



PSGR  
Krishnammal College for Women



## **DEPARTMENT OF BOTANY**

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

**(Semesters– I-IV)**

**BACHELOR OF BOTANY  
(2023 – 2026 Batch)**



### **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 (PSOs)**

**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.



College of Excellence, **nirf** 2024-7<sup>th</sup> Rank  
Autonomous and Affiliated to Bharathiar University  
Reaccredited with A<sup>++</sup> grade by NAAC, An ISO 9001:2015 Certified Institution  
Peelamedu, Coimbatore-641004

DEPARTMENT OF BOTANY  
CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES- BASED  
CURRICULARFRAMEWORK (LOCF)

BACHELOR OF BOTANY (2023-2026 Batch) SYLLABUS & SCHEME OF EXAMINATION  
Applicable to students admitted during the academic year 2023 – 2024 onwards (I-IV Sem)

SEM	Part	Subject Code	Title of the Paper		Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits	
									CA	ESE	TOTAL		
I	I	TAM2301/ HIN2301/ FRE2301	Language T/H/F Paper I	Language	6	88	2	3	25	75	100	3	
	II	ENG2301	English Paper-I	English	6	88	2	3	25	75	100	3	
	III A		PL23C01	Core Paper I- Microbiology & Plant diversity I	CC	6	88	2	3	25	75	100	5
			PL23CP1	Core Practical – I	CC	3	45	-	-	-	-	-	-
			CE23A01	Allied Chemistry for Biologists Paper-I/ Allied Physics Paper-I/ Allied Paper I -Mathematical for Sciences - I	GE	4	58	2	3	20#	55#	75	4
			CE23AP1 /PS23AP1	Allied Practical Chemistry / Physics	GE	7	103	2	3	20	55	75	5
	IV	NME22B1/A1 NME23ES	Basic Tamil/Advanced Tamil** Introduction to Entrepreneurship	AEC	2	28 30	2 -	- -	100	-	100	2	
II	I	TAM2302/ HIN2302/ FRE2302	Language T/H/F Paper - II	Language	6	88	2	3	25	75	100	3	
	II	ENG2302	English Paper-II	English	5	73	2	3	25	75	100	3	
	III A		PL23C02	Core Paper II– Plant Diversity II	CC	6	88	2	3	25	75	100	5
			PL23CP1	Core Practical I (Core Paper I & II)	CC	3	45	-	3	25	75	100	4
			CE23A02	IDC- Chemistry for Biologists II	GE	5	73	2	3	20#	55#	75	4
			CE23AP1	IDC- Chemistry Practical for Biologists	GE	3	45	-	3	15*	35*	50	2
	IV	NME23B2/A2	Basic Tamil/Advanced Tamil**	AEC	2	-	-	-	100	-	100	Grade **	
	IIIB	NM23GAW	Foundation Course –1 (General awareness)	AEC	2	25	5	-	100	-	100	2	
				Self study (Online)	100	-	100	Grade **					
III	I	TAM2303/ HIN 2303/ FRE2303	Language T/H/F Paper III	L	6	88	2	3	25	75	100	3	
	II	ENG2303	English Paper-III	E	5	73	2	3	25	75	100	3	
	III	PL23C03	Core Paper III - Cell and Molecular Biology	CC	5	73	2	3	25	75	100	5	
III		PL23CP2	Core Practical - II (Core Paper III)	CC	2	30	-	-	-	-	-	-	

III	III	PL23SCE1/ CS23SBGP	<b>Skill Based Course</b> Coursera -Climate Change and Health: From Science to Action GEN-AI	SEC	3	45/ 44	-/1	-	100	-	100	3
	III	AS23A01	Allied- II-Paper I- Zoology - Invertebrata and Chordata	GE	5	73	2	3	20	55	75	4
	III	TH23A09	Allied-II - Mathematics for Sciences- Paper-I	GE	7	103	2	3	25	75	100	5
	III	AS23AP1	Zoology Practical	GE	2	30	-	-	-	-	-	-
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
	IV	NM23UHR	Universal Human Values and Human Rights #	AECC	-	-	-	-	100	-	100	Gr.
	VI	16BONL1 16BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-
IV	I	TAM2304/ HIN2304/ FRE2304	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	L	5	73	2	3	25	75	100	3
	II	ENG2304	English Paper-IV	E	6	88	2	3	25	75	100	3
	III	PL23C04	Plant Anatomy, Wood Technology and Embryology	CC	5	73	2	3	25	75	100	5
	III	PL23CP2	Core Practical II	CC	2	30	-	3	25	75	100	4
III/IV	III	PL23SCE1/ CS23SBGP	Climate Change and Health: From Science to Action/ GEN-AI	SEC	3	45	-	-	100	-	100	3
IV	III	AS23A02/ TH23A14	General Principles in Zoology <sup>€</sup> / Mathematics for Sciences II	GE	5/7	73/ 103	2	3	20/ 25	55/ 75	75/ 100	4/ 5
	III	AS23AP1	Zoology Practical*	GE	2	30	-	3	15	35	50	2
	IV	NM23EII	Entrepreneurship and Innovation (IgniteX )	AECC	2	30	-	-	100	-	100	2
	IV	NM23EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr.
	V	COCOACT	Co- curricular activities	GC	-	-	-	-	100	-	100	1
I-IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	
I-V	VI	16BONL1 16BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	

\*\*not considered for grand total and CGPA; Grade\*\* - outside class hours.

