



# **SOURASHTRA COLLEGE, MADURAI – 625004**

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

## **BOTANY – SYLLABUS**

**(Under CBCS based on OBE) (For those admitted during 2024 – 2025 and after)**

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### **ABOUT THE DEPARTMENT**

The Department of Botany has a long and distinguished history of excellence characterized by competent faculty members who have made major contributions to Plant Science over the past 50 years. Prof. V. R. SATYA MOORTHY was instrumental to introduce the Biology subject in the college as a supportive course for P.U.C. in 1967. Prof. Dr. N. M. R. S. CHANDRAKANTHAN took initiatives to establish the Botany Department in 1978 from the Biology Department and rendering academic services to undergraduate students of Chemistry as an ancillary subject. He taught classes in Plant Science and as an acclaimed well-known plant taxonomist he also first documented the campus flora of the Sourashtra College. He eventually rose to the top as the Principal of the college in 2006 and served in the position until 2009.

The scope of botany has widened in recent times with the applications of the knowledge of plants to many other related areas of science. The opportunities for a postgraduate in various courses have expanded and there are greater prospects in academics, research, industry, consultancy and entrepreneurship, both in government and private sectors – in India and abroad. Job opportunities are also increasing as research organizations, herbal products companies, farm management organizations; biotech and drug development firms always do require the services of botany students.

### **VISION**

Our dream is to provide quality education that will enable the well-being of graduates in the betterment of the Nation through good services to the society, and to motivate students to acquire knowledge and skills besides instilling confidence in critical thinking in a global perspective with honesty, perseverance and compassion.

### **MISSION**

Our mission is to impart true botanical knowledge and bestow life skills to be a better citizen of tomorrow through an enlightened management and committed, competent faculty.



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### DISTRIBUTION OF CREDITS (UG PROGRAMME)

#### CATEGORY: ANCILLARY

Part	Course/Year	Semester	Title of the Paper	Course Code	Duration	Credits
III	B.Sc. (Chemistry) / I	I (T)	Plant Diversity, Cell Biology and Plant Biotechnology	24UBYA11	60 Hours (4 Hrs./Week)	4
III	B.Sc. (Chemistry) / I	I (P)	Plant Diversity, Cell Biology and Plant Biotechnology	24UBYAP1	30 Hours (2 Hrs./Week)	-
III	B.Sc (Chemistry) / I	II (T)	Taxonomy of Angiosperms, Embryology & Plant Physiology	24UBYA21	60 Hours (4 Hrs./Week)	4
III	B.Sc (Chemistry) / I	II (P)	Taxonomy of Angiosperms, Embryology & Plant Physiology	24UBYAP1	30 Hours (2 Hrs./Week)	2
IV	UG / II NME	III (T)	Medicinal Botany	24UBYN31	30 Hours (2 Hrs./Week)	2
IV	UG / II NME	IV (T)	Horticulture and Economic Botany	24UBYN41	30 Hours (2 Hrs./Week)	2

T – Theory

P – Practical

#### CATEGORY: PART – IV

S. No.	Course/Year	Semester	Title of the Paper	Course Code	Duration	Credits
IV	UG/ I	I (T)	Value Education	24UACVE1	30 Hours (2 Hrs./Week)	2
IV	UG/ I	II (T)	Environmental Studies	24UACES1	30 Hours (2 Hrs./Week)	2

T – Theory

P – Practical



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### **COURSE STRUCTURE – I SEMESTER**

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hrs. / Week</b>	<b>Exam (Hrs.)</b>	<b>CA</b>	<b>SE</b>	<b>Total Marks</b>	<b>Credits</b>
<b>1</b>	<b>24UBYA11</b>	<b>Part – III: Allied : Plant Diversity, Cell Biology and Plant Biotechnology</b>	<b>4</b>	<b>3</b>	<b>25</b>	<b>75</b>	<b>100</b>	<b>4</b>
<b>2</b>	<b>24UBYAP1</b>	<b>Part – III: Allied : Ancillary Practical * - Plant Diversity, Cell Biology and Plant Biotechnology</b>	<b>2</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
		<b>TOTAL</b>	<b>6</b>	<b>3</b>	<b>25</b>	<b>75</b>	<b>100</b>	<b>4</b>

\* Practical exam will be conducted in the second semester.

