



**PSGR  
Krishnammal College for Women**



**DEPARTMENT OF BOTANY**

**CHOICE BASED CREDIT SYSTEM (CBCS) &  
LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK (LOCF)**

**(Semester I-II)**

**BACHELOR OF SCIENCE - BOTANY  
(2025 – 2028 Batch)**



**BACHELOR OF SCIENCE - BOTANY  
CHOICE BASED CREDIT SYSTEM (CBCS) &  
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**SYLLABUS & SCHEME OF EXAMINATION  
2025-2028 Batch, Semester I-II**

**Programme Learning Outcomes (PLO's)**

Courses within the Botany curriculum will address goals and objectives at the appropriate level through measurable student learning outcomes developed by course instructors

**PLO 1:** Students will be able to remember, comprehend, apply, analyze and synthesize the core concepts in Botany, like evolution, biodiversity, structure and function, information flow, exchange and storage, pathways and transformations of energy and matter.

**PLO 2:** Students will develop the ability to apply and understand the defining characteristics of various processes of science and its uncertainty.

**PLO 3:** Students will also develop the ability to practice the skills of the scientific method. Engage in research projects and apply the quantitative skills to biological problems.

**PLO 4:** Students will be able to communicate and collaborate within and outside of biology and tap into the interdisciplinary nature of science.

**PLO 5:** Students will understand the relationship between science and society and to evaluate the impact of science as well as ethical implications of science in the society.

**Programme Specific Objectives (PSO's)**

At the end of the programme the student will

**PSO1:** Obtain strong foundation in classical botany, interdisciplinary subjects such as Bioinformatics, Biostatistics, and advance topics in Cell and Molecular biology, Biochemistry and Plant Biotechnology.

**PSO2:** Build capacity in Horticulture and production of cut flowers from the skill based courses offered.

**PSO3:** Carry out individual short-term internship and project work to acquire knowledge on research using basic and advanced instruments/equipments.

**PSO4:** Find opportunities for higher studies in top ranking universities.

**PSO5:** Gain career in teaching/research in Botany.



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**SYLLABUS & SCHEME OF EXAMINATION  
2025-2028 Batch, Semester I-II**

Sem	Part	Course Code	Title of the Course	Course Type	Instruction hours/week	Contact hours	Tutorial hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	TOTAL	
I	I	TAM2501/ HIN2501/ FRE2501	Tamil Paper I/ Hindi Paper I/ French Paper I	L	6	88	2	3	25	75	100	3
	II	ENG2501	English Paper I	E	6	88	2	3	25	75	100	3
	III	PL24C01	Microbiology & Plant Diversity I	CC	6	88	2	3	25	75	100	5
	III	PL24CP1	Botany Practical I	CC	3	45	-	-	-	-	-	-
	III	CE24A01/ PS23A03	Chemistry for Biologists / Physics Paper I	GE	4	58	2	3	20	55	75 <sup>e</sup>	4
	III	CE23AP1/ PS23AP1	Chemistry Practical for Biologists/ Physics Practical for Biologists	GE	3	45	-	-	-	-	-	-
	IV		NME25B1 / NME25A1	Basic Tamil I / Advanced Tamil I	AEC	2	28	2	-	100	-	100
NME23ES			Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I-II	VI	NM25GAW	General Awareness	AECC	SS	-	-	-	100	-	100	Gr.
		COM25SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
II-V	VI	24BONL 1 24BONL 2 24BONL 3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	
II	I	TAM2502/ HIN2502/ FRE2502	Tamil Paper II/ Hindi Paper II/ French Paper II	L	6	88	2	3	25	75	100	3
	II	ENG2502	English Paper II	E	5	73	2	3	25	75	100	3

III	PL24C02	Plant Diversity II	CC	6	88	2	3	25	75	100	5	
III	PL24CP1	Botany Practical – I	CC	3	45	-	3	25	75	100	4	
III	CE24A02/ PS24A02	Chemistry for Biologists- II/ Physics Paper - II	GE	5	73	2	3	20	55	75 <sup>€</sup>	4	
III	CE23AP1/ PS23AP1	Chemistry Practical for Biologists/ Physics Practical	GE	3	45	-	3	15	35	50 <sup>#</sup>	2	
IV	NM25UHR	Universal Human Values and Human Rights	AEC	2	30	-	-	100	-	100	2	
IV	*NME25B2/ NME25A2	Basic Tamil II/ Advanced Tamil II	AEC	-	-	-	-	100	-	100	Gr.	
I-II	VI	NM25GAW	General Awareness	AECC	SS	-	-	-	100	-	100	Gr.
I-II	VI	COM25SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	