€Allied theory CA & ESE will be evaluated for 25/75 converted into 20/55

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

L- Language

CC – Core Courses

GE – Generic Elective

SEC- Skill Enhancement Course

GC- General Courses

Gr. – Grade

E- English

CA – Continuous Assessment

ESE - End Semester Examination

AECC - Ability Enhancement Compulsory Course

SS- Self study

### **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):  $8 \times 5 = 40$

#### **Continuous Internal Assessment Pattern Theory**

##### **I Year UG (23 Batch)**

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**

**For allied courses with practical as 50 marks, the split-up is 15 marks as internal and 35 as external. Conversion will be carried out by CoE from 25 marks to 15 marks through ERP.**

##### **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.**

#### **Part IV**

##### **Introduction to Entrepreneurship / Women Studies / Universal Human Values and Human Rights / Environmental Studies / Design Thinking/IGNITE X**

Quiz : 50 marks

Assignment : 25marks

Project / Case study : 25 marks

**Total : 100 Marks**

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
<b>PL23C01</b>	<b>Core Paper I - Microbiology &amp; Plant diversity I</b>	<b>CORE</b>	<b>88</b>	<b>2</b>	<b>-</b>	<b>5</b>

### **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

<b>CLO Number</b>	<b>CLO Statement</b>	<b>Knowledge Level</b>
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 Outcomes**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
CLO1	S	M	M	M	M
CLO2	S	S	S	M	M
CLO3	S	S	M	S	S
CLO4	S	M	S	M	M

S- Strong; M-Medium

## Syllabus

### Unit I : Microbiology

20 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*, *Chlamydomonas*, *Oedogonium*, *Ectocarpus* and *Polysiphonia* (developmental studies on sex organs not required). Economic importance of Algae.

### Unit III: Fungi and Lichens

20 hrs

General characteristics of Fungi. Classification (Alexopoulos and Mims, 1972). Detailed study of morphology and reproduction of *Albugo*, *Saccharomyces*, *Penicillium*, *Puccinia*, *Polyporus* and *Aspergillus* (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

19 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

10 hrs

Artificial Intelligence-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, Behavioural ecology, Genes to phenotypes, Prediction, evolution, and control of infectious diseases.

## Text Books

S. No.	Authors	Year of publication	Title of the book	Publishers
1.	Vashishta, B.R., Sinha, A.E and Singh, V.P	2013	Algae	S Chand and Company Ltd., New Delhi
2.	Sharma O.P	2011	Algae	Tata Mc Graw-Hill

				Education
3.	Sharma O.P	2011	Fungi and allied microorganisms	Tata Mc Graw-Hill Education
4.	Purohit, S.S	2017	Microbiology-Fundamentals & Applications (7 <sup>th</sup> edition)	Rastogi Publications, Meerut
5.	Pandey, B.P	2005	College Botany Vol I	S Chand & Company, New Delhi.
6.	Vashishta B.R./ Sinha A.K. & Kumar Adarsh	2016	Botany for degree students Fungi	S. Chand and Company Ltd., New Delhi

### Reference Books

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

### 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

1. Dr. C. Krishnaveni
2. Dr. M. Kanchana
3. Dr. H. Rehana banu



COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23C02	Core Paper II - Plant Diversity II	CORE	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 Outcomes

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

CLO Number	CO 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 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

17hrs

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

#### Unit II - Pteridophytes

17 hrs

General characteristics and Classification of Pteridophytes (Sporne, 1975). Stellar Evolution Homospory, heterospory and seed habit. Apogamy and apospory. Economic importance of Pteridophytes.

#### Unit III – Pteridophytes(Contd..)

17hrs

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

Pteridophytes.

#### Unit IV- Gymnosperms

17hrs

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

#### Unit V- Palaeobotany

20hrs

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*, *Lepidodendron*, *Lepidocarpon*, *Calamites* and *Williamsonia sewardiana*.

#### Text Books

S.No	Authors	Year of publication	Title of the book	Publishers
1.	Vasishta.B.R , Sinha & Adarsh Kumar	2012	Botany for Degree students –Bryophyta	S Chand And Company Ltd., New Delhi
2.	Sharma O.P	2011	Bryophyta	Tata Mc Graw-Hill Education
3.	Sharma O.P	2011	Pteridophyta	Tata Mc Graw-Hill Education
4.	Vasishta PC, Sinha AK & Anilkumar	2005	Botany for degree students,	S Chand And Company Ltd., New Delhi.
5.	Pandey, B.P	2003	College Botany Vol II	S Chand & Company, New Delhi

#### Reference Books

S.No	Authors	Year of publication	Title of the book	Publishers
1.	Arnold. C. A.	2013	An Introduction to Palaeobotany	McGraw Hill Book Company, London
2.	Sporne, KR	1974	The Morphology of Gymnosperms	Hutchinson & Co., London.
3.	Sporne, KR	2015	The Morphology of Pteridophytes	Hutchinson & Co., London
4.	Steward.N.Wilson & Rothwell, W. Gar	2005	Palaeobotany and evolution of Plants	Cambridge University Press

#### 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

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
<b>PL23CP1</b>	<b>Core Practical – I (Theory Paper - I &amp; II Microbiology, Plant diversity I and Plant Diversity II)</b>	<b>CORE</b>	-	-	<b>90</b>	<b>4</b>

### **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 Outcomes**

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

<b>CLO Number</b>	<b>CLO Statement</b>	<b>Knowledge Level</b>
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**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
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 staining, Microscopic observation of bacteria- Gram 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* and *Calamites*

**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 NUMBER	COURSENAME	Category	L	T	P	Credit
23PELS1	PROFESSIONAL ENGLISH FOR LIFE SCIENCES	-	25	5	--	2

### Objectives

1. To develop the language skills of students by offering adequate practice in professional contexts.
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
3. To focus on developing students' knowledge of domain specific registers and the required language skills.
4. To develop strategic competence that will help in efficient communication
5. To sharpen students' critical thinking skills and make students culturally aware of the target situation.

