



PSGR Krishnammal College for Women



**DEPARTMENT OF BOTANY**

**CHOICE BASED CREDIT SYSTEM &  
OUTCOME BASED EDUCATION SYLLABUS**

**MASTER OF BOTANY**

**2020– 2021 BATCH**



### **PROGRAMME OUTCOMES (POs)**

**PO 1:** To produce graduates with more advanced knowledge and research skills in various disciplines of botany which are relevant to scientific development and conservation of plant diversity for socio-economic development of the country.

**PO 2:** To remember, comprehend, apply, analyze, and synthesize the core concepts in botany, like biodiversity, structure and function, evolution, information flow, exchange and storage pathways and transformations of energy and matter, medicinal plants and their uses, food science and nutrition, forestry, energy and environment management.

**PO 3:** To pursue advanced education, research and development, and other creative and innovative efforts in Life science.

**PO 4:** To define the characteristics of the process of science; practice the skills of the scientific method, engage in research projects and apply quantitative skills to biological problems to understand the ambiguity in science.

**PO 5:** To understand the relationship between science and society and will apply their skill to evaluate to solve the social problems like conservation and management of environment.

### **PROGRAMME SPECIFIC OUTCOMES (PSOs)**

At the end of the programme, the student will

**PSO1:** To gain advanced knowledge in various disciplines to analyze, and understand the core concepts in Botany.

**PSO2:** To be well equipped to pursue research and development in Life science.

**PSO3:** To secure jobs in the field of education, research and industries that requires scientific thinking and critical problem solving skills.

**PSO4:** To apply the entrepreneur skills gained in Botany for socio-economic development of the Country.



## DEPARTMENT OF BOTANY

## CHOICE BASED CREDIT SYSTEM &amp; OUTCOME BASED EDUCATION

## SYLLABUS &amp; SCHEME OF EXAMINATION

## MASTER OF BOTANY (2020-2021 Batch)

Programme & Branch M.Sc- Botany										
<i>Scheme of Examination</i> (Applicable to students admitted during the academic year 2020 – 2021 onwards)										
Sem	Subject Code	Title of the Paper	Inst Hrs/ week	Total Hours		Duration of exam Hrs	Maximum Marks			
				Contact Hrs	Tutorial Hrs		CA	ESE	Total	Credit
I	MPL2001	Paper I – Plant Diversity	5	71	4	3	40	60	100	5
	MPL2002	Paper II -Anatomy, Embryology and Tissue Culture.	5	71	4	3	40	60	100	5
	MPL2003	Paper III – Applied Microbiology	5	71	4	3	40	60	100	5
	MPL2004	Paper IV – Cell Biology and Genetics	5	71	4	3	40	60	100	5
	MPL16P1	Practical I (Theory papers I, II & III)	-	120	-	-	-	-	-	-
	MPL16P2	Practical II (Theory paper IV)	2	30	-	-	-	-	-	-
II	MPL2005	Paper- V - Plant Physiology	5	71	4	3	40	60	100	5
	MPL2006	Paper- VI – Biochemistry	5	71	4	3	40	60	100	5
	MPL2007	Paper –VII- Molecular Biology	5	71	4	3	40	60	100	5
	MPL2008	Elective –I	4	56	4	3	40	60	100	4
	MPL2009	Paper – VIII- Basics of Horticulture or Paper- IX- Bioinformatics								

	MCP14A1	IDC -Clinical Microbiology & Biochemistry	4	60	--	-	-	100	100	4
	MPL16P1	Practical I (Theory papers I, II& III)	-	-	-	4	40	60	100	4
	MPL16P2	Practical II (Theory papers IV, V, VI & VII)	6	90	-	4	40	60	100	4
		Library	1	15	-	-	-	-	-	-
<b>III</b>	MPL1910	Paper X- Taxonomy of Angiosperms	4	56	4	3	40	60	100	4
	MPL1911	Paper XI– Medicinal Botany	3	41	4	3	40	60	100	3
	MPL1912	Paper XII– Genetic Engineering	4	56	4	3	40	60	100	4
	MPL1913	Paper XIII– Plant Ecology and Phytogeography	4	56	4	3	40	60	100	4
	MPL1914	Elective –II Paper XIV – Biotechniques	3	41	4	3	40	60	100	3
	MPL1915	Or Paper XV -Immunology								
	MPL19S1	Special paper- Research Methodology	2	30	-	3	-	100	100	2
	MPL16P3	Practical – III (Theory Papers X, XI )	4	60	-	4	40	60	100	2
	MPL16P4	Practical – IV (Theory Paper XII & XIII	4	60	-	4	40	60	100	2
	MNM15CS	Cyber Security	2	26	4	-	#100	-	-	Grade
MPL15CE	Comprehensive Exam	-	-	-	2	-	-	-	Grade	
<b>IV</b>	MPL1916	Paper- XVI- Energy Science	5	71	4	3	40	60	100	5

	MPL1917	Paper-XVII Forestry	5	71	4	3	40	60	100	5
	MPL1418	Advanced Learners' Course – Food Science and Nutrition	Self study	-	-	3	25	75	*100	*5
	MPL16PR OJ	Projects	20	300	-	--	20	80	100	5

*\*Not considered for grand total and CGPA*

*# Only internal assessment*

**Bloom's Taxonomy based Assessment Pattern****CA I & II: (Theory & Practicals)**

<b>Bloom's Category</b>	<b>Section</b>	<b>Marks</b>		<b>Total</b>
<b>Remember (K<sub>1</sub>) Understand (K<sub>2</sub>) Apply, Analyse (K<sub>3</sub>, K<sub>4</sub>)</b>	<b>A – 5x2 marks</b>	<b>10</b>	<b>1 or 2 sentences</b>	<b>50</b>
	<b>B- 4x5 marks</b>	<b>20</b>	<b>250 words</b>	
	<b>C – 2 out of 3x 10 marks</b>	<b>20</b>	<b>500 words</b>	

**PG – End Semester Examination Pattern**

<b>Bloom's Category</b>	<b>Section</b>	<b>Marks</b>		<b>Total</b>
<b>Remember (K<sub>1</sub>) Understand (K<sub>2</sub>) Apply, Analyse (K<sub>3</sub>, K<sub>4</sub>)</b>	<b>A – 11 out of 13x2 marks</b>	<b>22</b>	<b>1 or 2 sentences</b>	<b>100</b>
	<b>B- 5 out of 7x6 marks</b>	<b>30</b>	<b>300 words</b>	
	<b>C – 4 out of 6x 12 marks</b>	<b>48</b>	<b>600-800 words</b>	

**WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF CONTINUOUS  
INTERNAL ASSESSMENT**

**Theory**

	CI AI	CI A II	Mod el Exa m	Assign ment/ Class Notes	Semin ar	Quiz	Class Participat ion	Library Usage	Attendan ce	Max. Marks
Core / Allied	5	5	6	4	5	4	5	3	3	40
SBS	5	5	15	-	-	-	-	-	-	25
ALC		10	15	-	-	-	-	-	-	25
Informat ion Security	40	40		10		10				100

**RUBRIC ASSESSMENT TOOL**

**Assignment Maximum - 20 Marks (converted to 4 marks) – Scale 4 to 1**

<b>Criteria</b>	<b>4 Marks</b>	<b>3 Marks</b>	<b>2 Marks</b>	<b>1 Mark</b>
<b>Focus Purpose</b>	Clear	Shows awareness	Shows little awareness	No awareness
<b>Main idea</b>	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
<b>Organization: Overall</b>	Well planned	Good overall organization	There is a sense of organization	No sense of organization
<b>Content</b>	Exceptionally well presented	Well presented	Content is sound	Not good
<b>Style: Details and Examples</b>	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

**Seminar Maximum - 20 Marks (converted to 5 marks) – Scale 4 to 1**

<b>Criteria</b>	<b>4 Marks</b>	<b>3 Marks</b>	<b>2 Marks</b>	<b>1 Mark</b>
<b>Focus Purpose</b>	Clear	Shows awareness	Shows little awareness	No awareness
<b>Main idea</b>	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
<b>Organization: Overall</b>	Well planned	Good overall organization	There is a sense of organization	No sense of organization
<b>Content</b>	Exceptionally well presented	Well presented	Content is sound	Not good
<b>Style Details and Examples</b>	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples



### CLASS PARTICIPATION

Maximum - 20 Marks (converted to 5 marks) – Scaled from 5 to 1

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark
<b>Level of Engagement in Class</b>	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contribute to class by offering ideas and asking no questions	Student never contributes to class by offering ideas
<b>Listening Skills</b>	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.
<b>Behavior</b>	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class
<b>Preparation</b>	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.

### QUIZ

Maximum - 20 Marks (converted to 4 marks)

## Mapping with Programme outcome

COURSE	Programme Out come				
	PO1	PO2	PO3	PO4	PO5
	<b>COURSE-MPL2001</b>				
<b>CO1</b>	M	S	S	M	M
<b>CO2</b>	S	S	S	S	M
<b>CO3</b>	S	M	M	S	M
<b>CO4</b>	M	M	S	S	S
<b>CO5</b>	M	M	S	S	S
<b>COURSE-MPL2002</b>					
<b>CO1</b>	M	S	S	M	M
<b>CO2</b>	S	S	S	S	M
<b>CO3</b>	S	M	M	S	M
<b>CO4</b>	M	M	S	S	S
<b>CO5</b>	M	M	S	S	S
<b>COURSE-MPL2003</b>					
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	S	S	S	M	S
<b>CO3</b>	M	S	M	S	S
<b>CO4</b>	S	M	S	S	M
<b>CO5</b>	M	M	M	S	S
<b>COURSE-MPL2004</b>					
<b>CO1</b>	S	S	M	S	M
<b>CO2</b>	M	S	M	M	S
<b>CO3</b>	S	S	S	M	S
<b>CO4</b>	S	S	M	M	S
<b>CO5</b>	M	S	S	S	M
<b>COURSE-MPL16P1</b>					
<b>CO1</b>	S	M	S	S	S
<b>CO2</b>	S	S	M	S	S
<b>CO3</b>	S	M	S	S	S
<b>CO4</b>	M	S	S	S	M
<b>CO5</b>	S	M	S	S	S
<b>COURSE-MPL16P2</b>					
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	S	S	S	S	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	S	S
<b>COURSE-MPL2005</b>					

