ecosystems	Ap	P	Case studies/Presentations/Field reports

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
\# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus

Module	Unit	Content	Hrs (45 + 30)
I		**Plant Ecology**	**9**
	1	Ecology - Definition, Ecosystem: ecological factors - biotic and abiotic.	2
	2	Ecological adaptations - Morphological and anatomical adaptations of the following types: Hydrophyte (*Vallisnaria*), Xerophyte (*Opuntia*)	2
	3	Halophyte (*Avicennia*), Epiphytes (*Vanda*) and parasites (*Cuscuta*)	2
	4	Ecological succession - Process of succession, types of succession, Hydrosere	3
II		**Biodiversity, Loss and its Consequences**	**18**
	5	Biodiversity - Definition, types of biodiversity - habitat diversity, species diversity and genetic diversity	3
	6	Values of Biodiversity - Economic and aesthetic value, Medicinal values	2
	7	Concept of Biodiversity Hotspots, Biodiversity hot spots of India.	2
	8	Concept of endemism and endemic species. ICUN plant categories with special reference to Western Ghats.	2
	9	Estimates of extinction rates worldwide and in India, causes of extinction/changes in biodiversity	2
	10	Habitat fragmentation and destruction	3
	11	Threats to biodiversity: Overexploitation, Invasive species	2
	12	Consequences: loss of gene pool, loss of ecosystem services, livelihood	2
III		**Biodiversity Conservation**	**8**
	13	Conservation methods - *In-situ* and *ex-situ* methods.	2
	14	*In-situ* methods - Biosphere reserves, National parks, Sanctuaries, Sacred grooves	2
	15	*Ex-situ* methods - Botanical gardens, Seed bank, Gene banks, Pollen banks	2
	16	Cryopreservation	2
IV		**Plant Interactions**	**10**
	17	Plant interactions: overview, Plant - microbe interactions: Mycorrhizae	1
	18	Plant - herbivore interactions, Plant defences against herbivores	2
	19	Plant - pollinator interactions, Pollination syndromes and floral specialization	2
	20	Ant-plant interactions	1
	21	Plant-animal interactions as ecosystem services	2
	22	Conservation aspect of plant-animal interactions	2

V	Practical (Mandatory Experiments)	30
	1. Study the morphological and anatomical adaptations of the hydrophytes, xerophytes, halophytes, epiphytes and parasites mentioned in the syllabus 2. Study of a pond/forest ecosystem and recording the different biotic and abiotic components 3. Field observations of plant-animal interactions in natural environments around campus 4. Field visit: To study different types of local vegetation/ecosystems and the report to be recorded.	
	Practical (Open Ended)	
	5. Case studies: Contemporary Indian wildlife and biodiversity issues 6. Group presentations in an area of conservation biology 7. Discussion on biodiversity (Man-animal conflict, human interference, climate change)	

Suggested Readings

- Rajak, A. 2020. Textbook of Biodiversity. 1st edition, Notion Press, India.
- Mahanty, S. and Srivastava, A. 2016. Biodiversity and It's Conservation. Disha International Publishing House, India.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2008. Ecology, Environment and Resource Conservation. Anamaya Publications (New Delhi).
- Krishnamurthy, K.V. 2004. An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
- Gaston, K J. and Spicer, J. I. 1998. Biodiversity: An Introduction. Blackwell Science, London, UK.
- Primack, R. B. 2002. Essentials of Conservation Biology (3rd edition). Sinauer Associates, Sunderland, USA.
- Chittka, L. and Thompson, J. D. (Eds.). 2001. Cognitive Ecology of Pollination-Animal Behaviour and Floral Evolution. Cambridge University Press.
- Herrera, C. M. and Pellmyr, O. (Eds.). 2002. Plant-Animal Interactions: An Evolutionary Approach. Blackwell Publishing.
- Schaeffer, H.M., and Ruxton, G.D. (Eds). 2011. Plant-Animal Communication. Oxford University Press.

Online Sources

- https://www.igntu.ac.in/eContent/IGNTU-eContent-313628797582-M.Sc-EnvironmentalScience-4-ManojkumarRai-MicrobialEcology-2-3.pdf
- http://www.eagri.org/eagri50/AMBE101/lec29.html
- http://eagri.org/eagri50/AMBE101/pdf/lec29.pdf
- ales.arizona.edu/classes/ento415/LECTURES/ENTO415_PlantInteractions.pdf
- https://entnemdept.ufl.edu/baldwin/webbugs/3005_5006/Docs/notes/notes10.pdf

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	1	3	2
CO2	3	-	2	-	2	3	3
CO3	3	-	2	-	2	3	3
CO4	3	-	1	-	2	3	3
CO5	3	1	2	1	2	3	3

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Discussion
- Assignment/ Seminar
- Project/Practical
- Final Exam

Mapping of Cos to Assessment Rubrics

	Internal Exam	Assignment/Seminar	Practical/Project Evaluation	End Semester Examinations
CO 1	✓	✓	✓	✓
CO 2	✓	✓	✓	✓
CO 3	✓	✓	✓	✓
CO 4	✓	✓	✓	✓
CO 5	✓			

CHRIST COLLEGE (AUTONOMOUS), IRINJALAKUDA

Programme	B. Sc.				
Course Title	**Aesthetic Botany**				
Type of Course	**Minor**				
Semester	**I**				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Higher secondary level biology course				
Course Summary	This course offers basic idea in gardening, horticulture, photography, illustration, and craft making using botanicals.				