### Course outcome

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

CLO Number	CO Statement	Knowledge Level
CLO1	Recognize their own ability to improve their own competence in using the language	K1
CLO2	Use language for speaking with confidence in an intelligible and acceptable manner	K2
CLO3	Read independently unfamiliar texts with comprehension and understand the importance of reading for life	K3
CLO4	Understand the importance of writing in academic life	K3
CLO5	Write simple sentences without committing error of spelling or grammar	K3

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

### Mapping with Programme Outcomes

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

S- Strong; M-Medium

### Syllabus

#### UNIT 1: Communication

5 hours

**Listening:** Listening to audio text and answering question Listening to Instructions

**Speaking:** Pair work and small group work.

**Reading:** Comprehension passages –Differentiate between facts and opinion

**Writing:** Developing a story with pictures.

**Vocabulary:** Register specific - Incorporated into the LSRW tasks

#### UNIT 2: Description

5 hours

**Listening:** Listening to process description.-Drawing a flow chart.

**Speaking:** Role play (formal context)

**Reading:** Skimming/Scanning- Reading passages on products, equipment and gadgets.

**Writing:** Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition- Free Writing.

**Vocabulary:** Register specific -Incorporated into the LSRW tasks.

### UNIT 3: Negotiation Strategies

5 hours

**Listening:** Listening to interviews of specialists / Inventors in fields (Subject specific)

**Speaking:** Brainstorming. (Mind mapping).Small group discussions (Subject- Specific)

**Reading:** Longer Reading text.

**Writing:** Essay Writing (250 words)

**Vocabulary:** Register specific - Incorporated into the LSRW tasks

### UNIT 4: Presentation Skills

5 hours

**Listening:** Listening to lectures.

**Speaking:** Short talks.

**Reading:** Reading Comprehension passages

**Writing:** Writing Recommendations Interpreting Visuals inputs

**Vocabulary:** Register specific - Incorporated into the LSRW tasks

### UNIT 5: Critical Thinking Skills

5 hours

**Listening:** Listening comprehension- Listening for information.

**Speaking:** Making presentations (with PPT- practice).

**Reading :** Comprehension passages –Note making.Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

**Writing:** Problem and Solution essay– Creative writing –Summary writing

**Vocabulary:** Register specific - Incorporated into the LSRW tasks

### Textbooks

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	TamilNadu State Council for Higher Education (TANSICHE)	English for Life Sciences Semester 1	--	--

### Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Sreedharan, Josh	The Four Skills for Communication	Foundation books	2016
2	Pillai, G Radhakrishna, K Rajeevan, P Bhaskaran Nair	Spoken English for you	Emerald	1998
3	Pillai, G radhakrishna, K Rajeevan, P Bhaskaran Nair	Written English for you	Emerald	1998

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23C03	Core Paper - III Cell and Molecular Biology	Theory	73	2	-	5

### Preamble

- To study the structure and function of basic components of prokaryotic and eukaryotic cells, cell membranes and cell wall
- To study the structure and function of cell organelles
- To appreciate the cellular components underlying mitotic cell division.
- To understand the structure and function of DNA, RNA.
- To appreciate the central dogma of life, protein synthesis

### Course Learning Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1.	Understand the structure and function of prokaryotic and eukaryotic cells, cell membranes, cell wall and cell organelles	K1, K2, K3
CLO2.	Know the process of cell cycle and cell division	K1, K2, K3
CLO3.	Understand the structure and function of DNA, RNA	K1, K2, K3
CLO4.	Appreciate the concept of transcription and translation	K1, K2, K3

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

### Syllabus

#### Unit-1

15 hrs

Prokaryotic and eukaryotic cell – structure: cell wall, plasma membrane and cytoplasm – structure and function. Cell organelles- Endoplasmic reticulum, Golgi body, Lysosomes, Vacuoles and Ribosomes, Mitochondria, chloroplast – structure and function.

#### Unit-II

14 hrs

Nucleus- structure and function; Cell cycle, Cell division- mitosis and meiosis. Chromosomes- Structure and function, Classification of chromosomes based on centromere. Special types of chromosomes- Lampbrush and Polytene chromosomes.

#### Unit-III

15 hrs

Nucleic acids: DNA as genetic material, Structure (Watson and Crick Model), forms and function of DNA. DNA replication- conservative and semi-conservative. Dispersive. Organization of DNA into chromosomes. Gene Mutation – types, causes.

Chromosomal aberrations

#### Unit-IV

14 hrs

RNA– structure, function & Types (tRNA, mRNA and rRNA). Central dogma of life  
Transcription– initiation, elongation and termination. Post transcriptional  
modifications. Genetic code- concept and properties, wobble hypothesis.

#### Unit-V

15 hrs

Translation – initiation, elongation and termination. Regulation of Gene expression-  
prokaryotes-operon concept- *lac* operon and *trp* operon. Post translational  
modifications.

#### Text Books

S.No.	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Gupta P.K.	Cell and Molecular Biology	Rastogi publications.	2 <sup>nd</sup> ed. 2017
2.	Arumugam N & Meyyan RP	Cell Biology, Molecular Biology & Genetics- Vol I	Saras Publications.	1 <sup>st</sup> ed. 2014
3.	Verma, P.S. and Agarwal, V.K	Cytology	S.Chand & Co, New Delhi	16 <sup>th</sup> ed. 2018
4.	Shukla, R.S. and Chandel, P.S.	Cytogenetics, evolution, Biostatistics and Plant Breeding	S. Chand & Co, New Delhi	1 <sup>st</sup> ed. 2014
5.	Verma P.S. and Agarwal V.K.	Cell biology, Genetics, Molecular Biology, Evolution and Ecology.	S. Chand and Company, New Delhi.	2 <sup>nd</sup> ed. 2022

#### Reference Books

S.No.	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Geoffrey M. Cooper and Robert E. Hausman,	The Cell – A Molecular Approach.	Sinauer Associates, Inc. Publishers - Sunderland, Massachusetts U.S.A.	6 <sup>th</sup> ed. 2013
2.	Clark, D. P., Pazdernik, N. J.	Molecular Biology	Netherlands: Elsevier Science	3 <sup>rd</sup> ed. 2018
3.	Ajoy Paul	Cell and Molecular Biology	Books and Allied Pvt Ltd., Kolkatta	3 <sup>rd</sup> ed. 2011
4.	De Robertis and De Robertis.	Cell and Molecular biology	Lippincott Williams and Wilkins. UK	8 <sup>th</sup> ed. 2017

**Pedagogy: E-content, Lecture, Power point presentation, Seminar, Quiz, Group Discussion and Video/ Animation**

#### Course Designers

Dr. K.S. Tamil Selvi

Dr.E.Uma



COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23CP2	Core Practical II (Core Paper III and IV)	Practical	-	-	60	4

#### Preamble

- To study the structural and functional aspects of various tissue systems and organs of dicots and monocots.
- To discuss the structure and functions of the meristematic, primary & complex tissues.
- To understand the structure of cells in relation to the functional aspects.
- Understand the cellular components underlying cell division.