<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	M	S
<b>CO5</b>	S	M	M	S	S
<b>COURSE-MPL2006</b>					
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	M	S
<b>CO5</b>	S	M	M	S	S
<b>COURSE-MPL2007</b>					
<b>CO1</b>	S	S	M	M	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	M	S
<b>COURSE-MPL2008</b>					
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	S	S	S	M	M
<b>CO3</b>	M	S	M	S	S
<b>CO4</b>	S	M	S	M	M
<b>CO5</b>	S	M	S	M	M
<b>COURSE-MPL2009</b>					
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	M	S	S	M	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	M	S	S	M
<b>CO5</b>	M	M	M	L	M
<b>COURSE-MCP14A1</b>					
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	S	S	S	S	L
<b>CO3</b>	S	S	M	M	S
<b>CO4</b>	S	M	M	M	S
<b>CO5</b>	S	M	M	S	S
<b>COURSE-MPL1910</b>					
<b>CO1</b>	S	S	M	M	M
<b>CO2</b>	S	S	M	S	M
<b>CO3</b>	S	S	M	S	M
<b>CO4</b>	S	S	M	S	M
<b>COURSE-MPL1911</b>					
<b>CO1</b>	S	M	S	S	S
<b>CO2</b>	S	S	M	S	S

<b>CO3</b>	S	M	S	S	S
<b>CO4</b>	S	M	M	S	M
<b>COURSE-MPL1912</b>					
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	M	S
<b>CO5</b>	S	M	M	S	S
<b>COURSE-MPL1913</b>					
<b>CO1</b>	S	S	S	S	-
<b>CO2</b>	S	S	M	S	S
<b>CO3</b>	S	M	S	-	M
<b>CO4</b>	S	S	S	S	S
<b>CO5</b>	S	M	M	M	-
<b>COURSE-MPL1914</b>					
<b>CO1</b>	S	S	M	M	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	S	M	S	S
<b>COURSE-MPL1915</b>					
<b>CO1</b>	S	S	M	M	M
<b>CO2</b>	M	M	M	M	M
<b>CO3</b>	M	M	M	M	S
<b>CO4</b>	M	M	M	S	S
<b>CO5</b>	M	M	M	S	S
<b>COURSE-MPL19S1</b>					
<b>CO1</b>	M	M	M	M	M
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	M	S	S	S	S
<b>CO4</b>	M	M	M	S	M
<b>CO5</b>	M	M	S	S	S
<b>COURSE-MPL16P3</b>					
<b>CO1</b>	S	M	S	S	S
<b>CO2</b>	S	S	M	S	S
<b>CO3</b>	S	M	S	S	S
<b>COURSE-MPL16P4</b>					
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	S	S	S	S	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	M	S
<b>CO6</b>	S	S	S	S	M
<b>CO7</b>	S	S	S	S	M
<b>COURSE-MPL1916</b>					

<b>CO1</b>	M	S	S	M	M
<b>CO2</b>	S	S	S	S	M
<b>CO3</b>	S	M	M	S	M
<b>COURSE-MPL1917</b>					
<b>CO1</b>	S	S	S	S	M
<b>CO2</b>	S	S	S	M	S
<b>CO3</b>	M	S	M	S	M
<b>CO4</b>	S	M	S	M	S
<b>COURSE-MPL1418</b>					
<b>CO1</b>	M	M	M	M	S
<b>CO2</b>	S	S	S	S	S
<b>CO3</b>	M	M	M	M	S
<b>CO4</b>	M	M	M	M	M
<b>CO5</b>	M	M	M	M	S

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
<b>MPL2001</b>	<b>Paper I - Plant Diversity</b>	<b>CORE</b>	<b>71</b>	<b>4</b>	<b>--</b>	<b>5</b>

### Preamble

To understand the diversity and their distribution

To study the evolution of plants.

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1.	Classification of different plant forms	<b>K2</b>
CO2.	To understand the relationship among Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms	<b>K2</b>
CO3.	Understand the life pattern of plants	<b>K3</b>
CO4.	Able to identify the plants	<b>K4</b>
CO5.	Distinguish different fossilized life forms with that of the present plants	<b>K5</b>

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1.</b>	S	S	S	S
<b>CO2.</b>	S	S	S	M
<b>CO3.</b>	M	S	M	S
<b>CO4.</b>	M	M	S	M
<b>CO5.</b>	S	S	M	S

**S- Strong; M-Medium**

## Syllabus

### Unit: I Phycology

14hrs

Classification of algae by Fritsch 1945. Structural organization, Reproduction and Phylogeny of Chlorophyceae, Xanthophyceae, Chrysophyceae, Phaeophyceae, Rhodophyceae and Myxophyceae. Algae in Biotechnology- Industrial, Nutraceutical and bioactive/Pharmaceutical.

### Unit: II Mycology and Plant pathology

14 hrs

Classification of Fungi by Alexopoulos and Mims, (1979). Salient features, Reproduction and Life cycle of Myxomycetes, Oomycetes, Ascomycetes and Basidiomycetes. Application of fungi – Industry, Agriculture and Forestry. Classification of plant diseases based on symptoms. Host - pathogen interaction, Defense mechanism.

### Unit: III Bryology

14 hrs

Classification - Reimers (1954). Structural organization of the gametophyte, sporophyte, methods of spore dispersal in Hepaticopsida, Anthocerotopsida and Bryopsida Bryophytes as pollution indicators.

### Unit: IV Pteridology

14 hrs

Classification - Sporne (1966). Comparative Morphology, Reproduction and Life cycle of Lycopsidea, Sphenopsida, Pteropsida. Heterospory and seed habit.

### Unit: V Gymnosperms

15 hrs

Classification of Gymnosperms by Sporne (1965). General account of Coniferales Taxales, Ginkgoales and Gnetales including fossils –*Williamsonia*, *Heterangium*, *Lagenostoma*, *Pentoxylon* and *Cordaites*.

## Text Books

1. Charles Joseph Chamberlain.M, 1986. Gymnosperm- Structure Evolution, 1<sup>st</sup> edn. CBS PublishersShadara, Delhi.
2. Singh, R.S, 2005. Introduction to principles of Plant pathology, 4<sup>th</sup> edn., Oxford & IB publishing co. pvt.ltd. New Delhi.
3. Vashishta B.R and Sinha A.K.. 2008. Algae. . S.Chand and Co. Ltd., New Delhi
4. Vashishta B.R and Sinha A.K.. 2008. Fungi. S. Chand and Co. Ltd., New Delhi

## Reference Books

1. Alexopoulos, C.J and C.W. Mims., 1985. Introductory mycology. John Wiley & Sons. I edn, Newyork.
2. Chapman V.J and Chapman P.J, 1973. The algae. Mac Milan 2<sup>nd</sup> Edition, Newyork.

3. Chamberlain C.J, 1986. Gymnosperms-Structure Evolution. 1<sup>st</sup> edition, CBS Publishers, Shahdara, Delhi.
4. Fritsch F.E. 1979. The structure and reproduction of the algae.Vol I and II. Cambridge University Press. Cup – Vikas student's edn, England.
5. Prem puri, 1985. Bryophytes –A Broad Prospective –2<sup>nd</sup> Edition. Atma Ram & Sons, New Delhi.

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

**Course Designers:**

**Dr. R. Sumathi**

**Dr. S. Sindhu**



COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2002	Paper II - Anatomy, Embryology and Tissue Culture	Core	71	4	-	5

### Preamble

- knowledge on Anatomy
- Predict anomalous growth into normal plant anatomy
- Compare dicot and monocot embryology
- Knowledge on tissue culture

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Illustrate the internal structure of plant tissue	K2
CO2	Interpret anomalous secondary growth in plants	K3
CO3	Critically analyze the embryological process in plants	K3
CO4	Appraise the knowledge of tissue culture	K4
CO5	Apply tissue culture techniques to conserve plants	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	M
CO2	S	S	S	S	M
CO3	S	M	M	S	M
CO4	M	M	S	S	S
CO5	M	M	S	S	S

**S- Strong; M-Medium**

### Syllabus

#### Unit: I

**14 hrs**

Introduction to meristems and its derivatives. Cytological characteristics and growth pattern of meristem. Epidermal tissue system – trichomes, glands, Stomata. Secretory tissues- nectaries and laticifers. Detailed structure of Vascular cambium, Secondary Xylem-Xylem rays, ray tracheids, wood parenchyma, tyloses, sap and heart wood, false annual rings, ring porous and diffuse porous wood, Compression wood and Secondary phloem, Phylogenetic specialisation.

**Unit: II****14 hrs**

Nodal anatomy., Periderm-Structure, morphology, Function and Lenticels, Anomalous secondary thickening in dicots- Achyranthus, Aristolochia, Bignonia, Leptadaenia, Mirabilis, Piper and arborescent monocots-Dracena

**Unit: III****14 hrs**

Microsporogenesis. Male gametophyte - structure, pollen wall morphogenesis and chemistry. Pollen-stigma interaction and incompatibility. megasporogenesis, Embryo sac structure and types - monosporic, biosporic and tetrasporic. Fertilization and its control, parthenocarpy endosperm - types and haustoria. Structure and development of dicot embryo – Ceratocephalus falcatum, monocot embryo – Najas lacerata, anomalous embryo development – Triticum.

**Unit: IV****14 hrs**

Tissue and cell culture techniques: Types of media, preparation of Murashige and Skoog medium, macro and micro nutrients, Growth hormones. Explant culture: Selection of explants, preparation of explants for inoculation. Callus production, micropropagation. Organ culture- meristem culture, anther and pollen culture and embryo culture. Cell culture techniques and its applications.

**Unit: V****15 hrs**

Protoplast culture -somatic hybridisation, somatic embryogenesis and artificial seed production. Somaclonal variation and its applications. Cryopreservation techniques. Application of tissue culture in the field of Agriculture, forestry and horticulture.