L – Language

GE – Generic Elective

AEC – Ability Enhancement Course

GC – General Course

CA – Continuous Assessment

E – English

ACC – Additional Credit Course

AECC – Ability Enhancement Compulsory Course

ESE – End Semester Examination

CC – Core Courses

SS- Self study

Gr. - Grade

€ : CA conducted for 25 and converted into 20, ESE conducted for 75 and converted into 55

# – Allied Practical CA & ESE will be evaluated for 25/75 converted into 15/35

\* After class hours

## **Continuous Internal Assessment Pattern**

### **Theory**

#### **I Year UG**

CIA Test : 5 marks (**conducted for 45 marks after 50 days**)

Model Exam : 7 marks (**Conducted for 75 marks after 85 days (Each Unit 15 Marks)**)

Seminar/Assignment/Quiz : 5 marks

Class Participation : 5 marks

Attendance : 3 marks

**Total : 25 Marks**

### **Practical**

Lab Performance : 7 marks

Regularity : 5 marks

Model Exam : 10 marks

Attendance : 3 marks

**Total : 25 marks**

### **ESE Practical Pattern**

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

### **CA Question Paper Pattern and distribution of marks Language and English**

Section A 5 x 1 (No choice) : 5 Marks

Section B 4 x 5 (4 out of 6) : 20 Marks (250 words)

Section C 2 x 10 (2 out of 3) : 20 Marks (500 words)

**Total : 45 Marks**

### ***CA Question from each unit comprising of***

One question with a weightage of 2 Marks :  $2 \times 3 = 6$

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :  $5 \times 3 = 15$

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :  $8 \times 3 = 24$

**Total : 45 Marks**

### **End Semester Examination – Question Paper Pattern and Distribution of Marks Language and English**

Section A 10 x 1 (10 out of 12) : 10 Marks

Section B 5 x 5 (5 out of 7) : 25 Marks (250 words)

Section A 4 x 10 (4 out of 6) : 40 Marks (600 - 700 words)

**Total : 75 Marks**

### **UG - Core and Allied courses:**

**ESE Question Paper Pattern: 5 x 15 = 75 Marks**

#### ***Question from each unit comprising of***

One question with a weightage of 2 Marks :  $2 \times 5 = 10$

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :  $5 \times 5 = 25$

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :  $8 \times 5 = 40$

**ESE Question Paper Pattern:(for Accounts Paper) 5 x 15 = 75 Marks**

#### ***Question from each unit comprising of***

One question with a weightage of 2 Marks :  $2 \times 5 = 10$

One question with a weightage of 5 Marks :  $5 \times 5 = 25$

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :  $8 \times 5 = 40$

## **Part IV**

### **Introduction to Entrepreneurship/ Universal Human Values and Human Rights**

Quiz: 50 marks

Assignment:

25marks

Project / Case study: 25

marks **Total: 100 Marks**

#### **Attendance**

91-100%	3Marks
81-90%	2 Marks
75-80%	1 Mark

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL24C01	Microbiology & Plant Diversity I	Theory	88	2	-	5

### Preamble

To study the characteristics and life cycle of Bacteria, Virus, Algae, Fungi and Lichens.  
 To study various plant diseases and their control measures.  
 To impart knowledge on Artificial Intelligence and its types.

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the cellular, biochemical, and physiological aspects of microorganisms and recognize the similarities and differences between microbial groups (bacteria, algae, fungi, protozoa, viruses)	K1
CLO2	Acquire knowledge about the diversity of algae based on structure and reproduction	K2
CLO3	Know about the morphology, reproduction and economic importance of fungi and lichens	K3
CLO4	Identify the causes, symptoms and control measures of plant diseases	K4
CLO5	Apply the artificial intelligence to the biological science	K5

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	M	M
CLO2	S	S	S	M	M
CLO3	S	S	M	S	S
CLO4	S	M	S	M	M
CLO5	S	M	S	S	M

S- Strong; M-Medium

### Unit I: Microbiology

19 hrs

History and scope of microbiology. Structure and reproduction of viruses. Bacteria: Morphology, ultra structure, growth and reproduction. Bacterial classification (Bergey, 1923). Microbial techniques - Methods of sterilization, Culture media and Pure culture techniques. Study of bacterial growth- growth curve. Gram staining.