#### Course learning outcomes

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

CO Number	CO Statement	Knowledge Level
CLO1	Recall the structure of the cell organelles through electron micrographs.	K1
CLO2	Understand the structure and functions of the meristematic, primary and complex tissues.	K2
CLO3	Distinguish between normal and anomalous secondary growth.	K2
CLO4	Discuss the development of the endosperm and embryo.	K3

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

#### Syllabus

##### Paper III - Cell and Molecular Biology

(30hrs)

- Study of plant cell organelles through photomicrographs/permanent slides- Cell wall, plasma membrane (Fluid Mosaic model), nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi body, lysosomes, vacuoles and ribosomes. Lampbrush and polytene chromosomes.
- Study of Nucleic acids by micrographs  
DNA (Watson & Crick model), t-RNA (clover leaf model).
- Study of various stages of mitosis using cytological preparation of Onion root tips.
- Study of various stages of meiosis using cytological preparation of Flower bud-anther.

## **Paper IV – Plant Anatomy, Embryology and Wood technology: (30hrs)**

### **Sectioning and Identification:**

**Plant Anatomy:** Primary structure of Leaf, stem and root of dicot and monocot. Secondary thickening in dicot stem -*Polyalthia* and root-*Vigna*. Anomalous secondary thickening in the stems - *Nyctanthus* and *Boerhaavia*; root – *Beta vulgaris*. Anomalous secondary thickening in the monocot stem-*Dracaena*.

### **Spotters: Book diagram/Permanent slides/Photographs**

Meristems – shoot and root apex, Xylem – tracheids and vessels, Phloem. Annual rings, Wood preservatives, Defects in wood.

**Embryology:** T.S of anther, Types of ovules, Types of embryosac- uninucleate, binucleate and mature embryosac; Types of endosperms – nuclear, cellular and helobial. Embryo mounting (*Tridax*).

### **Course Designers**

Dr.K.Gajalakshmi

Dr. K.S.Tamil Selvi

Dr.E.Uma

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23A01	Allied Paper – I: Fundamentals of Botany - I	Theory	73	2	-	4

### Preamble

- To study the characteristics and life cycle of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms
- To gain knowledge of adaptations of plants to different environments
- To learn the horticulture techniques.

### Course Learning Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1	Know about characteristics and life cycle of algae, fungi, bryophytes, pteridophytes, gymnosperms	K1
CLO2	Know about characteristics and life cycle of angiosperms	K1
CLO3	Understand the concept of plant adaptations to different environments	K2
CLO4	Appraise the horticulture techniques.	K2

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

### Syllabus

#### Unit I

15 hrs

General characteristics and classification of Algae (Fritsch-1935,1948) - A study of distribution, structure, reproduction and life cycle of *Volvox*. \*Economic importance of algae, General characteristics and classification of Fungi (Alexopoulos and Mims, 1979) –A study of distribution, structure, reproduction and life cycle of *Saccharomyces*. \*Economic importance of Fungi. General characteristics, classification (Zahlbruckner,1907), reproduction and \*Economic importance of Lichens.

**Unit II****15 hrs**

\*General characteristics and Classification of Bryophyte (Engler,1892)- Structure, Reproduction and Life cycle of *Riccia*, \*General characteristics and Classification of Pteridophytes (Reimer,1954) - Structure, Reproduction and Life cycle of *Lycopodium*, \*General characteristics and Classification of Gymnosperms (Sporne-1965) - Structure, Reproduction and Life cycle of *Cycas*.

**Unit III****15 hrs**

General Characteristics and Classification of Angiosperms (Bentham and Hooker, 1883). \*Morphology of stem, \*root, \*leaf, \*inflorescence, \*flower and \*fruit. Study of the following families with their Economic importance – Annonaceae, Rutaceae, Rubiaceae, Lamiaceae, Amarantaceae and Poaceae.

**Unit- IV****14 hrs**

Ecology –\*Plant adaptations. Xerophytes - *Nerium*, *Opuntia*. Mesophytes -*Helianthus*, *Hibiscus*. Hydrophytes-*Hydrilla*, *Nelumbium*. \*Phytogeography –\*Vegetations of Tamil Nadu: \*Evergreen, \*scrub jungle, \*Mangrove

**Unit V****14 hrs**

Horticulture: scope and importance, \*propagation methods –\*cutting, \*layering and \*grafting techniques), gardening and landscaping, \*irrigation methods, manures, lawns, indoor plants, bonsai techniques.