**Text Book**

1. Maheswari.P,1991. Introduction to the Embryology of Angiosperms. Tata McGraw Hill Publishing Co., NewDelhi.
2. Pandey.B.P, 2001. Plant Anatomy. Sixth Revised Edition.. S.Chand and Compnay Ltd. New Delhi.
3. Ramawat, K.G., 2004. Plant Biotechnology. S.Chand and Company Ltd. New Delhi.

**Reference Books**

1. Katherine Esau, K.1963. Plant anatomy of Seed Plants. Second Edition. Wiley Eastern Limited, New Delhi.
2. Reinert Bajaj, 1977. Applied and fundamental aspects of Plant cell, Tissue culture and Organ. Narosa publishers. New Delhi

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*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

**Course Designers:**

Dr.C.Krishnaveni  
Dr.E.Uma

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2003	PAPER-III- Applied Microbiology	Core	71	4	--	5

### Preamble

- To understand the use of microbes at industrial level.
- Application of microbes for environmental aspects.

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Identify the microbes and to preserve microbes	K2
CO2	Understand the fermentation technology and its application	K3
CO3	Know the application of microbial products at pharmaceutical level	K4
CO4	Use microbes for biofertilizers	K5
CO5	Apply microbes to clean the polluted environment	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	M	S
CO3	M	S	M	S	S
CO4	S	M	S	S	M
CO5	M	M	M	S	S

**S- Strong; M-Medium**

### Syllabus

#### Unit I: Introduction to microbiology

**14 hrs**

History and scope of Microbiology- study of microbial structure: Microscopy and specimen preparation, Preservation of microbes- freeze drying(lyophilisation); outline of microbial diversity – Archaea, Gram Bacteria (Non Proteobacteria and Proteobacteria) Gram positive bacteria (Low

G+C gram positives, High G+C Gram positives) Fungi, Slime molds and water molds, algae and protozoa.

**Unit II : Industrial microbiology**

**14 hrs**

Upstream process –Fermentation, Media for industrial fermentation, principles of microbial growth and culture systems, solid substrate fermentation. Fermentors- Principle, Mode of operation, Types of fermentors – Conventional fermentor, Continuous stirred tank fermentor, Airlift fermentor, Packed bed fermentor and Photobioreactor. Downstream process –Solid-liquid separation, Release of intracellular products, Concentration, Purification and Formulation.

**Unit III**

**14 hrs**

Microbial products and its uses: Production, harvest, recovery, uses and mode of action of enzymes- lipase and amylase; Pharmaceutical products: Antibiotics-Streptomycin; Vitamins B2; Ethanol and Probiotics. Therapeutic proteins– Insulin. Mass culture and utilization of bacteria as SCP.

**Unit IV : Agriculture microbiology**

**14 hrs**

Microbes as Bio-fertilizers. Nitrogenous Biofertilizers, PGPR, Solid Waste - Biomanure technology, Effective microorganisms (EM), Vermicomposting, Bio-pesticides, Edible Mushroom production.

**Unit V : Environmental Microbiology**

**15 hrs**

Pollution microbiology- Biodeterioration of paper, textiles and wood microbes in Bioremediation - Oil Spills, Super Bugs, microbes in mining, ore- leaching, oil recovery. Biodegradation of xenobiotics.

**Text Books**

1. Casida. L.E. JR, 2006. Industrial Microbiology (1<sup>th</sup> Ed). New age Intl (P) Limited, New York.
2. Prescott, Harley and Klein, 2005. Microbiology (VI<sup>th</sup> Ed). McGraw Hill, Higher education, New York.
3. Stainer R.Y, 1984. General Microbiology. (IV<sup>th</sup> Ed). The Macmillan Press Ltd, Hong kong.
4. Sathyanarayana, U.2012. Biotechnology, Books & Allied (P) Ltd, Kolkata.

**Reference Books**

1. Dubey, R.C. 1993. (I<sup>st</sup> Ed). Text book of Biotechnology. S.Chand and Company Ltd, New delhi.
2. Pelczar, JR, 1988. Microbiology. (V<sup>th</sup> Ed). Mc Graw Hill company. New Delhi.
3. Rita singh, 2004. (I<sup>st</sup> Ed). Industrial Biotechnology. Global vision publishing, New delhi.
4. Sathyanarayana, U. 2012. Biotechnology, Books & Allied (P) Ltd, Kolkata.

***Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion***

**Course Designers:**

Dr. S.N. Padmadevi  
Dr. R. Sumathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2004	Paper- IV – Cell Biology and Genetics	Core	71	4	-	5

### Preamble

- To differentiate the structure and functions of both prokaryotic and eukaryotic cell organelles and cell membrane
- To distinguish the basic processes of cell signaling and signaling pathways
- To differentiate the Mendelian inheritance with non-Mendelian inheritance patterns.
- To detect the mutation types and causes, and identify the structural and numerical changes of chromosomes.
- To examine the different types of gene transfer mechanism and genome variation role in health and disease.

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Differentiate Structure and functions of cell organelles and cell membrane	K2
CO2	Relate the cell signalling pathways and cell communication	K3
CO3	Compare and contrast the mendelian inheritance with non-Mendelian inheritance	K4
CO4	Classify the mutation types, structural and numerical alterations of chromosomal implication	K5
CO5	Compare the horizontal and vertical gene transfer mechanism and genetic disorders	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	S	M	M	S
CO3	S	S	S	M	S
CO4	S	S	M	M	S
CO5	M	S	S	S	M

S- Strong; M-Medium

## Syllabus

### Unit – I

14 hrs

**Structural organization and function of cell organelles** - cell wall, nucleus, mitochondria, ER, golgibodies, chloroplast, lysosomes, peroxisomes, vacuoles, structure and function of cytoskeleton and its role in motility. Membrane structure and function – lipid bilayer, ion channels, membrane pumps, intracellular transport, electrical properties of membrane. Cell division and cell cycle. Organization of genes and chromosomes – unique and repetitive DNA, interrupted genes, structure of chromatin and chromosomes, transposons.

### Unit – II

14 hrs

**Cell signalling:** Hormones and their receptors, cell surface receptor, signalling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signalling pathways, bacterial and plant two-component signalling systems.

### Unit – III

14 hrs

**Cellular communication:** general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extra cellular matrix, neurotransmission and its regulation.

**Cancer:** oncogenes, tumor suppressor genes, cancer and the cell cycle, virus induced cancer, metastasis.

### Unit – IV

14 hrs

**Mendelian Genetics-** Mendelian Principles and gene interaction; Multiple alleles – ABO blood group, MN blood group, Rh factor; sex limited and sex influenced characters; Linkage and crossing over, linkage maps. Inheritance of mitochondrial and chloroplast genes, maternal inheritance. Mutation – types, causes and detection, structural and numerical alterations of chromosomes and their genetic implications.

### Unit – V

15 hrs

**Microbial genetics:** Methods of genetic transfers – transformation, conjugation, transduction and sex-duction. Gene mapping, mapping genes by interrupted mating, fine structure analysis of genes. Recombination- homologous and nonhomologous recombination. Human genetic disorders. Population genetics – gene pool, gene frequency, Hardy -Weinberg equilibrium- factors affecting the equilibrium, genetic drift.

## **Text Books**

1. Gupta, P.K. 1988. Cell and Molecular Biology. I Edn. Rastogi publications, UP.
2. Sambamurty.A.V.S.S. 1999. Genetics. I edn. Narosa Publishers, New Delhi.
3. Verma, P.S. and AgarwalV.K. 2007. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S.Chand and Co. New Delhi.

## **Reference Books**

1. De Robertis and De Robertis. 2005. Cell and Molecular biology. I Ed. Lippincott Williams and Wilkins. UK.
2. Gardener, E. J. 1975. Principles of Genetics. 5<sup>th</sup> Edition. John Wiley. New York.
3. Gilmartin and Bowler, 2002. Molecular Plant Biology: A practical approach (Vol. I and II), Oxford University press, UK.
4. Joseph K. John. 2006, Biomembranes and Biosignalling. Campus Books International, New Delhi.

***Pedagogy: Power point presentation, Lecture, viedeos, seminar, quiz and discussion***

## **Course Designers:**

Dr. K.Gajalakshmi  
Dr. E. Uma

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2005	Paper V - Plant Physiology	CORE	71	4	-	5

### Preamble

To know the structure and function of plant organelles  
 To obtain knowledge on various metabolic processes in plants  
 To study the role of growth hormones to maintain the life of plants  
 To understand the physiology of plants under stress condition.

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Understand the structure and function of plant organelles	K2
CO2	Understand the symbiotic relationship between plants and microbes	K2
CO3	Interpret lipid metabolism with the physiological function	K3
CO4	Application of growth hormones to regulate the life cycle of plants	K4
CO5	Apply various stress factors to produce stress resistant plants	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	M	S
CO3	M	S	M	S	S
CO4	S	M	S	M	S
CO5	S	M	M	S	S

**S- Strong; M-Medium**



## Syllabus

### Unit I

14 hrs

**Carbon metabolism-** Photosynthetic apparatus, Photosynthetic pigments and absorption of light energy, Fluorescence and Phosphorescence, Quantum requirement and Quantum yield. Red drop and Emerson's enhancement effects. Two pigment system, Action spectrum, Light and dark reactions, Hatch slack pathway. Differences between C<sub>3</sub> and C<sub>4</sub> plants. Photorespiration and Glycolate metabolism (C<sub>2</sub>- cycle), Chemosynthesis. Breakdown and Synthesis in Sucrose, Starch and Cellulose.

### Unit II

14 hrs

**Nitrogen metabolism-** Nitrogen in plants, Sources of nitrogen to plants. Conversion of nitrate into Ammonia, biological Nitrogen fixation, Mechanism of Biological Nitrogen fixation, Biosynthesis of Amino acids. Synthesis of Proteins in plants.

### Unit III

14 hrs

**Lipid metabolism-** Fats, distribution in plants, Breakdown of fats, Oxidation of glycerol, Breakdown of fatty acids- $\alpha$ -oxidation,  $\beta$ - oxidation. Glyoxylate cycle, significance. Fat synthesis- synthesis of Glycerol, synthesis of Fatty acids, Condensation of Fatty acids and Glycerol. Phospholipids.

