HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)
Re-Accredited with A++ Grade by NAAC (3rd Cycle)
Uthamapalayam - 625 533.

DEPARTMENT OF BOTANY

ALLIED – BOTANY

SYLLABUS

Choice Based Credit System – CBCS

With

Outcome Based Education (OBE)

(Academic Year 2026 - 2027 onwards)

Details of Course Category, Code, Credits & Title

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
Semester - I							
Part – III							
Allied	26UBYGE11	Allied Botany - I	4	25	75	100	3
Allied Practical	26UBYGE2P	Allied Botany Practical	2	40	60	100	2
Semester - II							
Allied	26UBYGE21	Allied Botany - II	4	25	75	100	3
Allied Practical	26UBYGE2P	Allied Botany Practical	2	40	60	100	2

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UBYGE11	**ALLIED BOTANY - I**	**Generic Elective**	**4**	**3**	**25**	**75**	**100**

Course Objectives		
To study the structure and life cycle of primitive plants, to observe the ultrastructure of plant cell organelles and microbes, and demonstrates the basic concepts of Mendelism and techniques in Plant tissue culture.		
UNIT	**Contents**	**No. of Hours**
I	**Algae:** General characters of algae - Structure, reproduction and life cycle of the following genera - *Anabaena* and *Sargassum* and economic importance of algae.	12
II	**Fungi, Bacteria and Virus:** General characters of fungi, structure, reproduction and life cycle of the following genera – *Penicillium* and *Agaricus* and economic importance of fungi. Bacteria-general characters, structure of *Escherichia coli* and economic importance of bacteria. Virus - general characters.	12
III	**Bryophytes, Pteridophytes and Gymnosperms:** General characters of Bryophytes, Structure and life cycle of *Funaria*. General characters of Pteridophytes, Structure and life cycle of *Lycopodium*. General characters of Gymnosperms, Structure and life Cycle of *Pinus*.	12
IV	**Cell Biology:** Plant cell structure/organization. Cell organelles-ultra structure and function of Chloroplast, and Mitochondria. Cell division-mitosis and meiosis.	12
V	**Genetics and Plant Biotechnology:** Mendelism - Law of dominance, Law of segregation, Law of independent assortment. Monohybrid and dihybrid cross. Plant Tissue culture - Callus culture, Somatic embryogenesis and Micropropagation.	12
	Total	60

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Increase the awareness and appreciation of human friendly algae and their economic importance.	K1,K2,K3,K4
2	Develop an understanding of microbes and fungi and appreciate their adaptive strategies	K1,K2,K3,K4
3	Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and	K1,K2,K3,K4

	Gymnosperms.	
4	Compare the structure and function of cells and explain the development of cells.	K1,K2,K3,K4
5	Understand the core concepts and fundamentals of genetics and plant biotechnology.	K1,K2,K3,K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	Singh, V., Pande, P. CandJain, D.K.2021. A Text Book of Botany. Rastogi Publications, Meerut.	
2.	Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International(P) Ltd., Publishers, Bengaluru	
3.	Sharma, O.P.2017. Bryophyta, MacMillan India Ltd. Delhi.	
4.	Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi.	
5.	Rao, K., Krishnamurthy, K.V and Rao, G.S.1979. Ancillary Botany,S. Viswanathan Pvt. Ltd., Madras.	
Reference Books		
1.	Parihar, N.S.2012. An introduction to Embryophyta – Pteridophytes - Surjeet Publications, Delhi.	
2.	Alexopoulos,C.J.2013.Introduction to Mycology.WilleyEasternPvt.Ltd.	
3.	Vashishta, P.C.2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.	
4.	Coulter, M.Jhon,2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.	
5.	Vashishta, P.C.2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.	
6.	Parihar,N.S.2013.AnintroductiontoEmbryophyta–Bryophytes-,Surjeet Publications, Delhi	
7.	PandeyB.P.1986, Text Book of Botany(College Botany) Vol I & II, S. Chand and Co. New Delhi.	