**Note: \*Online Learning****Text Books**

S.No.	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Srivastava, H.N	Algae	Pradeep Publications, Delhi	10 <sup>th</sup> Ed. 2004
2.	Srivastava, H.N.	Fungi.	Pradeep Publications, Delhi	10 <sup>th</sup> Ed. 2004
3.	Srivastava, H.N.	Pteridophytes	Pradeep Publications, Delhi	10 <sup>th</sup> Ed. 2004
4.	Pandey, P.B	Plant Anatomy	S. Chand & Co, New Delhi	1 <sup>st</sup> Ed. 2001
5.	Singh, V. and Jain	Taxonomy of Angiosperms	Rastogi Publications, New Delhi	2 <sup>nd</sup> Ed. 1985
6.	Purohit S.S & Ranjan .R	Ecology, Environment and Pollution	Agrobios, India, Jodhpur	1 <sup>st</sup> Ed. 2003

## Reference Books

S.No	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Sharma O.P.	Plant Taxonomy	Tata McGraw Hill Comp, New Delhi	2 <sup>nd</sup> Ed. 2018
2.	Pandey, B. P.	Taxonomy of Angiosperms	S. Chand & Co, New Delhi	6 <sup>th</sup> Ed. 2015

**Pedagogy:** Powerpoint, lecture, seminar, quiz and discussion.

## Course Designers

Dr. R. Sumathi

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
NM23DTG	DESIGN THINKING	Theory	30	-	-	2

**Preamble:**

1. To expose the students to the concept of design thinking as a tool for innovation
2. To facilitate them to analyze the design process in decision making
3. To impart the design thinking skills

**Course learning outcomes**

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of Design thinking and its application in varied business settings	K1
CLO2	Describe the principles, basis of design thinking and its stages	K2
CLO3	Apply design thinking process in problem solving	K3
CLO4	Analyse the best practices of design thinking and impart them in business and individual day to day operations.	K4

**Mapping with Programme Learning Outcomes**

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

S-Strong; M-Medium

**UNIT –1**

**(6 Hours)**

Design Thinking Overview: Introduction to Design Thinking and Design Research Strategies  
-Design Thinking Skills

**UNIT– II**

**(6 Hours)**

Design Thinking Mindset- Principles of Design Thinking-Basis for design thinking- Design Thinking Hats - Design thinking team

**UNIT–III**

**(6 Hours)**

Empathize - definition - Listen & Empathize with the Customers and/ or Users - Tools and Techniques

**UNIT–IV**

**(6 Hours)**

Define -Definition -Defining the Problem -Tools and Techniques-Journey mapping and Ideate - definition - Ideation techniques

**UNIT –V**

**(6**

**Hours)**

Prototype-Definition-Prototype Alternate Solutions-Test the Solutions-

Visualization-Story Telling - Cautions and Pitfalls - Best Practices

**Text Books:**

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christian Mueller-Roterberg	Handbook of Design Thinking Tips & Tools for how to design thinking	Amazon Kindle Version	2018
2	Gavin Ambrose Paul Harris	Design Thinking	AVA Publishing Switzerland	2010
3	Sambrant Srivastava and Vijay Kumar	A Text Book of Design Thinking	Vayu Education of India	2022

**Reference Books:**

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Maurício Vianna Ysmar Vianna Isabel K. Adler Brenda Lucena Beatriz Russo	Design Thinking-Business Innovation	MJV Press	2011
2	Moritz Gekeler	A practical guide to design thinking	Friedrich-Ebert-Stiftung	2019
3	J.Berengueres	The Brown Book of Design Thinking	UAE University College, Al Ain	2014

**Blended Learning Links**

UNIT	TOPICS	LINK
<b>UNIT I</b>	Introduction to Design Thinking	<a href="https://www.digimat.in/nptel/courses/video/109104109/L01.html">https://www.digimat.in/nptel/courses/video/109104109/L01.html</a>
	Design Thinking skills	<a href="https://www.youtube.com/watch?v=b-9Id-Jt_PI">https://www.youtube.com/watch?v=b-9Id-Jt_PI</a>
<b>UNIT II</b>	Principles& Basis of Design Thinking	<a href="https://youtu.be/6-NRiom8K9Y">https://youtu.be/6-NRiom8K9Y</a>
	Design Thinking hats	<a href="https://www.youtube.com/watch?v=bc-BvFQDmmk">https://www.youtube.com/watch?v=bc-BvFQDmmk</a>
<b>UNIT III</b>	Empathize	<a href="http://acl.digimat.in/nptel/courses/video/109104109/L02.html">http://acl.digimat.in/nptel/courses/video/109104109/L02.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L03.html">http://acl.digimat.in/nptel/courses/video/109104109/L03.html</a> <a href="https://youtu.be/ls2mqHs02B0">https://youtu.be/ls2mqHs02B0</a>
<b>UNIT IV</b>	Define	<a href="http://acl.digimat.in/nptel/courses/video/109104109/L04.html">http://acl.digimat.in/nptel/courses/video/109104109/L04.html</a> <a href="https://youtu.be/veixQsRnZZU">https://youtu.be/veixQsRnZZU</a> <a href="https://youtu.be/6-bDSKZJEAM">https://youtu.be/6-bDSKZJEAM</a>
	Ideate	<a href="http://acl.digimat.in/nptel/courses/video/109104109/L11.html">http://acl.digimat.in/nptel/courses/video/109104109/L11.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L12.html">http://acl.digimat.in/nptel/courses/video/109104109/L12.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L13.html">http://acl.digimat.in/nptel/courses/video/109104109/L13.html</a>
	Prototype	<a href="http://acl.digimat.in/nptel/courses/video/109104109/L15.html">http://acl.digimat.in/nptel/courses/video/109104109/L15.html</a>
<b>UNIT V</b>	Testing	<a href="http://acl.digimat.in/nptel/courses/video/109104109/L16.html">http://acl.digimat.in/nptel/courses/video/109104109/L16.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L17.html">http://acl.digimat.in/nptel/courses/video/109104109/L17.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L18.html">http://acl.digimat.in/nptel/courses/video/109104109/L18.html</a> <a href="http://acl.digimat.in/nptel/courses/video/109104109/L19.html">http://acl.digimat.in/nptel/courses/video/109104109/L19.html</a>

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23C04	Paper - IV – Plant Anatomy, Wood Technology and Embryology	Theory	73	2	-	5

### Preamble

- To know the anatomical structure of the Angiosperm plants
- To identify woods of commercial importance
- Methods of preserving and seasoning woods.
- To study the structure and development of embryo

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Know the fundamental structure of different plant tissue system	K1
CLO2	Understand the development of different types of cells in plant system	K2
CLO3	Identify the quality of wood	K3
CLO4	Analyse the Anatomical variation between the plant species	K4

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

### Syllabus

#### Unit I

(15 hrs)

**Plant Anatomy:** General account on Meristems. Shoot Apical Meristems, theories - apical cell theory, histogen, tunica and corpus. Root Apical Meristems- Korper and Kappe theory and Quiscent centre theory. Simple tissues- parenchyma, collenchyma and sclerenchyma.