### Unit IV

14 hrs

**Growth and Movements:** Natural growth hormones in plants- physiological effects and Biosynthesis of Auxins, Gibberellins, Cytokinin and Ethylene. Morphactins. Photoperiodism – Photoperiodism, photoperiodic induction and Phytochrome. Vernalisation- perception of the cold stimulus, presence of a floral hormone. Conditions necessary for vernalization. Mechanism, Devernalization. Senescence in plants–Programmed Cell Death (PCD), Abscission of Leaves, Circadian rhythm and biological clock

### Unit V

15 hrs

**Stress Physiology:** Introduction, water deficit and drought resistance in xerophytes and mesophytes. Salt stress and salt resistance. Cold injury and cold resistance, High temperature (Heat) stress in higher plants. Heavy metal stress in plants, Biotic resistance in plants. Dormancy – Factors causing dormancy, Secondary dormancy, Artificial methods of breaking the dormancy of seeds and advantages of dormancy of seeds.

## Text Books

1. Jain.V.K. 2013. Fundamentals of Plant Physiology. S.Chand & Company, New Delhi.
2. Mukherji S. & Ghosh, A. K. 1996. Plant Physiology. I edn. New Central Book agency. India.
3. Verma, V. 2007. Plant Physiology. 1<sup>st</sup> edition, Ane Books India, New Delhi.

## Reference Books

1. Noggle, G.J. and Fritz, G.J. 2005. Introductory to Plant physiology. Second edition, Prentice Hall of India, New Delhi.
2. Salisbury F.B & Ross.C.W . 1992. Plant physiology.4<sup>th</sup> Edition, Wards worth Pvt. Co. California.
3. Trivedi,P.C., Trivedi,P.C. and Gusmao K.S. 2006. Advances in Plant Physiology. I.K.International Pvt., Ltd., India.

***Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion***

**Course Designers:**

1. Dr.C.Krishnaveni
2. Dr.M.Kamalam

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2006	Paper VI – Biochemistry	CORE	71	4	--	5

### Preamble

- To gain a comprehensive idea of bioenergetics and the role of enzymes in regulation of cellular activity
- To understand the biological and economic importance of carbohydrates
- To grasp the biological significance of proteins
- To discern and appreciate the functions of lipids
- To realize the magnitude of immunological implications

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Apply the knowledge of thermodynamics in biochemical reactions	K2
CO2	Interpret the structure and functions of carbohydrates in living systems	K3
CO3	Analyze and appraise the role of proteins in biological systems	K4
CO4	Categorize and deduce the effects of lipids in biological systems	K5
CO5	Reconstruct immunological events	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	M	S
CO3	S	S	M	S	S
CO4	S	S	M	M	S
CO5	S	M	M	S	S

S- Strong; M-Medium

### Syllabus

#### Unit I

14 hrs

Carbohydrates- Importance, structure and classification of monosaccharides, oligosaccharides and polysaccharides. Monosaccharides - Structure of glucose, reaction of monosaccharides - Esterification, oxidation, reduction reactions, derivatives of monosaccharides. Oligosaccharides- Maltose, sucrose, lactose. Polysaccharides- Cellulose, starch, glycogen, chitin and glycoproteins.

**Unit II** **14 hrs** Proteins-  
General structure- Amino acid structure, classification and properties. Structure of proteins - Primary, secondary, tertiary and quaternary structure, properties of proteins, denaturation. Classification of proteins- based on functions, based on chemical nature and solubility, and based on nutrition. Important structural proteins- keratins, collagens. Important functional proteins- antibodies, ribonuclease.

**Unit III** **14 hrs**  
Lipids – Classification and functions, Fatty acids – Saturated, unsaturated, Nomenclature, essential fatty acids; Triacylglycerols- properties. Test to check purity of fat and oils, Phospholipids- types and functions, Glycolipids- cholesterol- structure and occurrence, properties, functions, hypercholesterolemia, Lipoproteins- structure and classification, conversion of VLDL to LDL, HDL, metabolism of HDL, disorders of plasma lipoproteins, fatty liver, lipotropic factors, obesity, Steroids and Amphipathic lipids.

**Unit IV** **14 hrs**  
Enzymes- Nomenclature, classification and properties, Enzymes as catalyst, enzyme specificity, Michaelis-Menton constant, mechanism of enzyme catalysis, factors affecting enzyme activities, enzyme regulators and inhibitors. Allosteric enzymes. Ribozymes.

**Unit V** **15hrs** Bioenergetics-  
Concept of energy, Thermodynamic principles in biology, Concepts of entropy, enthalpy, free energy and standard free energy, ATP as energy currency of the cell. Interconversion of adenine nucleotides.

#### **Text Books**

1. Hames and Hooper. 2001. Instant notes – Biochemistry. Taylor & Francis Group, Newyork.
2. Jain, J.L. 2004. Biochemistry, S. Chand and Company, New Delhi.
3. Rastogi, S.C. 2010. Biochemistry, McGraw Hill publishers, New Delhi.
4. Satyanarayana, U. 2005. Biochemistry, Books and allied (P) Ltd. Andrapradesh.
5. Stryer L. 2012. Biochemistry, Freeman Company, Newyork.

#### **Reference Books**

1. Jain, J.L, Sunjay Jain and Nitin Jain. 2010. Biochemistry, S. Chand and Company, New Delhi
2. Lehninger, 2005. Biochemistry Fourth edition, Freeman Company, New York.
3. Nelson D.L. and Michael, M. Cox, 2005. Principles of Biochemistry, Freeman Company, New York.
4. Prescott, Harley Klein, 2005. Microbiology- Sixth Edition, McGraw Hill publishers, New Delhi.

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

#### **Course Designers:**

**Dr. S. N. Padmadevi**  
**Dr. B Chitra Devi**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2007	Paper-VII- Molecular Biology	CORE	71	4	--	5

### Preamble

- To obtain in depth understanding of the organization of the genetic material in prokaryotic and eukaryotic cells.
- To gain a comprehensive idea of transcription in prokaryotes and eukaryotes
- To grasp the significance of genetic code and translation
- To discern and appreciate post translational modification of proteins
- To realize the magnitude of developments in nanotechnology

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the process of DNA replication	K2
CO2	Apply the knowledge of transcription and translation processes	K3
CO3	Investigate and question the experimental conclusions	K4
CO4	Experiment in nanobiotechnology	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	S	S	M	S	S
CO4	S	S	M	M	S

S- Strong; M-Medium

### Syllabus

#### Unit-I

14 hrs

DNA- structure – types; DNA replication, repair and recombination : Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extrachromosomal replicons, DNA damage and repair mechanisms, homologous and site-specific recombination.

#### Unit-II

14 hrs

RNA synthesis and processing: structure and function of different types of RNA. Transcription in prokaryotes & eukaryotes - factors and machinery, formation of initiation complex, transcription activator and repressor, RNA polymerases, capping, elongation, and termination, RNA processing, RNA editing, splicing and polyadenylation, RNA transport.

#### Unit-III

14 hrs

Translation in Prokaryotes - Regulation of gene activity in prokaryotes: Operon concept- trp operon & Lac operon. Translation in eukaryotes: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors.

#### **Unit IV**

**14 hrs**

Protein transport and processing: Post- translational modification of proteins. Protein sorting – Transport of proteins into chloroplast, mitochondria, endoplasmic reticulum and nucleus. Protein targeting and protein degradation.

#### **Unit- V**

**15 hrs**

**Nanobiotechnology:** Introduction to nanoscale materials: Bucky ball, carbon nanotubes and nanowires. Synthesis and characterization of nanoparticles from biological sources: Active nanoparticles from microbes and plants. \*Applications of nano in biology and current status of nanobiotechnology.

#### **Text Books**

1. Gupta, P.K. 2004. Molecular Biology and Genetic Engineering. Rastogi Publications. Meerut.
2. Pradeep, T. 2008. Nano: The Essentials. 1<sup>st</sup>edition, Tata McGraw-Hill, New Delhi.
3. Richard Booker and Earl Boysen, 2008. Nanaotechnology, 1<sup>st</sup> edition, Wiley India Pvt. Ltd.New Delhi
4. Satyanarayana.U. 2005. Biotechnology. 2nd edition, Books and Allied pvt. Ltd.
5. Tiwari, M.D. 2008. Modern dictionary of nanatechnology. 1<sup>st</sup> edition, Deep and Deep Publications Pvt Ltd., New Delhi.

#### **Reference Books**

1. Arora, M.P, 2008. Nanomedicine, , I ed. Discovery publishing house pvt. Ltd, New Delhi.
2. De Robertis E.D.P. and De Robertis, Jr. E.M.F. 2001. Cell and Molecular Biology. 2<sup>nd</sup> edition, Lippincott Williams and Wilkins.
3. Goodsell, D. S. 2004. Bionanotechnology, I ed, Willey Liss Publications, USA.

*Pedagogy: Power point presentation, Lecture,, seminar, quiz and discussion*

#### **Course Designers:**

**Dr. M. Kanchana**  
**Dr. B. Chitra Devi**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2008	Elective I–Paper VIII-Basics of Horticulture	CORE	56	4	--	4

### Preamble

- To learn the fundamental aspects of horticulture
- To learn the soil physical, chemical and biological properties and their impact on growth of plants
- To know the Nursery techniques
- To learn the techniques of fruit and vegetable cultivation and post harvest management

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	The fundamental aspects of horticulture	K2
CO2	The soil physical, chemical and biological properties and their impact on growth of plants	K2
CO3	Nursery techniques	K3
CO4	Techniques of vegetable cultivation and post harvest management	K3
CO5	Techniques of fruit cultivation and post harvest management	K3

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	M	M
CO3	M	S	M	S	S
CO4	S	M	S	M	M
CO5	S	M	S	M	M

S- Strong; M-Medium

### Syllabus

Unit I Basic concepts of horticulture

11 hrs

Scope and importance – Global scenario of horticultural crops- Divisions of horticulture - area and production – export and import - classification of horticultural crops – Nutritive value of horticultural crops – horticultural therapy – Horticulture Zones of India and Tamil Nadu .