**CA** – Class Assessment (Internal)

**SE** – Summative Examination

**T** – Theory

**P** – Practical



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBYA11	PLANT DIVERSITY, CELL BIOLOGY AND PLANT BIOTECHNOLOGY	ALLIED	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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### COURSE DESCRIPTION:

This course helps the students to understand the potentiality and significances of plant diversity, cell biology and plant biotechnology.

### COURSE OBJECTIVE:

To understand the importance of botany

### COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	recognize and expose the diversity and complexity of plant life forms	Upto K3
CO 2	clarify of the life forms based on their morphology and anatomy	Upto K3
CO 3	receive the glimpse of economic importance of the lower plants	Upto K3
CO 4	explain the principles and applications of tissue culture	Upto K3
CO 5	understand the concepts of cell and their significances	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2- UNDERSTANDING, K3- APPLY



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### **PLANT DIVERSITY, CELL BIOLOGY AND PLANT BIOTECHNOLOGY**

#### **UNIT – I: ALGAE & FUNGI**

General characteristics of **Algae**. Structure and life cycle of *Sargassum*\*. Economic importance of Algae.

General characteristics of **Fungi**. Structure and life cycle of *Puccinia*\*. Economic importance of Fungi.

**Note:** \*Development of gametophyte, sporophyte and sex organs need not be discussed

#### **UNIT – II: LICHENS & BRYOPHYTES**

General Features of **Lichens**, Structure and reproduction of *Usnea*. Economic importance of Lichens.

General characteristics of **Bryophytes**. Structure and life cycle of *Funaria*\*. Economic importance of Bryophytes.

**Note:** \*Development of gametophyte, sporophyte and sex organs need not be discussed

#### **UNIT – III: PTERIDOPHYTES & GYMNOSPERMS**

General characteristics and economic importance of **Pteridophytes**. Structure and Life history of *Lycopodium*\*.

General characteristics and economic importance of **Gymnosperms**. Structure and Life history of *Pinus*\*.

**Note:** \*Development of gametophyte, sporophyte and sex organs need not be discussed

#### **UNIT – IV: CELL BIOLOGY**

Prokaryotic and Eukaryotic cell- structure. Cell organelles - ultra structure and functions of chloroplast, mitochondria and nucleus. Cell division – mitosis and meiosis and its significances.

#### **UNIT – V: PLANT TISSUE CULTURE**

Plant tissue culture - Definition, totipotency, Basic Tissue culture techniques, sterilization methods, Callus induction, Anther Culture, Applications of tissue culture.



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### TEXT BOOKS:

1. Pandey B.P. 2014. *A Text book of Botany- Algae, Fungi & Bryophyta*, Vol. I & II. S. Chand & Company Ltd. Ramnagar, New Delhi.
2. Pandey B.P. 2014. *A Text book of Botany-Bryophyta, Pteridophyta & Gymnosperms*. S. Chand & Company Ltd. Ramnagar, New Delhi.
3. Ignacimuthu, S. 1996. *Basic Biotechnology* – Tata McGraw Publishing Co. Ltd.
4. Dubey, R .C. 2002. *A Textbook of Biotechnology*. S.Chand and Co. Ltd., New Delhi.
5. Singh, V., Pande, P.C and Jain, D.K. 2021. *A Text Book of Botany*. Rastogi Publications, Meerut.
6. Bhatnagar, S.P and Alok Moitra. 2020. *Gymnosperms*, New Age International (P) Ltd., Publishers, Bengaluru.
7. Sharma, O.P. 2017. *Bryophyta*, MacMillan India Ltd. Delhi.
8. Lee, R.E. 2008. *Phycology*, IV Edition, Cambridge University Press, New Delhi.
- Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. *Ancillary Botany*, S.Viswanathan Pvt. Ltd., Madras.

### REFERENCE BOOKS:

1. Smith, G.M. 1971. *Cryptogamic Botany - Algae & Fungi*, Vol. I. Tata McGraw Hill Pub. Co. NewDelhi.
2. Smith, G.M. 1971. *Cryptogamic Botany - Bryophytes & Pteridophytes*, Vol. II. Tata McGraw Hill Pub. Co. New Delhi.
3. Vasishta, P.C. 2005. *Botany for Degree students- Gymnosperms*, Vol. V. S. Chand & Company Ltd. Ramnagar, New Delhi- 110055.
4. Satyanarayana, U. 2013. *Biotechnology*. Books and Allied (P) Limited, Kolkata, India.
5. Alexopoulos, C.J. 2013. *Introduction to Mycology*. Willey Eastern Pvt. Ltd.