#### Unit II

(14 hrs)

Evolution of plant vascular system. Complex tissues – primary xylem and phloem, secondary xylem and phloem. Primary structure of dicot and monocot stem; dicot and monocot root. Anatomical structure of dicot and monocot leaf. Epidermal Tissues -Types of stomata and Secretory tissues.

#### Unit III:

(15 hrs)



Formation of Secondary thickening in Dicot stem and Dicot root. Anomalous secondary thickening in Dicot stems - *Nyctanthus* and *Boerhaavia*; Dicot root of *Beta vulgaris*. Anomalous secondary thickening in monocot stem – *Dracaena*\*.

**Unit IV: (14 hrs)**

Wood Technology: Brief account on the formation and types of woods. Annual rings and Dendrochronology. Physical, Chemical, and Mechanical properties of wood. Defects in woods. Seasoning of woods, Methods of preservation of wood, and uses of wood.

**Unit V: (15 hrs)**

**Embryology:** Microsporogenesis and development of male gametophyte; Megasporogenesis and development of female gametophyte. Structure of 8 nucleate monosporic embryo sac (*Polygonum*), Bisporic (*Allium*), tetrasporic (*Peperomia*). Fertilization and Double Fertilization. Types of endosperm. Development of monocot (*Luzulla*) and dicot (*Capsella*) embryo.

**Text Books**

S.No	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Pandey.BP.	Plant Anatomy	S.Chand and company.	6 <sup>th</sup> Ed. 2001
2.	Tayal, MS	Plant Anatomy	Rastogi Publications	3 <sup>rd</sup> Ed. 2004
3.	Katherine Esau	Anatomy of seed plants	John Wiley and Sons. U.S.A.	3 <sup>rd</sup> Ed. 2011
4.	Singh, V., Pande, PC. and Jain, DK	Anatomy and Embryology of Angiosperms	Rastogi Publications	3 <sup>rd</sup> Rev. Ed. 2018
5.	Christian Brischke	Wood Protection and Preservation	Mdpi AG	1 <sup>st</sup> Ed. 2020

**Reference Books**

S.No	Authors	Title of the book	Publishers	Edition & Year of publication
1.	D.F.Cutter, C.E.J Bottla, D.W.Stevenson,	Plant Anatomy, An applied Approach	Blackwell Publishing. Australia.	1 <sup>st</sup> Ed. 2011
2.	Franz F. P. Kollmann, Wilfred A. Côté	Principles of Wood Science and Technology	Springer Berlin, Heidelberg	1 <sup>st</sup> Ed. 2020
3.	Bhojwani, SS., Bhatnagar, SP and Dantu, PK	The Embryology of Angiosperms	S Chand publishers	6 <sup>th</sup> Ed. 2020

**Pedagogy:** E-content, Lecture, Power point presentation, Seminar, Quiz, Group Discussion

*and Video/ Animation*

*Links for blended learning*

<b>S.No.</b>	<b>Topic</b>	<b>Link for the topic</b>
1.	Plant Anatomy	<a href="https://www.youtube.com/watch?v=03K82iPyWS0">https://www.youtube.com/watch?v=03K82iPyWS0</a> <a href="https://m.youtube.com/watch?v=lp4rIgsRdLc">https://m.youtube.com/watch?v=lp4rIgsRdLc</a> <a href="https://byjus.com/biology/ts-of-dracaena-stem/">https://byjus.com/biology/ts-of-dracaena-stem/</a>
2.	Wood Technology	<a href="https://www.youtube.com/watch?v=9zT3qaZJxIw">https://www.youtube.com/watch?v=9zT3qaZJxIw</a> <a href="https://www.youtube.com/watch?v=qHzIWI7CS8E">https://www.youtube.com/watch?v=qHzIWI7CS8E</a>
3.	Embryology	<a href="https://www.youtube.com/watch?v=dgFY7WUTASQ">https://www.youtube.com/watch?v=dgFY7WUTASQ</a> <a href="https://www.youtube.com/watch?v=bUjVHUf4d1I">https://www.youtube.com/watch?v=bUjVHUf4d1I</a>

**Course Designer**

Dr.M.Kamalam

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23CP2	Core Practical II (Core Paper III and IV)	Practical	-	-	60	4

#### Preamble

- To study the structural and functional aspects of various tissue systems and organs of dicots and monocots.
- To discuss the structure and functions of the meristematic, primary & complex tissues.
- To understand the structure of cells in relation to the functional aspects.
- Understand the cellular components underlying cell division.

#### Course learning outcomes

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

CO Number	CO Statement	Knowledge Level
CLO1	Recall the structure of the cell organelles through electron micrographs.	K1
CLO2	Understand the structure and functions of the meristematic, primary and complex tissues.	K2
CLO3	Distinguish between normal and anomalous secondary growth.	K2
CLO4	Discuss the development of the endosperm and embryo.	K3

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

#### Syllabus

##### Paper III - Cell and Molecular Biology

(30hrs)

- Study of plant cell organelles through photomicrographs/permanent slides- Cell wall, plasma membrane (Fluid Mosaic model), nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi body, lysosomes, vacuoles and ribosomes. Lampbrush and polytene chromosomes.
- Study of Nucleic acids by micrographs  
DNA (Watson & Crick model), t-RNA (clover leaf model).
  - Study of various stages of mitosis using cytological preparation of Onion root tips.
  - Study of various stages of meiosis using cytological preparation of Flower bud-

anther.