**Unit II Soil and climatic factors on crop production** **11 hrs**

Influence of soil – physical and chemical properties and climatic factors – light, temperature, photoperiod, relative humidity, rainfall, micro climate, pollution – influence of biotic and abiotic stresses on crop production.

**Unit III Nursery techniques** **11 hrs**

Nursery techniques Establishment of nursery, selection of site, methods of production, seeds, cutting, layering, budding, tissue culture. Principles and methods of pruning and training of horticultural crops– Management of nursery, Hydroponics.

**Unit IV: Vegetable Cultivation** **11 hrs**

Vegetable production in nutrition garden, kitchen garden, truck garden, market garden, roof garden, floating garden – types of vegetable farming and contract farming- rice fallow cultivation, river bed cultivation, rain fed cultivation, organic farming, vermicomposting, export standards of vegetables.

**Unit V Orchards** **12 hrs**

Planting systems – planning, layout and management of an orchard- after-cultural practices – clonal orchards- use of growth regulators – water management – drip and fertigation - weed management - nutrient management - soil fertility management - cropping systems - intercropping - multi-tier cropping, post harvest processing and value addition, storage and marketing of horticultural produce.

### **Text Books**

1. Adams, C.R. and M. P. Early, 2004. Principles of horticulture, Butterworth – Heinemann, Oxford University Press.
2. Bansil. P.C. 2008. Horticulture in India, CBS Publishers and Distributors, NewDelhi.
3. Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publication.
4. Jitendra Singh, 2006. Basic Horticulture, Kalyani Publishers, New Delhi.

### **Reference Books**

1. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology, Pointer publishers. Jaipur.
2. Chandra, R. and Mishra M., 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.



3. Christopher, E.P. 2001. Introductory Horticulture. Biotech Books, New Delhi.
4. Jacob John. P. 2008. A hand book of post harvest management of fruits and vegetables. Daya publishers.
5. Rajan, S. and B.L. Markose. 2007. Propagation of horticultural crops. New India Publishing, New Delhi.

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

**Course Designers:**

**Dr.K.S.Tamil Selvi**

**Dr.R.S. Meerabai**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2009	Elective-I – Paper IX- Bioinformatics	Elective	56	4	-	4

### Preamble

- To develop the knowledge about the information and applications of databases.
- To operate the algorithm and alignment type software tools
- To perform sequence alignment between two nucleotide or amino acid sequences and find out structural or functional similarity.
- To construct the phylogeny tree
- To categorise the genome diversity by gene identification and gene prediction.
- To identify the protein expression and function in a genome.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate nucleic acid and protein databases and their formats	K2
CO2	Identify the regions of similarity	K2
CO3	Inferred the homology and the evolutionary relationships between the sequences studied.	K2
CO4	Generate the evolutionary tree	K5
CO5	Identify the gene annotation	K4
CO6	Compare the protein structure and function	K6

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	S
CO2	M	S	S	M	S	S
CO3	S	S	M	S	M	S
CO4	S	M	S	S	M	S
CO5	M	M	M	S	L	M
CO6	S	S	M	M	S	S

S- Strong; M-Medium

### Syllabus

## UNIT I

11 hrs

**Different types of nucleic acid and protein databases and data retrieval** - Introduction to bioinformatics. Classification of biological databases. Biological data formats. Application of bioinformatics in various fields. Introduction to single letter code of amino acids, symbols used in nucleotides, data retrieval systems – *Entrez* and SRS.

## UNIT II

11 hrs

**Sequence alignment algorithms:** Pairwise alignment - Local and Global alignment. Methods of alignment: dot plot; dynamic programming algorithm -Needleman and Wunsch algorithm, Smith-Waterman algorithm. Database searches for homologous sequences - FASTA and BLAST. Sequence filters. **Statistics of alignment score and scoring matrices** – PAM and BLOSSUM.

## UNIT III

11 hrs

**Multiple sequence alignment** – Methods of multiple sequence alignment -. Profiles, PRINTS, BLOCKS, PRINTS, PRODOM, PFAM. Progressive alignment – Clustal W, T-Coffee. Iterative Alignment method. Evaluating multiple alignments. Application of multiple sequence alignment.

**Phylogeny:** Phylogenetic analysis, Definition and description of phylogenetic trees and various types of trees, Method of construction of Phylogenetic trees [distance based method (UPGMA), Maximum Parsimony.

## UNIT IV

11 hrs

**Genomics– Functional genomics-** Introduction of transcriptomics, proteomics, metabolomics. **Comparitive genomics-** Bacterial, Yeast, *Arabidopsis thaliana*. Gene identification and prediction: Basis of gene prediction, codon bias; pattern identification **Annotation of Genome:** structural annotation – gene prediction approaches – Open Reading Frame (ORF) prediction – Hidden Markov Model – Pattern identification – Prediction of promoter sequences. Functional annotation – prediction of gene function.

## UNIT V

12 hrs

**Introduction to Proteome** - Proteome and technology. Primary attributes for protein identification - protein species of origin, Protein isoelectric point, Protein mass, aminoacid composition, Protein N- and C-terminal sequence tags and cross species protein identification. Modifications that influence protein change on 2-D PAGE - Detection and analysis of co- and post-translational modification.

### Text Books

1. Alam Khan, I. 2005. Elementary Bioinformatics. 1<sup>st</sup> ed, Pharma Book Syndicate, Adithya Art Printers, Hyderabad.
2. Arthur. M. and Lesk, 2002. Introduction to Bioinformatics, 1<sup>st</sup> ed, Oxford University Press, UK.

3. Attwood, T.K and Parry-Smith, D. J. 2002. Introduction to Bioinformatics. 3<sup>rd</sup> ed, Pearson education, New Delhi.
4. Chowdhary, K.R. and Bansal. V.S. 2011. Bioinformatics and Computational Technologies. Ist edn., Scientific Publishers, New Delhi.
5. Mani. K and Vijayaraj. N. 2004. Bioinformatics A Practical Approach, 1<sup>st</sup> edn. Aparnaa Publication. Coimbatore.
6. Ranga, M.M. 2009. Bioinformatics, 2<sup>nd</sup> edn, Agrobios, Jodhpur.
7. Westhead, D.R., Parish, J .H and Twyman, R. M. 2003. Bioinformatics. 1<sup>st</sup> Indian ed, Viva Books Private Limited, New Delhi.

### Reference Books

1. Dunn S.R., M.J., Pennington. 2002. Proteomics from Protein sequence to function. 3<sup>rd</sup> edn. Viva Books Pvt., Ltd. New Delhi.
2. Liebler, C.D. 2002. Introduction to Proteomics: Tools for the New Biology. 1<sup>st</sup> Edn. Humana Press Inc, New Jersey.
3. Mehrotra.P, Kumund Sarin, Swapna. K. & Srivastava. 2005. The New hand Book of Bioinformatics, 1<sup>st</sup> edn. Vikas Publishing House Pvt. Ltd, Noida, Uttar pradesh.

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

### Course Designers:

**Dr. K.Gajalakshmi**  
**Dr. E.Uma**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MCP14A1	IDC –Clinical Microbiology & Biochemistry	IDC	60	-	-	4

### Preamble

- To enable the students to understand the principles of clinical chemistry
- To gain the importance of hypertension and hypotension
- To enable the students to understand the principles and the concepts underlying clinical laboratory tests in clinical chemistry
- To differentiate the blotting technique and vaccination types
- To acquire knowledge on basic mechanisms involved in the causation and treatment of common disease and their influence on clinical presentation and therapy

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate the clinical specimens	K <sub>3</sub>
CO2	Classify the composition of blood, Perform analysis of chemical analytes in blood and other body fluids	K <sub>2</sub> , K <sub>3</sub>
CO3	Calculate the test results and convert them to form meaningful in patient assessment	K <sub>3</sub>
CO4	Compare and contrast the different types of blotting techniques and vaccination.	K <sub>6</sub>
CO5	Correlate laboratory results with infectious diseases processes	K <sub>4</sub>

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	S
CO2	S	S	S	S	L	L
CO3	S	S	M	S	M	M
CO4	S	M	M	M	S	S
CO5	S	M	M	S	S	S
CO1	S	L	M	M	S	S

S- Strong; M-Medium

### Syllabus

## **Unit I**

**(12 Hrs)**

**Cinical microbiology:** Clinical specimens –Collection- needle aspiration, Incubation, Catheter; handling, transport. Isolation of microbes from specimens-selective media, differential media, enrichment media, characteristic media. Identification of microbes (virus, bacteria, fungi and parasites) through morphological and biochemical characteristics.

## **Unit II**

**(12 Hrs)**

Principles of clinical biochemical analysis: Basis of analysis of body fluids for diagnostic prognostic and monitoring purposes.

Blood Analysis: Composition of blood, blood grouping & matching, physiological function of Plasma protein, role of blood as oxygen carrier, blood pressure - Hypertension & hypotension, coagulation of blood, Anaemia – causes & control .Urea determination- the urease method, estimation of bile pigment in serum, estimation of total protein in serum, estimation of total proteins and albumin based on biuret method and BCG method.

## **Unit III**

**(12Hrs)**

Clinical Chemistry: Determination of Glucose in Serum by Folin & Wu's method, Determination of Serum Cholesterol - Sackett's method for total cholesterol. Diagnostic test for Sugar in Urine. Test for salt in Serum, Test for Chlorides. Detection of Cholesterol in Urine, Detection of Diabetes . Typical reference ranges for biochemical analyst Viz, sodium, potassium, urea, creatinum, AST, ALT, AP and cholesterol and their significance. Biological role of sodium, potassium, calcium, iodine, copper and zinc.

## **Unit IV**

**(12Hrs)**

**Electrophoresis, Blotting and Vaccination** : Principles, Techniques: southern, western and northern blotting. Vaccines and immunizations: Active immunization, passive immunization, Type of vaccines-whole organism vaccines, purified macromolecules as vaccines, Recombinant –vector vaccines, DNA vaccines.