### Unit II: Algae

19 hrs

General characteristics of algae, Classification of algae (Fritsch, 1935). A detailed study on structure, reproduction and life cycle of *Anabaena* (Cyanophyceae), *Chlamydomonas* & *Oedogonium* (Chlorophyceae), *Ectocarpus* (Phaeophyceae) and *Polysiphonia* (Rhodophyceae) (developmental studies on sex organs not required). Economic importance of Algae.

### Unit III: Fungi and Lichen

20 hrs

General characteristics of Fungi. Classification (Alexopoulos and Mims, 1972). Detailed study of morphology and reproduction of *Albugo* (Oomycetes), *Saccharomyces* (Ascomycetes), *Penicillium* (Plectomycetes), *Puccinia* (Teliomycetes), *Polyporus* (Agaricomycetes) and *Aspergillus* (Eurotiomycetes) (developmental studies on sex organs not required). Economic importance of Fungi.

**Lichens:** General characteristics, classification (Alexopoulos and Mims, 1979), reproduction and economic importance of Lichens. Detailed study of *Usnea*.

### Unit: IV Plant Pathology

20 hrs

Classification of diseases– general symptoms. Penetration and disease development. Morphological and biochemical defense mechanisms in plants. A detailed study of the following plant diseases – Mosaic disease of tobacco, Citrus canker, Late blight of Potato, Red rot of sugarcane, Tikka disease of groundnut (causal organisms, symptoms, disease cycle and bio-control measures).

### Unit: V Artificial Intelligence

10 hrs

Definition; Types- Weak AI or Narrow AI, General AI and Super AI. Brief introduction to solutions to real-world problems by implementing the following AI processes/ techniques: 1-Machine Learning, 2- Deep Learning, 3- Natural Language Processing and 4- Robotics. AI to reintegrate biology: Biological knowledge discovery and assembly, Behavioral ecology, Genes to phenotypes, Prediction, Evolution, and Control of infectious diseases.

## Text Books

S. No.	Authors	Title of the Book	Publishers	Year & Edition
1.	Singh V, Pandae P.C. & Jain, D.K	A Text Book of Botany	Rastogi Publications, Meerut	2023 V Edn.
2.	Vashishta, B.R., Sinha, A.E and Singh, V.P	Botany for Degree Students : Algae	S Chand and Company Ltd., New Delhi	2015 I Edn
3.	Sharma O.P	Algae	Tata Mc Graw-Hill Education	2011
4.	Sharma O.P	Fungi and allied microorganisms	Tata Mc Graw-Hill Education	2024 III Edn.
5.	Purohit, S.S	Microbiology- Fundamentals & Applications	Rastogi Publications, Meerut	2017 VII Edn.
6.	Pandey, B.P	College Botany Vol I	S Chand & Company, New Delhi.	2021 V Edn.
7.	Vashishta B.R./ Sinha A.K. & Kumar Adarsh	Botany for degreestudents Fungi	S. Chand and CompanyLtd., New Delhi	2016 I Edn.

## Reference Books

S. No.	Authors	Title of the Book	Publishers	Year & Edition
1.	Alexopoulos, CJ, Mims CW & Blackwell M	Introductory Mycology	John Wiley & Sons, New York	2007 IV Edn.
2.	Gangulee, HC. & KarAK	College Botany, Vol-II	New Central Book Agency Pvt. Ltd. Calcutta.	2011 IV Edn.
3.	Mehrotra, RS & Aneja, KR	An Introduction to Mycology	New Age International Private Limited, New Delhi	2015 II Edn.

### Online course materials

1. <https://www.researchgate.net/publication/354185787>
2. <https://www.edureka.co/blog/types-of-artificial-intelligence/>
3. <https://www.mygreatlearning.com/blog/what-is-artificial-intelligence/#WhatisArtificialIntelligence>

## Pedagogy

E-content, Lecture, Power point presentation, Seminar, Assignment, Quiz, Group Discussion, Video / Animation

## Course Designers:

Dr. C. Krishnaveni , Dr. M. Kanchana, Dr. H. Rehana banu

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL24CP1	Practical – I Microbiology & Plant Diversity I & II	Practical	-	-	90	4

### Preamble

- To observe, characterize and identify the different types of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Fossilized plants.
- To identify and differentiate the various plant diseases and the causative organism
- To isolate microorganisms from soil and establish pure cultures.
- To distinguish between Gram positive and Gram negative bacteria.

### Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the different forms of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Fossilized plants	K1
CLO2	Know the host – pathogen interactions	K2
CLO3	Prepare sterile microbial culture media and demonstrate pure culture techniques	K3
CLO4	Interpret the industrial impact of fermentation process	K3

### Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	M	M
CLO2	S	S	M	M	M
CLO3	S	S	M	M	M
CLO4	S	S	M	M	M

S- Strong; M-Medium

### Syllabus

#### Microbiology & Plant Diversity I

45 Hrs

**Algae** - *Anabaena*, *Chlamydomonas*, *Oedogonium*, *Ectocarpus* and *Polysiphonia*

**Fungi** - *Albugo*, *Saccharomyces*, *Penicillium*, *Puccinia*, *Polyporus* and *Aspergillus*

## **Lichens -*Usnea***

**Plant pathology-** Mosaic disease of tobacco, Citrus canker, Late blight of potato, Red rot of sugarcane, Tikka disease of groundnut.

## **Microbial Techniques**

Sterilization techniques

Preparation of culture media: Nutrient broth and Nutrient Agar medium

Potato Dextrose Agar Medium

Preparation of Slants

Soil dilution, Plating techniques, Enumeration of bacteria and fungi

Microscopic observation of fungi - Lactoglycerol trypan blue

Microscopic observation of bacteria - Gram staining staining

Fermentation using yeast

## **Plant Diversity II**

**45 Hrs**

**(Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)**

### **Study of the following types**

**Bryophyta-** *Marchantia*, *Anthoceros* and *Funaria*

**Pteridophyta-** *Psilotum*, *Lycopodium*, *Equisetum* and *Marsilea*

**Gymnosperms -***Cycas*, *Pinus* and *Gnetum*

**Palaeobotany -***Rhynia*, *Lepidodendron*, *Lepidocarpan*, *Calamites* and *Williamsonia*

### **Course Designers:**

1. Dr. C. Krishnaveni
2. Dr. M. Kanchana
3. Dr. K.S. Tamil Selvi
4. Dr. H. Rehana banu
5. Dr.E. Uma

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL24C02	Plant Diversity II	Theory	88	2	-	5

### Preamble

To study the classification, characteristics and life cycle of Bryophytes, Pteridophytes and Gymnosperms  
 To study the process of fossilization, geo-chronology and radio-carbon dating

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Know the lifecycle of Bryophytes, Pteridophytes and Gymnosperms	K1
CLO2	Understand the characteristics of Bryophytes, Pteridophytes and Gymnosperms	K2
CLO3	Know the process of fossilization	K2
CLO4	Assess the evolutionary features of Bryophytes, Pteridophytes and Gymnosperms	K3

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	M	M	M
CLO2	M	M	S	M	M
CLO3	S	S	M	M	S
CLO4	S	S	M	M	M

S- Strong; M-Medium

### Syllabus

#### Unit I - Bryophytes

18hrs

General characteristics, Classification of Bryophytes (Reimers-1954). Occurrence, distribution, common species, structure and reproduction of *Marchantia* (Marchantiaceae), *Anthoceros* (Anthocerotaceae) and *Funaria* (Funariaceae) (developmental studies on sex organs not required). Economic and ecological importance of Bryophytes. Evolution of Bryophytes.

#### Unit II – Pteridophytes - I

17hrs

General characteristics, Classification of Pteridophytes (Sporne, 1975). Stelar evolution, homosporous, heterosporous and seed habit. Apogamy and apospory. Economic importance of Pteridophytes.

#### Unit III – Pteridophytes - II

17hrs

A detailed study of morphology, anatomy and reproduction of *Psilotum* (Psilotaceae), *Lycopodium* (Lycopodiaceae), *Equisetum* (Equisetaceae) and *Marsilea* (Marsileaceae) (developmental studies on sex organs not required). Origin and

evolution of Pteridophytes.

#### Unit IV- Gymnosperms

18hrs

General characteristics, distribution and classification of Gymnosperms (Sporne, 1965). Detailed study of morphology, anatomy and reproduction of *Cycas* (Cycadaceae), *Pinus* (Pinaceae) and *Gnetum* (Gnetaceae) (developmental studies on sex organs not required). Economic importance of Gymnosperms with special reference to oil, resin, timber, etc.,

#### Unit V- Palaeobotany

18hrs

Fossils-fossilization process and types of fossils - compression, impression, petrification, coal balls. Geological time scale. Radiocarbon dating. A detailed study of external and internal features and reproduction in *Rhynia* (Rhyniaceae), *Lepidodendron* (Lepidodendraceae), *Lepidocarpon* (Lepidocarpaceae), *Calamites* (Calamitaceae) and *Williamsonia seawardiana* (Williamsoniaceae).

#### Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Sharma O.P	Textbook Of Bryophyta	Medtech Science Press	2024 and 1 <sup>st</sup> Edn.,
2.	Vasishta PC, Sinha AK & Anilkumar	Pteridophyta Botany For Degree Students	S Chand & Company, New Delhi	2015 and 1 <sup>st</sup> Edn.,
3.	Vasishta PC, Sinha AK & Anilkumar	Botany for degree students	S Chand And Company Ltd., New Delhi.	2016 and 1 <sup>st</sup> Edn.,
4.	Pandey, B.P	College Botany Vol II	S Chand & Company, New Delhi	2016 and 8 <sup>th</sup> Edn.,

#### Reference Book

S.No	Authors	Title	Publishers	Year and Edition
1.	Arnold. C. A.	An Introduction to Palaeobotany	McGraw Hill Book Company, London	2005 and 2 <sup>nd</sup> Edn.,
2.	Sporne, KR	The Morphology of Gymnosperms	Hutchinson & Co., London.	1974 and 2 <sup>nd</sup> Edn.,
3.	Sporne, KR	The Morphology of Pteridophytes	Hutchinson & Co., London	2015 and 4 <sup>th</sup> Edn.,
4.	Steward. N. Wilson & Rothwell, W. Gar	Palaeobotany and evolution of Plants	Cambridge University Press	2010 and 2 <sup>nd</sup> Edn.,

#### Pedagogy

E-content, Lecture, Power point presentation, Seminar, Assignment, Quiz, Group Discussion, Video / Animation

#### Course Designers

1. Dr. C. Krishnaveni
2. Dr. K. S. Tamilselvi
3. Dr. B. S. Chithra Devi
4. Dr. R. Sumathi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL24CP1	Botany Practical I	Practical	-	-	90	4

### Preamble

- To observe, characterize and identify the different types of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and fossilized plants.
- To identify and differentiate the various plant diseases and the causative organisms.
- To isolate microorganisms from soil and establish pure cultures.
- To distinguish between Gram positive and Gram negative bacteria.

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the different forms of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and fossilized plants	K1
CLO2	Know the host – pathogen interactions	K2
CLO3	Prepare sterile microbial culture media and demonstrate pure culture techniques	K3
CLO4	Interpret the industrial impact of fermentation process	K3

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	M	M
CLO2	S	S	M	M	M
CLO3	S	S	M	M	M
CLO4	S	S	M	M	M

S- Strong; M-Medium

### Syllabus

#### Microbiology & Plant Diversity I

45 Hrs

**Algae** - *Anabaena*  
*Chlamydomonas*  
*Oedogonium*  
*Ectocarpus*  
*Polysiphonia*

**Fungi** - *Albugo*  
*Saccharomyces*  
*Penicillium*  
*Puccinia*  
*Polyporus*  
*Aspergillus*

**Lichens** - *Usnea*

**Plant Pathology**- Mosaic disease of tobacco,  
Citrus canker  
Late blight of potato  
Red rot of sugarcane  
Tikka disease of groundnut.

**Microbial Techniques**

Sterilization techniques  
Preparation of culture media: Nutrient broth and Nutrient Agar medium  
Potato Dextrose Agar Medium  
Preparation of Slants  
Soil dilution, Plating techniques, Enumeration of bacteria and fungi  
Microscopic observation of fungi - Lactoglycerol trypan blue  
Microscopic observation of bacteria - Gram staining staining  
Fermentation using yeast

**Plant Diversity II**

**45 Hrs**

**(Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)**

**Study of the following types**

**Bryophyta**- *Marchantia thallus*

*Anthoceros*  
*Funaria*

**Pteridophyta**-*Psilotum*

*Lycopodium,*  
*Equisetum*  
*Marsilea*

**Gymnosperms** - *Cycas*

*Pinus*  
*Gnetum*

**Palaeobotany** - *Rhynia*

*Lepidodendron,*  
*Lepidocarpan,*  
*Calamites*  
*Williamsonia*

**Course Designers**

1. Dr. C. Krishnaveni
2. Dr. K.S. Tamil Selvi
3. Dr. H. Rehana banu
4. Dr.E. Uma