Course Outcomes (CO): After completing the Course, the student should be able to:-

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Demonstrate basic principles of gardening to successfully grow and maintain plants	Ap	C	Assignment/ Quiz
CO2	Demonstrate fundamental knowledge in plant propagation and care and identify the importance of floriculture and its market	Ap	C	Assignments / Practical/ Quiz
CO3	Implement the passion for plants into captivating botanical imagery	Ap	C	Assignments/ Practical
CO4	Implement techniques to plan, plant, and nurture both indoor and outdoor gardens	Ap	C	Assignments/ Practical
CO5	Design art pieces using plant parts	C	P	Observation of Practical Skills

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

- Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus:

Module	Unit	Content	Hrs (45 +30)
I	**Introduction to Aesthetic Botany**		**15**
	1	Aesthetic characteristics of plants - Shape and outline, Structure and branching pattern, Symmetry of flowers, Geometric arrangements of leaves, Size and scale, Surface texture, Pattern and veining, Colour- flower hues, foliage variations, seasonal shifts.	2
	2	Landscaping - Goals, Types, Planning and layout, Style of gardens (Formal, Informal); Types of gardens (English, Mughal and Japanese)	2
	3	Gardening - definition; Principles of garden design, site selection, Features of a garden (Trees, shrubs and shrubberies, climbers and creepers, Lawn, Garden wall, Fences and gates, Paths and walkways, Borders, Hedge, Edging, Rockery, Flower beds, Pergola, Gazebo, Garden furniture, Solar-electric lights, Sculptures, Water garden)	3
	4	Propagating structures - green house, poly house, mist chamber, net frame	1
	5	Indoor gardening - selection of indoor plants, care and maintenance of indoor plants; Vertical gardens Some Famous gardens of India	3
	6	Bonsai - principle, types, methods & tools	2
	7	Aquascaping & Terrarium - Methods	2
II	**Horticultural techniques**		**15**
	8	Soil - components of soil, types of soil Fertilizers - chemical, organic, biofertilizer, composting systems Pots and Potting - Earthen, fibre, polythene bags Potting mixture, potting, repotting, top dressing. Irrigation - Surface, sprinkle, drip	4
	9	Garden tools and implements	1
	10	Seed propagation - Seed quality, seed treatment, essential conditions for successful propagation, raising of seed beds, transplanting techniques	2
	11	Vegetative propagation: a) Cutting (stem, roots, leaves) b) Grafting (approach, side, tongue)	3

		c) Budding (T-budding, patch) d) Layering (simple, trench, air)	
	12	Protection of horticultural plants - Precautions to avoid pests and diseases, biopesticides	1
	13	Hydroponics - Principle and method	1
	14	Floriculture - Industrial importance of ornamental plants Floriculture in India Cut flower market - Scope and prospects	2
	15	Flower shows and exhibitions - Importance	1
III	**Botanical documentation**		**8**
	16	Digital documentation - Basics	2
	17	Photography - Basics of Botanical Photography, Composition, Lighting and capturing, Editing and Presentation	2
	18	Micro and Macro photography	2
	19	Botanical illustrations - Botanical illustration techniques, Sketching, Water colour, Pen and Ink. Colour theory and Mixing; Significance	2
IV	**Botanical Art and Craft**		**7**
	20	Floral arrangements - Ikebana: Types of arrangements. Contemporary floral design styles.	3
	21	Resin embedding of flowers - techniques, methods and applications.	2
	22	Botanical printing - process and techniques	2
V	**Practical (Mandatory list)**		**30**
	1. Vegetative propagation-cutting, budding, grafting, layering 2. Familiarizing gardening tools and implements 3. Fresh and dry flower arrangements 4. Preparation of potting mixture and Polybag filling 5. Visit to public/institutional/ botanical gardens/nurseries/horticulture station (A brief report may be recorded)		
	Practical (Open ended)		
	1. Preparation of bottle gardens 2. Terrarium making 3. Botanical Photographs		

Suggested Readings

- Andiance and Brison. 1971. Propagation Horticultural Plants.
- Chanda, K.L. and Choudhury, B. Ornamental Horticulture in India.
- George Acquaah. 2005. Horticulture: Principles and Practices. Pearson Education, Delhi.
- Hudson, T. Hartmann, Dale K. Kester, Fred T. Davies, Robert L. Geneve, Plant Propagation, Principles and Practices.
- Kolay, A.K. Basic Concepts of Soil Science. New Age International Publishers, Delhi.
- Nishi Sinha: Gardening in India, Abhinav Publications, New Delhi.
- Prasad, S., and U. Kumar. Green house Management for Horticultural Crops, Agrobios, Jodhpur.
- Sudhir P. 2018. Landscape gardening. Scientific Publishers India.
- Gavino M. 2018. Floriculture and landscaping. Scitus Academics LLC.
- Percy L. 2004. Gardening in India. Oxford & IBH publishers.
- Laeeq F. 2008. Gardens. National book trust India Publishers.
- Ekta Chaudhary 2022. Garden Up. Penguin Random House India publishers.
- Prathap Rao M. 2020. Landscape Design. Standard Publishers and Distributors Pvt.
- Percy L. 2008. Gardening in India. 2nd Edition, Oxford & IBH publishers.

Online Sources

- https://www.georgeweil.com/blog/botanical-printing-an-overview/
- https://www.lostincolours.com/eco-printing-for-beginners/
- https://www.instructables.com/Techniques-to-Embed-Flowers-in-Resin/
- https://www.researchgate.net/publication/341831968_Epoxy_resin_encapsulation_technique

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	3	-	1	2	0
CO2	3	-	2	-	1	1	1
CO3	3	-	3	3	-	1	0
CO4	3	-	3	-	2	1	0
CO5	3	-	3	2	1	1	1

Correlation Levels:

Level	Correlation
-	Nil
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Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Internal Exam
- Project/Practical
- 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	✓			