## **Unit V**

**(12 Hrs)**

**Common Diseases & their treatments:** Insect borne diseases: Malaria, Filarisis & Plague.

Air Borne diseases: Diphtheria, Whooping cough, Influenza, Measles mumps, Tuberculosis, Water borne diseases: Cholera, Typhoid, & Dysentery. Common disease of the digestive system- jaundice, respiratory system- asthma, nervous system- epilepsy. Some other common diseases-piles, leprosy. First aid for accidents. Common poisons & their antidotes - acid poisoning, alkali poisoning, Poisoning by disinfectants hallucinogens. Toxic effects of metals: Toxicity of Iron , Copper , Arsenic , Mercury, Lead, Cadmium, Aluminium & Radionuclide & Wilson's disease.

### **Text Books**

1. Ambika Shanmugam, 2005. Fundamentals of Biochemistry for Medical Students, Nagaraj and Company Private Limited.
2. Asim. K. Das, 2007. Bioinorganic chemistry 1<sup>st</sup> edn. Books & Allied Pvt Ltd.
3. Jayashree Ghosh, 2003. Textbook of Pharmaceutical Chemistry 3<sup>rd</sup> edn, S. Chand & Co.
4. Jayashree Ghosh, 2006. Fundamental concepts of Applied Chemistry 1<sup>st</sup> edn, S. Chand & Co.
5. Mallikarjuna Rao, N, 2006. Medical Biochemistry 6<sup>th</sup> edn. New Age International (P) Limited, Publishers
6. Rana, S.V.S, 2005. Bio Techniques. Theory and Practice. Rastogi Publications, Meerut.

### **Reference Books**

1. Lensing M.Prescott, John P, Harley, Donald A Klein. 2005. Microbiology, 6<sup>th</sup> Edition, Tata mc Graw Hill, New Delhi.
2. Lowrie D.B, Whalen R.G, 2000. DNA vaccines-methods and protocols, Humana press, Totowa, New Jersey.
3. Keith Wilson, John Walker. 2008. Principles and Techniques of Biochemistry and Molecular Biology, 6<sup>th</sup> Edn. Cambridge University Press.

*Pedagogy: Lecture by chalk & talk, power point presentation, e-content, simulation, numerical exercises, group discussion, assignment, quiz, seminar.*

### **Course Designers:**

1. Mrs. N. ShyamalaDevi, Dr. N. Aruna Devi - Department of Chemistry
2. Dr. K. Gajalakshmi, Dr. K .S. Tamilselvi - Department of Botany

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL16P1	Practical I Theory paper I, II and III Plant Diversity, Anatomy, Embryology & tissue culture & applied microbiology	CORE	-	-	105	4

### Preamble

- To observe, characterize and identify the different forms of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
- To identify the plants by their anatomical characters.
- To identify the embryological characters of the plants.
- To standardize the media for tissue culture.
- To isolate microorganisms from the various sources and to establish pure cultures.

### Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Learn & compare different life forms of the plants	K2
CO2	Identify the anatomical characters	K3
CO3	Identify the embryological characters	K3
CO4	Examine the explants and callus culture	K4
CO5	Isolation of microbes from various samples in different media	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	M	S	S	S
CO4	M	S	S	S	M
CO5	S	M	S	S	S

S- Strong; M-Medium

### Syllabus

Algae

45 hrs

*Scenedesmus, Pithophora, Bulbochaete, Nitella, Diatoms- Cyclotella and Navicula, Padina, Batrochospermum, Gracilaria and Lyngbya*

Mycology



Isolation of coprophilous fungi. *Saprolegnia*, *Lycoperdon*, *Phyllochora*, *Cercospora*

### **Plant pathology**

Herbarium of Paddy Blast, Angular Leaf spot of Cotton and Cucumber Mosaic Virus.

### **Bryophytes**

Vegetative and reproductive structures of *Reboulia*, *Lunularia*, *Anthoceros*, *Pogonatum* and *Sphagnum*

### **Pteridophytes**

*Selaginella*, *Isoetes*, *Osmunda*, *Adiantum*, *Angiopteris*, *Pteris*, *Azolla*

### **Gymnosperms**

*Cycas*, *Pinus*, *Araucaria*, *Cupressus*..

### **Anatomy**

**30 hrs**

Anomalous secondary thickening - *Aristolochia*, *Bignonia*, *Piper*, *Leptadaenia*, *Mirabilis*, *Achyranthes*, *Dracaena*.

Nodal anatomy – unilacunar, trilacunar and multilacunar nodes.

Submission of 5 permanent slides of Stem/ root/ leaf / petiole (**only hand sections**)

### **Embryology**

T. S. of anther - archesporial, pollen mother cell stage and mature anther.

Pollen germination.

Embryo sac – 4 nucleate and 8-nucleate.

Endosperm haustoria,

dicot and monocot embryo.

Embryo dissection-*Tridax*

### **Tissue culture**

Preparation of MS medium,

Inoculation of Explants

Callus culture and Micropropagation

### **Applied Microbiology**

**30 hrs**

Preparation of PDA medium.

Preparation of Mueller Hinton Agar (MHA) medium.

Preparation of Sabouraud Dextrose Agar (SDA) medium,

Preparation of selective medium-Pikovskaya's medium,

Isolation of micro organisms from soil, spoiled vegetables and fruits.

Isolation of phosphorus solubilizing micro organism.

Milk spoilage test.

Edible mushroom production.

Preparation of vermicompost.

## **Course designers**

Dr. S.N.Padmadevi,

Dr. M. Kamalam,

Dr. R. Sumathi,

Dr. S. Sindhu,

Dr. E. Uma

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL16P2	<b>PRACTICAL - II</b> Theory Papers (IV, V, VI and VII) Cell Biology and Genetics	Practical	-	-	120	4

### Preamble

- To gain knowledge about the fundamental processes of cell division
- To be skilled in solving problems in genetics
- To discern and appreciate the physiological and biochemical process in plants
- To acquire the capability of identifying and quantifying prokaryotic and eukaryotic genome.
- To refine the skills in nano-particle identification

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Assess the biological processes of cells	K3
CO2	Calculate and categorize problems in genetics	K4
CO3	Explain physiological processes and formulate biochemical experiments	K5
CO4	Resolve, criticize and defend problems at molecular level	K6

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	S	S

S- Strong; M-Medium

### Syllabus

#### Cell Biology and Genetics

**30 hrs**

Mitosis and Meiosis.

Spotters – plasma membrane, cell organelles, chromosomes, lamp brush chromosomes. Simple problems in genetics – Monohybrid, dihybrid and factor interaction. Linkage maps.

#### Physiology and Biochemistry

**45 hrs**

##### Physiology

##### Individual experiments

Separation of leaf pigments (Paper chromatography)

Separation of flower pigments (Thin Layer Chromatography)

Effects of CO<sub>2</sub> Concentration and light intensity on photosynthesis- Wilmot's bubbler

Absorption spectrum of chlorophyll a and b  
Test for Fat/oils.  
Test for proteins.

### **Demonstration**

Hill's reaction by isolated chloroplast.  
Column chromatography - leaf pigment separation  
Effect of cytokinin on leaf senescence.  
Effect of auxin on etiolated seeds.  
Effect of GA<sub>3</sub> on amylase.

### **Biochemistry**

#### **Individual experiments:**

Estimation of total carbohydrates and total proteins.  
Effect of temperature on membrane permeability - beetroot discs.

#### **Demonstration Experiments**

TLC of Sugars, amino acids and Estimation of total lipids.

### **Molecular Biology**

**45 hrs**

Single bacterial colony isolation  
Isolation of Bacterial genomic DNA  
Estimation of Bacterial genomic DNA – Spectrophotometer analysis  
Estimation of Bacterial genomic DNA – Agarose Gel Electrophoresis & Gel documentation  
Isolation of Plasmid DNA  
Estimation of Plasmid DNA – Spectrophotometer analysis  
Estimation of Plasmid DNA – Agarose Gel Electrophoresis & Gel documentation  
Isolation of Plant genomic DNA  
Estimation of Plant genomic DNA – Spectrophotometer analysis  
Estimation of Plant genomic DNA – Agarose Gel Electrophoresis & Gel documentation

**Spotters:** Fullerene C<sub>60</sub>, Gold nanoparticles, Carbon nano tube

### **Course designers**

Dr. Gajalakshmi & Dr. B. Chitradevi  
Dr. S.N. Padmadevi & Dr. R. Sumathi  
Dr. M. Kanchana & Dr. B. Chitradevi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1910	Paper X – Taxonomy of Angiosperms	Core	56	4	-	4

### Preamble

- To understand the principles of plant systematics, taxonomic and phylogenetic relationships.
- To grasp the importance of taxonomy softwares and GIS.
- To gain a comprehensive idea of herbarium techniques.
- To develop skill in identification of plants.
- To acquire knowledge on the diagnostic characters and economic importance of plant families.

### Course outcomes

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

CO Number	CO statement	Knowledge level
CO1	Illustrate the different systems of classification of flowering plants	K2
CO2	Apply the knowledge of Herbarium technique and GIS in identification of plants	K3
CO3	Analyze and appraise the role of International Code of Nomenclature (ICN) in naming of plants	K4
CO4	Compare and explain the diagnostic characters among different families	K5

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	M
CO2.	S	S	M	S	M
CO3.	S	S	M	S	M
CO4.	S	S	M	S	M

S- Strong; M – Medium

### Syllabus

#### Unit I

11 hrs

History of classification - Contributions of Linnaeus. Systems of classification Bentham and Hooker, Engler and Prantl and Hutchinson: Principles, merits and demerits of the systems. APG system of classification III (2009). Phylogeny of Angiosperms.

**Unit II****11 hrs**

Modern trends in taxonomy: anatomy, embryology, cytology, chemical characters and their use in taxonomy. Molecular taxonomy and its applications. Herbarium technique, floras, monograph. Computer aided taxonomy– DELTA, GRIN, IPNI. Biodiversity portal. GIS in taxonomy.

**Unit III****11 hrs**

Botanical Nomenclature: Principles and recommendations of ICN –typification, priority, valid and effective publication, citation, retention, and conservation. Key-types. Botanical gardens, major herbaria in India and World. Plant distribution-continuous and discontinuous distribution. Endemism – types with examples.

**Unit IV****11 hrs**

Study of diagnostic characters, economic importance and phylogenetic relationship of: Magnoliaceae, Menispermaceae, Polygalaceae. Caryophyllaceae, Oxalidaceae, Meliaceae, Vitaceae, Sapindaceae and Fabaceae.