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	1	3	3
CO 2	3	3	1	3	3
CO 3	3	3	2	3	3
CO 4	3	3	2	3	3
CO 5	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	3
CO2	3	3	1	3	3
CO3	3	3	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
	UNIT - I	
1.1	General character of Algae	3
1.2	Structure and Reproduction of *Anabaena*	3
1.3	Structure and Reproduction of *Sargassum*	3
1.4	Economic importance of Algae	3
	UNIT - II	
2.1	General characters and Economic importance of Fungi of Fungi	2
2.2	Structure, reproduction and life cycle of Penicillium	2
2.3	Structure, reproduction and life cycle of *Agaricus*	2
2.4	General characters and economic importance of Bacteria	3
2.5	General characters of Virus	2
2.6	Structure of *E.coli*	1
	UNIT - III	
3.1	General characters of Bryophytes	2
3.2	Structure and Life cycle of *Funaria*	2
3.3	General characters of Pteridophytes	2
3.4	Structure and Life cycle of *Lycopodium*	2
3.5	General characters of Gymnosperms	2
3.6	Structure and Life cycle of *Pinus*	2
	UNIT - IV	
4.1	Plant cell structure / organization	3
4.2	Ultra structure and functions of Chloroplast	2
4.3	Ultra structure and functions of Mitochondria	2
4.4	Cell division- Mitosis	2
4.5	Meiosis	3
	UNIT - V	
5.1	Introduction to Genetics-Mendel's Law	1
5.2	Monohybrid cross	1
5.3	Dihybrid cross	2
5.4	Plant tissue culture – Introduction	2
5.5	Invitro culture methods – Callus Culture	2
5.6	Somatic embryogenesis	2
5.7	Micropropagation	2
	Total	**60**

Course Designer
Name: Mrs. A. M. Rashida Banu
Assistant Professor of Botany

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UBYGE21	ALLIED BOTANY - II	Generic Elective	4	3	25	75	100

Preamble		
To be familiar with basic concepts of Plant systematics, learn the importance of plant structure and reproductive patterns, and know about the physiological process of plant metabolism.		
UNIT	**Contents**	**No. of Hours**
I	**MORPHOLOGY OF FLOWERING PLANTS:** Plant and its parts. Structure and function of root and stem. Phyllotaxy. Inflorescence - Racemose, Cymose. Terminology with reference to flower description.	12
II	**TAXONOMY:** Study of the range of characters and plants of economic importance in the following families: Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.	12
III	**ANATOMY** Tissue and tissue systems: Simple and complex tissues. Anatomy of monocot and dicot roots - anatomy of monocot and dicot stems - Anatomy of dicot and monocot leaves.	12
IV	**EMBRYOLOGY** Structure of mature anther and ovule - Types of ovules, structure of embryo sac, pollination –double fertilization, structure of dicotyledonous and monocotyledonous seeds.	12
V	**PLANTPHYSIOLOGY** Photosynthesis- light reaction- Calvin cycle; respiration-Glycolysis-Krebs cycle-electron transport system. Growth hormones- auxins and cytokinins and their applications.	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Understand the fundamental concepts of plant systematics	K1,K2,K3,K4
2	Identify and distinguish the different plants with its families	K1,K2,K3,K4
3	Analyze the types of cells and difference of its pattern in plants	K1,K2,K3,K4
4	Analyze and recognize the reproductive structures and methods in plants	K1,K2,K3,K4
5	Classify aerobic and anaerobic respiration and understand the importance of photosynthesis	K1,K2,K3,K4,
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Text books		
1.	Sharma, O.P.2017. Plant Taxonomy.(II Edition).The McGraw Hill Companies	

2.	Bhojwani, S.S. Bhatnagar, S. Pand Dantu, P.K.2015. The Embryology of Angiosperms (6th revised and enlarged edition). Vikas Publishing House, New Delhi
3.	Maheshwari, P.1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi
4.	V.K.Jain, 2022. Fundamentals of Plant Physiology, S. Chand Publishing
5.	Pandey B.P, *Plant Anatomy*, S Chand publication, 2001.
Reference Books	
1.	Lawrence. G.H.M.1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2.	Bhojwani, S. Sand Bhatnagar, S.P.2000.The Embryology of Angiosperms (4th Revised and enlarged edition).Vikas Publishing House, New Delhi
3.	Pandey,B.P.2012.Plant Anatomy.SChandPublishing
4.	Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.
5.	Jain, V.K. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd., New Delhi
6.	Verma, S.K.2006. A Text book of Plant Physiology, S.K. Chand & Co., New Delhi

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	1	3	3
CO 2	3	3	1	3	3
CO 3	3	3	2	3	3
CO 4	3	3	2	3	3
CO 5	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	3
CO2	3	3	1	3	3
CO3	3	3	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Plant parts	1