**Paper IV – Plant Anatomy, Wood technology and Embryology:  
Sectioning and Identification:**

**(30hrs)**

**Plant Anatomy:** Primary structure of Leaf, stem and root of dicot and monocot. Secondary thickening in dicot stem -*Polyalthia* and root-*Vigna*. Anomalous secondary thickening in the stems - *Nyctanthus* and *Boerhaavia*; root – *Beta vulgaris*. Anomalous secondary thickening in the monocot stem-*Dracaena*.

**Spotters: Book diagram/Permanent slides/Photographs**

Meristems – shoot and root apex, Xylem – tracheids and vessels, Phloem. Annual rings, Wood preservatives, Defects in wood.

**Embryology:** T.S of anther, Types of ovules, Types of embryosac- uninucleate, bi-nucleate and mature embryosac; Types of endosperms – nuclear, cellular and helobial. Embryo mounting (*Tridax*).

**Course Designers**

Dr.K.Gajalakshmi

Dr. K.S.Tamil Selvi

Dr.E.Uma

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23SCE1	Climate Change and Health: From Science to Action	Theory	45	-	-	3

S.No.	Topic of the Course	Link of the Course	Duration in hrs
1.	What is Climate Change?	<a href="https://www.coursera.org/learn/what-is-climate-change?specialization=our-responses-climate-change">https://www.coursera.org/learn/what-is-climate-change?specialization=our-responses-climate-change</a>	6
2.	Tropical Forest Landscapes 101: Conservation & Restoration	<a href="https://www.coursera.org/learn/tropicalforests101">https://www.coursera.org/learn/tropicalforests101</a>	20
3.	Climate change and Indigenous People and local communities	<a href="https://www.coursera.org/learn/climate-change-indigenous-communities">https://www.coursera.org/learn/climate-change-indigenous-communities</a>	14
4.	Our Earth's future	<a href="https://www.coursera.org/learn/earth-climate-change">https://www.coursera.org/learn/earth-climate-change</a>	8

## 2. What is Climate change?

**Week 1** - The Climate System and Climate Change – 2 hours

**Week 2** - Impacts of Climate Change – 2 hours

**Week 3** - Attitudes About Climate Change – 3 hours

## 3. Tropical Forest Landscapes 101: Conservation & Restoration

**Week 1** - Why conserve and restore tropical forest landscapes? – 3 hours

**Week 2** - Ecology of tropical forest landscapes – 3 hours

**Week 3** - Social considerations for restoration and conservation – 3 hours

**Week 4** - Conservation strategies – 3 hours

**Week 5** - Restoration fundamentals – 3 hours

**Week 6** - Agroforestry and agroecology – 3 hours

**Week 7** - Funding conservation and restoration – 4 hours

#### **4. Climate change and Indigenous People and local communities**

**Week 1** - Climate change and Indigenous Peoples and local communities – 1 hour

- Introduction – 2 hours

**Week 2** - Climate change impacts on indigenous peoples and local communities – 3 hours

**Week 3** - Coping and adapting to climate change impacts – 3 hours

**Week 4** - Local Indicators of climate change impacts – 2 hours

**Week 5** - The role of IPLC in global climate governance – 3 hours

#### **5. Our Earth's future**

**Week 1** - Climate Change Is Happening: See It – 2 hours

**Week 2** - It All Comes Down to the Ocean – 1 hour

**Week 3** - Climate Change is Happening: Model It – 1 hour

**Week 4** - Living with Climate Change – 1 hour

**Week 5** - Mitigate, Adapt, or Suffer? – 2 hours

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23A02	Allied Paper II – Fundamentals of Botany- II	Theory	73	2	-	4

#### Preamble

- To Gain Knowledge of the anatomy of plants
- To Gain Knowledge of the embryology of plants
- To study the metabolism of plants
- To know about the plant tissue culture techniques
- To Gain Knowledge of the microbial techniques

#### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Appreciate the anatomy of plants	K1
CLO2	Appreciate the embryology of plants	K2
CLO3	Appreciate the metabolism of plants	K3
CLO4	Understand the plant tissue culture techniques	K3
CLO5	Understand the microbial techniques	K2

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

#### Syllabus

##### Unit I

15 hrs

A brief account of meristems. Simple and complex permanent tissues Primary structure of dicot and monocot stem, root and leaf; Secondary structure of dicot stem and root.

##### Unit II

14 hrs

Microsporogenesis and development of male gametophyte, megasporogenesis and development of female gametophyte, structure of monosporic 8 – nucleate embryo sac (*Polygonum*). Types of endosperm, development of dicot and monocot embryos.

##### Unit III

15hrs

Plant Physiology- osmosis and diffusion. Passive and Active absorption of water, Photosynthesis - Photosynthetic apparatus, light and dark reaction. Transpiration.Plant movements, plant growth regulators –Auxin and Cytokinin.

##### Unit IV

14hrs

Tissue culture: Concept and Techniques– Sterilization, Medium preparation (MS medium),

Callus culture, organogenesis and regeneration. Hardening and field transfer.

### Unit-V Microbial techniques

15 hrs

Methods of sterilization, Culture media- PDA, Serial dilution techniques. Pure culture techniques, Microbial growth and Growth curve. Typical Fermentation process.