**Unit V****12 hrs**

Combretaceae, Lythraceae, Aizoaceae, Oleaceae, Apocynaceae, Boraginaceae, Bignoniaceae, Nyctaginaceae, Aristolochiaceae, Santalaceae, Araceae, and Cyperaceae.

**Text Books**

1. Gurucharan Singh, 2004. Plant systematic – An Integrated Approach. 1st Edn Scientific Publishers, Inc. New Hampshire, USA.
2. Sambamurthy, A.V.V.S., 2005. Taxonomy of Angiosperms. 1<sup>st</sup> Edn. I.K. International Pvt. Ltd., New Delhi.
3. Sharma, O.P. 2009. Plant Taxonomy. Second Edition Tata McGraw Hill Education Private Limited, New Delhi.

**Reference Books**

1. Sivarajan, V.V., 1991. Introduction to the Principles of Plant Taxonomy. Ed. N.K.B. Robson, 2nd Edn, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Simpson, G.M., 2010. Plant Systematics. Second Edition. Elsevier, Amsterdam.
3. Stevens, P. F., 2012. Angiosperm Phylogeny Website. Version 12.
4. <http://www.systbot.uu.se/classification/APGclassification.html>.
5. <http://www.mobot.org/MOBOT/research/APweb/>

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

**Course designers**

Dr. C. Krishnaveni  
Dr. H. Rehana Banu

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1911	Paper XI – Medicinal Botany	Core	41	4	-	3

#### Preamble

- To study the importance of medicinal plants in human life
- To understand the drug designing and drug development

#### Course Outcomes

CO Numbers	CO Statement	Knowledge Level
CO1	Understand the importance of traditional knowledge in human welfare	K2
CO2	Apply the pharmacognostical techniques to evaluate plant drug	K3
CO3	Identify the phytochemical constituents present in the plants	K4
CO4	Apply the knowledge to bring out the herbal products at industrial level	K5

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	M	S	S	S
CO4	S	M	M	S	M

**S- Strong; M-Medium**

#### Syllabus

##### Unit I

**8 hours**

Ethnobotany: concepts and definition. History of Ethnobotany, Distribution of tribes in India, Basic knowledge of tribes- Irulas, Kanis, Paliyars. Pharmacognosy- Introduction, Classification of crude drugs- organized drugs - morphological, chemical and pharmacological method; unorganized crude drugs – gums, mucilages, and resins.

##### Unit II

**8 hours**

Scheme for pharmacognostic studies of crude drugs: Collection of drugs. Processing of crude drugs- Drying – Natural and Artificial methods; Marketing of drugs. Factors affecting the yield

of drugs. Evaluation of crude drugs – Microscopic evaluation, physical evaluation –Moisture, Extractive value and ash value.

**Unit III**

**8 hours**

Drug adulteration: Types of adulterants. Chemical evaluation of drugs- Soxhlet extraction - qualitative estimation of alkaloids, glycosides, phytosterols, tannins and terpenoids. Steam distillation- Essential oil –*Eucalyptus* and *Citronella* oil

**Unit IV**

**8 hours**

Biological sources: Geographical distribution and uses of drugs –*Tinospora cordifolia*, *Tylophora asthmatica*, *Acorus calamus*, *Terminalia chebula*, *Plantago ovata* and *Holarhena antisysenterica* and *Papaver somniferum* .

**Unit V**

**9 hours**

Applications: Phytochemicals in industry and health care. Plant drugs in the treatment of diseases- Arthritis, Constipation, diabetes, psoriasis, hypertension and memory loss. Biocides, biofungicides, and Biopesticides.

**Text Books**

1. Kokate, K., A.P. Purohit and S.B. Gokhale, 2007. Pharmacognosy, 39<sup>th</sup>Edn. NiraliPrakahan, India.
2. Saharan, Moond, Chouhan and Gupta, 2008. Principles of Pharmacognosy, Agrobios, India.
3. Jain, S.K. and V.Mudgal, 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehra dun.
4. Jain, S.K.1991. Contributions to Indian Ethno botany. Scientific publishers, Jodhpur.

**Reference Books**

1. Tyler, E.V., Brady,R.L.andRobbers,E.J., 1981. Pharmacognosy. 9<sup>th</sup>edn. Lea and Febiger, Philadelphia.
2. Trease,G.E. and E.C.Evans, 1983. Pharmacognosy. 12<sup>th</sup> edition, Bailliere Tindall, Eastbourne, U.K.

**Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion**

**Course designers**

Dr. M. Kamalam

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1912	Paper XII – Genetic Engineering	Core	56	4	-	4

### Preamble

- To acquire detailed idea about genome organization in plants, methodologies and markers in gene cloning
- To discern and appreciate the basic techniques and safety concerns in genetic engineering
- To realize the applications of genetic engineering in combating biotic and abiotic stress in economically important plants

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Apply the knowledge of vectors and gene manipulation techniques	K3
CO2.	Analyze and appraise the methodologies of gene transformation	K3
CO3.	Interpret the role of markers in genetic engineering	K4
CO4.	Categorize and deduce the effects of gene manipulation	K5
CO5.	Formulate techniques for stress tolerance in plants	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	M	S
CO3	S	S	M	S	S
CO4	S	S	M	M	S
CO5	S	M	M	S	S

S- Strong; M-Medium

### Syllabus

#### Unit I

**11 hrs**

Vectors in gene cloning: Plasmids, Phagemids, Cosmids. Artificial chromosomes:, BAC, YAC and PAC. Features of Ti and Ri plasmids and its use as vectors, binary vectors, viral vectors, Transposons as vectors. Promoters and terminators: inducible promoters and tissue specific promoters.

#### Unit II

**11hrs**

Plant Genetic Transformation: Gene transfer methods in plant cells: Transfection, Electroporation, Ultra sonication, Particle Bombardment – Gun method, Agroinfection and Liposome fusion. Transgene stability and gene silencing.



**Unit III****11hrs**

Molecular markers – Introduction, Classification of molecular markers – RFLP, RAPD, AFLP, Microsatellites (SSRs) and Minisatellites. Application of DNA markers in molecular breeding. QTL mapping and marker assisted selection breeding – MABB, MARS, Marker assisted QTL introgression and Gene pyramiding.

**Unit IV****11hrs**

Concerns about GM crops - Golden rice and terminator seeds. Safety concerns Basic techniques in Genetic Engineering: Isolation and purification of nucleic acids, Agarose gel electrophoresis, PCR, Southern, Northern and Western blotting techniques.

**Unit V****12hrs**

Application of Plant Transformation: Biotic stress: Herbicide resistance-phosphinothricin. Insect resistance- *Bt* genes. Disease resistance - PR proteins. Virus resistance: Coat protein mediated and nucleocapsid gene. Abiotic stress: Drought, cold and salt resistance. Post-harvest losses: long shelf life of fruits and flowers.

**Text Books**

1. Primrose, S. B. and Twyman, R. 2006. Principles of Gene Manipulation and Genomics. VII edn. Blackwell Publishing Company, U.S.A.
2. Slater, A., Scott, N.W. and Fowler, M.R. 2008. Plant Biotechnology (The genetic manipulation of plants). II edn. Oxford University press, U.K.
3. Brown, T.A. 2016. Gene Cloning and DNA Analysis: An Introduction. VII edn. John Wiley & Sons, U.K.

**Reference Books**

1. Hammond, P., McGarvey, P. and Yusibov, V. 2000. Plant Biotechnology: New Products and Applications. Springer-Verlag Berlin Heidelberg, Germany.
2. Gilmartin, P.M. and Bowler, C. 2002. Molecular Plant Biology: A Practical Approach (Vol. I and II), Oxford University Press, U.K.
3. Chrispeels, M. J and Sadava, D.E. 2003. Plants, Genes and Crop Biotechnology. II edn. Jones and Bartlett Publishers, U.S.A.
4. De Robertis, E.D.P. and De Robertis, Jr., E.M.F. 2010. Cell and Molecular biology. VIII edn. Lippincott Williams and Wilkins, U.S.A.

***Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion***

**Course designers**

Dr. M. Kanchana  
Dr. B. S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1913	Paper- XIII – Plant Ecology and Phytogeography	Core	56	4	-	4

### Preamble

- To provide in depth knowledge about ecology and the human impact on ecosystems.
- The course will give a picture on how an ecological approach and methods may be used to investigate different environmental issues.

### Course Outcomes

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

Cos	CO Statement	Knowledge Level
CO1	Use ecological knowledge in order to understand the distribution of species in ecosystems.	K2
CO2	Discuss different theories that may explain biological diversity and threats towards biological diversity.	K3
CO3	Understand the concepts of ecological succession, concept of climax and ecosystem equilibrium and stability.	K3
CO4	Explain the ecological background to the most important environmental problems in the world.	K5
CO5	Interpretate geological history and the role of historical biogeography in plant distributions.	K4

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	-
CO2	S	S	M	S	S
CO3	S	M	S	-	M
CO4	S	S	S	S	S
CO5	S	M	M	M	-

S- Strong; Medium

### Syllabus

#### UNIT-I: Ecosystem Structure and function

11hrs

Structure- Abiotic, Biotic, Ecological pyramids. Function of ecosystem: Productivity- primary, secondary, Food chains- Grazing, Detritus. Food webs and tropic levels and energy flow.

**UNIT II: Community Ecology****11hrs**

Characteristics of communities Analytical Quantitative – Frequency, density, Abundance, Cover and Basal area. Qualitative – Physiognomy, Phenology, Stratification, sociability, vitality and Life form. Synthetic characters- Presence and constance, Fidelity, Dominance. Method of study of communities- Raunkiaer’s Life form , **Physiological methods- Sampling units, Quadrat method, Transect method, Point method.**

**UNIT III: Ecological Succession****11hrs**

Causes, trends of succession, Types of succession- Primary, secondary and allogenic, Process of succession- Nudation, Invasion, competition and coactions-reaction, stabilization. Concept of climax- Monoclimax and Polyclimax theories.