1.2	Structure and functions of Root	1
1.3	Structure and functions of stem	1
1.4	Phyllotaxy	2
1.5	Types of Inflorescence- Racemose and Cymose	3
1.6	Technical terms to describe a flower	4
UNIT – II		
2.1	Distinguishing characters and economic importance of Caesalpiniaceae	3
2.2	Distinguishing characters and economic importance of Euphorbiaceae	3
2.3	Distinguishing characters and economic importance of Asclepiadaceae	3
2.4	Distinguishing characters and economic importance of Poaceae	3
UNIT – III		
3.1	Simple and Permanent tissues: Parenchyma, collenchyma, sclerenchyma.	2
3.2	Complex permanent tissues: Xylem and Phloem	4
3.3	Primary anatomical structure of dicot root and monocot root	2
3.4	Comparison of Primary anatomical structure of monocot stem with dicot stem	2
3.5	Primary anatomical structure of dicot and monocot leaf	2
UNIT – IV		
4.1	Structure of anther and ovule	2
4.2	Types of ovule	2
4.3	Structure of embryo sac	2
4.4	Pollination and double Fertilization	2
4.5	Structure of dicotyledonous and monocotyledonous seeds	2
UNIT – V		
5.1	Photosynthesis	4
5.2	Glycolysis	2
5.3	Krebs cycle	2
5.4	Growth hormones – Auxin, Cytokinin, applications	4
Total		**60**

Course Designer
Name: Dr. A. Maajitha Begam
Assistant Professor of Botany

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UBYGE2P	ALLIED BOTANY PRACTICAL	Generic Elective	2	2	40	60	100

Preamble

To enhance information on the identification of each taxonomical group by developing the skill-based detection of the morphology and microstructure of plants and to be familiar with the basic concepts and principles of plant systematic.

UNIT	Contents	No. of Hours
I	Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.	12
II	Microphotographs of the cell organelles ultra structure and Simple genetic problems.	12
III	To dissect a flower, construct floral diagram and write floral formula.	12
IV	Demonstration experiments 1.Ganong's Light screen 2.Ganong's respiroscope Spotters-Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm an atomy, Embryology, Cell biology and Biotechnology	12
V	To make suitable micro preparations of anatomy materials in the syllabus	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	To study the internal organization of algae and fungi.	K1,K2,K3,K4
2	Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.	K1,K2,K3,K4
3	To study the classical taxonomy with reference to different parameters.	K1,K2,K3,K4
4	Understand the fundamental concepts of plant anatomy and embryology	K1,K2,K3,K4
5	To study the effect of various physical factors on photosynthesis.	K1,K2,K3,K4

K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze

Textbooks

1.	Sharma, O.P.2017.Bryophyta, MacMillan India Ltd, New Delhi.
2.	Sharma, O.P.2012. Pteridophyta, Tata McGraw- Hills Ltd, New Delhi
3.	Subramaniam, N.S.1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
4.	Benjamin, A. Pierce. 2012. Genetics- A conceptual Approach. W. H. Freeman and Company, New York, England.

5.	Noggle G. R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi
Reference Books	
1.	Strick berger, M.W.2005. Genetics (III Ed).Prentice Hall, New Delhi, India.
2.	Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
3.	Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing.
4.	Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & Wiley Publications
5.	Steward, F.C. 2012. Plant Physiology Academic Press, US

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	1	3	3
CO 2	3	3	3	3	3
CO 3	2	3	2	3	3
CO 4	3	2	2	2	3
CO 5	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	3
CO2	3	3	3	3	3
CO3	2	2	2	2	3
CO4	3	3	2	3	2
CO5	3	3	2	3	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Micro Preparation of Algae	3
1.2	Micro Preparation of Fungi	2
1.3	Micro Preparation of Bryophytes	2
1.4	Micro Preparation of Pteridophytes	2
1.5	Micro Preparation of Gymnosperms	3
UNIT - II		

2.1	Ultra structure of Chloroplast	3
2.2	Ultra structure of Mitochondria	3
2.3	Experiment of Mono hybrid cross	3
2.4	Experiment of Di hybrid cross	3
UNIT - III		
3.1	Description and Dissection of flowers belongs to Caesalpiniaceae family	3
3.2	Description and Dissection of flowers belongs to Asclepiadaceae family	3
3.3	Description and Dissection of flowers belongs to Euphorbiaceae family	3
3.4	Description and Dissection of flowers belongs to Poaceae family	3
UNIT - IV		
4.1	Demonstration of Ganong's Light screen Experiment	2
4.2	Demonstration of Ganong's respire scope Experiment	2
4.3	Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms.	4
4.4	Spotters - Embryology	2
4.5	Spotters - Biotechnology	2
UNIT - V		
5.1	Micro preparations of Dicot and Monocot Roots	4
5.2	Micro preparations of Dicot and Monocot Stems	4
5.3	Micro preparations of Dicot and Monocot Leaves	4
Total		**60**

Course Designer
Name: Dr. A. Maajitha Begam
Assistant Professor of Botany