### DIGITAL TOOLS:

1. <https://arboretum.harvard.edu/wp-content/uploads/2013-70-4-beyond-pine-cones-an-introduction-to-gymnosperms.pdf>
2. <https://www.us.elsevierhealth.com/medicine/cell-biology>
3. <https://www.us.elsevierhealth.com/medicine/genetics>
4. <https://www.kobo.com/us/en/ebook/plant-biotechnology-1>
5. <https://www.kobo.com/us/en/ebook/the-algae-world>
6. [http://www.freebookcentre.net/biology-books-download/Fungi-\(PDF-15P\).html](http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html)
7. <http://scitec.uwichill.edu.bb/bcs/bl14apl/bryo1.htm>
8. <https://www.toppr.com/guides/biology/plant-kingdom/pteridophytes/>

**COURSE DESIGNER: Dr. M. VENKATESAN**

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBYAP1	PLANT DIVERSITY, CELL BIOLOGY, PLANT BIOTECHNOLOGY	ALLIED PRACTICAL	2	-	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	-	-	-

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input checked="" type="checkbox"/>
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### COURSE DESCRIPTION:

To help students develop and practice methods and basic techniques about Plant Diversity, Cell biology, Plant Biotechnology

### COURSE OBJECTIVE:

To understand preparation of temporary slides and their importance in various fields

### COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify the various groups of plants based on their morphology	Upto K3
CO 2	distinguish the life forms at generic level based on anatomical variations	Upto K3
CO 3	equipped with micro preparation of various groups of plants	Upto K3
CO 4	explain the principles, importance and applications of plants	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLY



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### **PLANT DIVERSITY, CELL BIOLOGY, PLANT BIOTECHNOLOGY**

#### **LIST OF EXPERIMENT:**

1. Sectioning and Mounting of T.S. of Sargassum (stem, leaf).
2. Sectioning and Mounting of T.S. of Lycopodium (stem),
3. Sectioning and Mounting of T.S. of Pinus (needle).
4. Spotters- Identification of specimens or slide from Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms (mentioned in the syllabus).
5. Spotters -Identification of pictures or Photographs related to Plant tissue culture and cell biology.

**COURSE DESIGNER: Dr. M. VENKATESAN**





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### **COURSE STRUCTURE – II SEMESTER**

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hrs. / Week</b>	<b>Exam (Hrs.)</b>	<b>CA</b>	<b>SE</b>	<b>Total Marks</b>	<b>Credits</b>
<b>1</b>	<b>24UBYA21</b>	<b>Part – III: Allied :</b> Taxonomy of Angiosperms, Embryology & Plant Physiology	<b>4</b>	<b>3</b>	<b>25</b>	<b>75</b>	<b>100</b>	<b>4</b>
<b>2</b>	<b>24UBYAP1</b>	<b>Part – III: Allied :</b> <b>Ancillary Practical -</b> Taxonomy of Angiosperms, Embryology & Plant Physiology	<b>2</b>	<b>3</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>2</b>
		<b>TOTAL</b>	<b>6</b>	<b>3</b>	<b>25/40</b>	<b>75/60</b>	<b>100</b>	<b>6</b>

**CA** – Class Assessment (Internal)

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**T** – Theory

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBYA21	TAXONOMY OF ANGIOSPERMS, EMBRYOLOGY & PLANT PHYSIOLOGY	ALLIED	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input checked="" type="checkbox"/>
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### COURSE DESCRIPTION:

To acquire basic knowledge, skills and creating interest among the students about Taxonomy, Embryology of Angiosperms & Plant Physiology

### COURSE OBJECTIVES:

- To provide the basic knowledge of plant taxonomy
- To help the students know the economically important plants in day to day life
- To make the students understand the Plant Physiological process.

### COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify angiosperm plants based on their morphology	Upto K3
CO 2	recognize the importance of Plant Resources	Upto K3
CO 3	explain the fundamentals of plant embryology	Upto K3
CO 4	know the value of the basic physiological process and metabolic functions in plants.	Upto K3
CO 5	understand the concept of photosynthesis and respiration in plants	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2- UNDERSTANDING, K3- APPLY

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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### **TAXONOMY OF ANGIOSPERMS, EMBRYOLOGY & PLANT PHYSIOLOGY**

#### **UNIT – I: TAXONOMY OF ANGIOSPERMS**

Principles and types of classifications. Herbarium techniques. Outline of Bentham and Hooker's system of classification-Merits and Demerits.