#### Text books

S.No	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Tayal, MS	Plant Anatomy	Rastogi Publications	3 <sup>rd</sup> Ed. 2004
2.	Singh, V., Pande, PC. and Jain, DK	Anatomy and Embryology of Angiosperms	Rastogi Publications	3 <sup>rd</sup> Rev. Ed. 2018
3.	Jain.V.K	Fundamentals of plant physiology	Chand & Company, New Delhi	19 <sup>th</sup> Ed. 2017
4.	Kalyan Kumar, De.	An Introduction to Plant Tissue Culture.	New Central Book Agency Pvt.Ltd. Howrah.	1 <sup>st</sup> Ed. 2004
5.	Kumaresan, V	Biotechnology	Saras Publication, Nagercoil, TamilNadu	6 <sup>th</sup> Ed. 2017

#### Reference books

S.No	Authors	Title of the book	Publishers	Edition & Year of publication
1.	Sharma, P.D	Microbiology	Rastogi Publications, Meerut.	3 <sup>rd</sup> Ed. 2010
2.	Michael J. Pelczar, E.C.S. Chan and Noel R Krieg.	Microbiology	Mc Graw Hill, New Delhi.	5 <sup>th</sup> Ed. 1988
3.	Mukherji.S. and A.K. Ghosh.	Plant Physiology	New Central Book Agency Pvt Ltd. Kolkatta.	1 <sup>st</sup> Ed. 2017

**Pedagogy:** Powerpoint, lecture, seminar, quiz and discussion.

#### Links for blended learning

S.No.	Unit	Topic	Link for the topic
1.	Unit I	Anatomy	<a href="https://www.youtube.com/watch?v=SiZiTeQ-nHk">https://www.youtube.com/watch?v=SiZiTeQ-nHk</a> <a href="https://www.youtube.com/watch?v=LzFDghMoMRQ">https://www.youtube.com/watch?v=LzFDghMoMRQ</a> <a href="https://www.youtube.com/watch?v=bbgwE-h84iE">https://www.youtube.com/watch?v=bbgwE-h84iE</a>
2.	Unit II	Embryology	<a href="https://www.youtube.com/watch?v=EgiET_piGpA">https://www.youtube.com/watch?v=EgiET_piGpA</a> <a href="https://www.youtube.com/watch?v=DPcSTA3EUE4">https://www.youtube.com/watch?v=DPcSTA3EUE4</a> <a href="https://www.youtube.com/watch?v=x26Fg8ltCGw">https://www.youtube.com/watch?v=x26Fg8ltCGw</a>



3.	Unit III	Plant Physiology	<a href="https://www.youtube.com/watch?v=eeOcGX5qPp8">https://www.youtube.com/watch?v=eeOcGX5qPp8</a> <a href="https://www.youtube.com/watch?v=iP6PtdhgzSk">https://www.youtube.com/watch?v=iP6PtdhgzSk</a> <a href="https://www.youtube.com/watch?v=zt9ja6p8q6U">https://www.youtube.com/watch?v=zt9ja6p8q6U</a> <a href="https://www.youtube.com/watch?v=Py2O9rXENIg">https://www.youtube.com/watch?v=Py2O9rXENIg</a> <a href="https://www.youtube.com/watch?v=DMWB9b58Rt4">https://www.youtube.com/watch?v=DMWB9b58Rt4</a>
4.	Unit IV	Tissue culture	<a href="https://www.youtube.com/watch?v=eMv_PMNPYMc">https://www.youtube.com/watch?v=eMv_PMNPYMc</a> <a href="https://www.youtube.com/watch?v=YodPROvjroU">https://www.youtube.com/watch?v=YodPROvjroU</a>
5.	Unit V	Microbiology	<a href="https://www.youtube.com/watch?v=Bh-ytzY5uVY">https://www.youtube.com/watch?v=Bh-ytzY5uVY</a> <a href="https://www.youtube.com/watch?v=OLz9JOrJepU">https://www.youtube.com/watch?v=OLz9JOrJepU</a> <a href="https://www.youtube.com/watch?v=Ppe_bgnPFHU">https://www.youtube.com/watch?v=Ppe_bgnPFHU</a>

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PL23AP1	Allied Paper - Practical	Practical	-	-	60	2

### Preamble

- To observe and identify the different types of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
- To obtain knowledge on anatomy of plants.

### Course learning outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Differentiate the different forms of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.	K1
CLO2	Preparation of culture media.	K2
CLO3	Illustrate the internal structure of plant tissues.	K3
CLO4	Analyse the various pigments in plants	K3

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

### Syllabus

Semester- III

30 hrs

#### Specimens

Bryophytes - Habit of *Riccia*

Pteridophytes - Habit of *Lycopodium cernuum*, *L. clavatum*, *L. phlegmaria* Gymnosperms - Habit of *Cycas*, Male cone, Female cone

Taxonomy - Study of plants belonging to the families (Annonaceae, Rutaceae, Rubiaceae, Lamiaceae, Amaranthaceae, and Poaceae) and their economic importance

Ecology- Habit of *Nerium*, *Opuntia*, *Helianthus*, *Hibiscus*, *Hydrilla*, *Nelumbium*

#### Slides

Algae - *Volvox*- Daughter colonies, Oogonia and Antheridia. Fungi - *Saccharomyces*-Single cell structure

Bryophytes - *Riccia*- Reproductive Structures-Antheridium, Archegonium and Sporangium  
Pteridophytes - *Lycopodium*- L.S. of Cone  
Gymnosperms - *Cycas*- T.S. of Coralloid root

### **Sectioning**

Bryophytes - *Riccia*- T.S. of Thallus  
Pteridophytes - *Lycopodium*- T.S. of Stem  
Gymnosperms - *Cycas* - T.S. of Leaflet, T.S. of Rachis  
**Demonstration** – cutting, layering, Grafting and bonsai

## **Semester- IV**

**30 hrs**

### **Slides**

Anatomy - Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma), Complex Tissues (Xylem and Phloem)  
Embryology- T.S. of Mature anther, 8- nucleated Embryosac, Mature Embryo

### **Sectioning**

Anatomy- Primary structure of Dicot stem, root and leaf Primary structures of Monocot stem and root

### **Experiments**

Physiology - Determination of osmotic potential by Plasmolytic method.  
Separation of leaf pigment by Paper chromatography.

Microbiology- Preparation of Potato Dextrose Agar Medium, Serial dilution techniques and culture techniques –Pour plate, spread plate, streak plate & slant.

### **Demonstration Experiments**

Physiology – hill reaction,  
Tissue culture – sterilization, preparation of MS medium, inoculation, callus induction and organogenesis.

**Spotters** Microbiology – fermentor

## **Course Designers**

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