#### **UNIT – II:**

Study of diagnostic features of following families and their economic importance  
Caesalpiniaceae, Rubiaceae, Euphorbiaceae, Poaceae

#### **UNIT – III: EMBRYOLOGY**

Structure of mature anther and ovule - types of ovules, structure of embryo sac - double fertilization, endosperm and its types, structure of dicotyledonous and monocotyledonous seeds.

#### **UNIT – IV: PLANT PHYSIOLOGY**

Definitions: Diffusion, osmosis and imbibition. Absorption of water – Active and Passive absorption. Transpiration- Types, stomatal mechanism (Steward theory), Guttation.

#### **UNIT – V:**

Photosynthesis - light reaction - Calvin cycle; respiration - Glycolysis - Krebs cycle – electron transport system. Growth hormones - auxins and cytokinins and its physiological role.

#### **TEXT BOOKS:**

1. Sharma, O.P. 2009. *Plant Taxonomy*, Tata McGraw-Hill publishers, New Delhi
2. Vashishta, P.C.1992. *Taxonomy of Angiosperms*, R.Chand and Co. Ltd., New Delhi.
3. Mukherji. S. and Ghosh, A. K. 2005. *Plant Physiology*, New Central Book Agency Ltd., New Delhi
4. Bhojwani, S.S. Bhatnagar, S.P and Dantu, P.K. 2015. *The Embryology of Angiosperms* (6th revised and enlarged edition). Vikas Publishing House, New Delhi

#### **REFERENCE BOOKS:**

1. Lawrence, G.H.M. 1951. *Taxonomy of Vascular plants*. The Mac-Millan Co., New York.
2. Maheshwari, P. 1980, *An Introduction to the Embryology of Angiosperms*. Tata McGraw Hill Publishing Company Ltd., Bombay – New Delhi
3. Salisbury, F. B. and Ros, C. W. 2010. *Plant Physiology*, Asia Ltd., Singapore.
4. Ting, I.P. 1982. *Plant Physiology*. Addison Wesley Pb. Philippines.

#### **DIGITAL TOOLS:**

1. [https://books.google.co.in/books/about/Plant\\_Taxonomy.html?id=0bYs8F0Mb9gC&redir\\_esc=y](https://books.google.co.in/books/about/Plant_Taxonomy.html?id=0bYs8F0Mb9gC&redir_esc=y)
2. [https://books.google.co.in/books/about/PLANT\\_TAXONOMY\\_2E.html?id=Roi0lwSXFuUC&redir\\_esc=y](https://books.google.co.in/books/about/PLANT_TAXONOMY_2E.html?id=Roi0lwSXFuUC&redir_esc=y)
3. <https://archive.org/EXPERIMENTS/plantanatomy031773mbp>
4. <https://www.amazon.in/Embryology-Angiosperms-6th-S-P-Bhatnagar-ebook/dp/B00UN5KPQG>
5. <https://www.crcpress.com/Plant-Physiology/Stewart-Globig/p/book/9781926692692>

**COURSE DESIGNER: Dr. M. VENKATESAN**



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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UBYAP1	TAXONOMY OF ANGIOSPERMS, EMBRYOLOGY & PLANT PHYSIOLOGY	ALLIED PRACTICAL	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input checked="" type="checkbox"/>
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### COURSE DESCRIPTION:

To help students develop and practice basic knowledge about taxonomy, embryology of angiosperms & plant physiology.

### COURSE OBJECTIVES:

- To identify the various families based on their morphological characters.
- To acquire concept of physiological process in plants

### COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify the various angiosperm plants based on their morphology	Upto K3
CO 2	understand developmental biology of plants	Upto K3
CO 3	understand the concept of physiological process in plants	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



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### **TAXONOMY OF ANGIOSPERMS, EMBRYOLOGY & PLANT PHYSIOLOGY**

#### **LIST OF EXPERIMENTS:**

1. To assign the given plant specimens to the respective families giving reasons.
  - i. Caesalpiniaceae
  - ii. Rubiaceae
  - iii. Euphorbiaceae
  - iv. Poaceae
2. To describe the given plant in technical terms
3. Spotters – identification of sections of Anther and Ovule (Permanent slides)
4. To describe any three physiological setups (Effect of light intensity on the rate of photosynthesis, Ganong's Potometer, Kuhne's fermentation tube)
5. To conduct field visit to the botanically important areas (minimum two days)
6. Submission of 5 herbarium sheets.

**COURSE DESIGNER: Dr. M. VENKATESAN**