**Population Ecology:** Characteristics of a population (Population size and Density, Dispersion, Age structure Natality (Birth Rate), Mortality (Death rate), Biotic potential, Life Tables, Population growth curves.

**UNIT IV: Applied Ecology****11hrs**

Global environmental change -Atmosphere composition and structure, Global warming- Green house gases and Ozone depletion. Remote sensing and Geographic Information System (GIS).

**Conservation strategies:** IUCN categorization- *In-situ* conservation (National parks, Biosphere reserves, Wildlife sanctuaries) *Ex-situ* conservation –(Seed bank, Botanical gardens). Sacred groves.

**UNIT V: Phytogeography****12hrs**

**Principles and importance of plant geography- Phytogeographic regions of India. Agro-climatic regions of India, Patterns of distribution – Disjunction and Variance. Theories of present day distribution of plants- Continental drift hypothesis- Gondwana land factors involved in distribution. Factors involved in distribution – Endemism, Age and Area hypothesis; Dispersal and Migration and their aims and methods.**

*The topics shall be studied by the students through quiz, field trips and online links mentioned in the reference*

<b>Text Books</b>				
<b>S.No.</b>	<b>Authors</b>	<b>Year of Publication</b>	<b>Title of the Book</b>	<b>Publishers</b>
1	Singh, J.S., Singh, S.P. and Gupta, S.	2006	Ecology Environment and Resource Conservation.	Anamaya Publications, New Delhi.
2	Sharma, P.D.	2013	Ecology and Environment. XI <sup>th</sup> Edn	Rastogi publications, Meerut.
3	Kumaresan, V. and Arumugam, N.	2015	Plant ecology and Phytogeography	Saras publication, Nagarcoil, India.

## Reference Books

S.No.	Authors	Year of Publication	Title of the Book	Publishers
1	Odum, E.P.	1975	Ecology (2nd ed.)	Oxford & IBH Publishing Co., New Delhi.
2	Krebs.	1985	Ecology	C.J, Haper & Row, New York.
3	Sinha,R.K. and Dalbir Singh.	1997	Global Biodiversity	INA Shree Publishers, Jaipur

### Flipped mode: online links

- [www.pdst.ie/sites/default/files/1.5.3%20Quantiative%20Studies.pptx](http://www.pdst.ie/sites/default/files/1.5.3%20Quantiative%20Studies.pptx)
- <https://www.youtube.com/watch?v=KuG-UjpQzm0>
- <https://www.youtube.com/watch?v=hqjXWEkByg>
- [www.smtasmc.org/images/phytogeographical\\_regions\\_of\\_India.pptx](http://www.smtasmc.org/images/phytogeographical_regions_of_India.pptx)
- <https://www.slideshare.net/ranjithkumarbs/agro-climatic-regions>
- <https://www.youtube.com/watch?v=5q8hzF9VVE>
- <https://www.youtube.com/watch?v=-XPzj95nEHY>

**Pedagogy: Power point presentation, Lecture, videos, seminar, quiz and discussion**

## Course Designers:

Dr. K. Gajalakshmi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1914	Elective- II Paper - XIV - Biotechniques	Core	41	4	-	3

#### Preamble

- To obtain in depth understanding of microtechniques
- To gain a comprehensive idea of the workings and applications of pH meter, Centrifuges and Spectrophotometer
- To grasp the significance of Chromatographic techniques
- To discern and appreciate purification of proteins

#### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Understand the nuances of microtechniques	K2
CO2.	Apply the knowledge of various instruments in designing experiments	K3
CO3.	Investigate and question the experimental conclusions	K4

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	S	S	M	S	S

S- Strong; M-Medium

#### Syllabus

##### Unit I

8 hrs

Microtechnique – Killing, Fixing, Preparation of Paraffin blocks –dehydration and infiltration with paraffin, Sectioning, Staining, and Mounting. Ocular and Stage micrometer.

##### Unit II

8 hrs

Principles and uses of pH meter. Centrifugation-Principle, Types of Centrifuges - clinical centrifuge, refrigerated centrifuge, High speed centrifuge - ultra centrifuge, Applications of Centrifugation.

##### Unit III

8 hrs

Spectrophotometer- Beer-Lambert's Law, Principle, types-UV Visible spectrophotometer, Atomic Absorption Spectrophotometry and Applications. FTIR.

**Unit IV****8 hrs**

Principles and applications of chromatography: Paper Chromatography, Thin layer Chromatography, Column Chromatography, Gas Liquid Chromatography (GLC), High Pressure Liquid Chromatography (HPLC).

**Unit V****9 hrs**

Enzymology- protein purification - analytical and preparative methods. Extraction, Repeated freezing and thawing, sonication, homogenization, Filtration, precipitation, Dialysis, purification, Gel Electrophoresis, SDS PAGE, Gel Documentation. Concentration of the purified protein- Lyophilisation. Crystallization.

**Text Books**

1. Jayaraman, J. 1992. Laboratory Manual in Biochemistry. Wiley Eastern Ltd. New Delhi.
2. Sadasivam, S and Manickam,A. 1992. Biochemical Methods for Agricultural Sciences. (1st Ed).Wiley Eastern Limited, New Delhi.
3. Rana, S.V.S., 2005. Biotechniques Theory and Practice, Rastogi Publication. Meerut.

**Reference Books**

1. Berlyn, G.P. and Miksche, J.P. 1976. Botanical Microtechnique and Cytochemistry.(1st Ed). The Iowa State University Press. Ames, U.S.A.
2. Harborne.J.B.1998. Phytochemical methods. Chapman and Hall, New Delhi.
3. Sharma, K. 2007. Manual of Microbiology: Tools and Techniques. Parwana Bhawan, New Delhi.
4. Mahajan,R. 2010. Practical manual of Biotechnology, Vayu education of India, New Delhi.

*Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion*

**Course Designers:**

Dr. B. S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1915	Paper XV – Immunology	Core	41	4	-	3

#### Preamble

- To understand the concept of immune systems.
- To gain knowledge about mechanism of immunity.
- To know the relationship between immunity and cancer.

#### Course Outcomes

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

CO Number	CO statement	Knowledge level
CO1	To understand the types of immune cells	K2
CO2	To understand antigen-antibody interaction	K3
CO3	Importance of immunodeficiency and transplantation	K3
CO4	Create awareness about vaccination and hypersensitivity reaction	K4
CO5	To evaluate the role of immunity in health and disease	K5

#### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	M
CO2.	M	M	M	M	M
CO3.	M	M	M	M	S
CO4.	M	M	M	S	S
CO5.	M	M	M	S	S

S- Strong; M – Medium

#### Syllabus

##### Unit I

8 hrs

Immune system:- Phagocytes, mast cells, basophils, lymphocytes, lymphoid organs and tissues; T cells, B cells. Immunity in the newborn.

##### Unit II

8 hrs

Antibody:- Basic structure, classes and functions. A brief account of cytokines. Antigens; tumor antigens; B cell recognition of antigen; T cell recognition of antigen. Major histocompatibility complex.

##### Unit III

9 hrs

Immunodeficiency:- Deficiency in the immune system, Primary / congenital (inherited), secondary (acquired) immunodeficiency. Diagnosis and treatment of immunodeficiency. Transplantation:- Transplantation problems, transplantation antigens, rejection mechanism, prevention of graft rejection.

#### **Unit IV**

**8hrs**

Vaccination:- Principles of vaccination, immunization, antigen preparations, vaccines to pathogens, tumor vaccines. Hypersensitivity- Definition, classification, a brief account of various types. Brief account on edible vaccines.

#### **Unit V**

**8 hrs**

Immunity in health and disease: autoimmune diseases-insulin dependent diabetes, rheumatoid arthritis and autoimmune hemolytic anemia. Organ transplantation, cancer and AIDS.

### **Text Books**

1. Kuby, J. 1997. Immunology, 3<sup>rd</sup> edition W.H. Freeman, Oxford. UK.
2. Satyanarayana, U., 2009. Biotechnology. Uppala Aauther- Publisher Interlinks, Vijayawada.

### **Reference Books**

1. Roitt, I.M. Essential Immunology, 9<sup>th</sup> edition, Blackwell Scientific, Oxford, UK. 1997.
2. Lydyard, P. M., Whelan, A. and M. W. Fanger., 2000. *Instant Notes in Immunology*, 1st edition Viva Books Private Limited, Chennai.

***Pedagogy: Power point presentation, Lecture, seminar, Assignment, quiz and discussion***

### **Course Designers:**

Dr.B.S.Chithra Devi



<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
<b>MPL19S1</b>	<b>Special Paper- Research Methodology</b>	<b>Core</b>	<b>30</b>	<b>-</b>	<b>-</b>	<b>2</b>

### Preamble

- To give background on history and methodologies of scientific research and scientific reading
- To provide basic knowledge on research designs, IPR and especially patents and patent regulations
- To understand the importance of sampling, data collection and statistical analysis of data and interpret data
- To learn report writing and presentations, Gain knowledge of biosafety and risk assessment
- To become familiar with ethical issues in biological research

### Course outcomes

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
<b>CO1</b>	Understand history and methodologies of scientific research and scientific reading	K2
<b>CO2</b>	Understand and practice research designs, IPR and especially patents and patent regulations;	K3
<b>CO3</b>	Acquire knowledge on data collection, Analyze and interpret the data	K5
<b>CO4</b>	Apply knowledge in report writing and presentations, Gain knowledge of biosafety and risk assessment	K5
<b>CO5</b>	Understand ethical aspects related to biological research. Appreciate scientific ethics through case studies	K4

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1.</b>	M	M	M	M	M
<b>CO2.</b>	M	M	S	S	M
<b>CO3.</b>	M	S	S	S	S
<b>CO4.</b>	M	M	M	S	M
<b>CO5.</b>	M	M	S	S	S

S- Strong; M – Medium

### Syllabus

#### Unit I

6 hrs

Meaning of research: objectives of research; Essential steps in research; types of research. Research methods Vs methodology. Research process– formulating the research problem. Selecting the problem, defining the problem, extensive literature survey, use of internet for literature collections, development of working hypotheses

### **Unit II**

**6 hrs**

Research Design:- Definition and importance of research design, features of a good design;– Classification of different search designs – a) exploratory research studies b) Descriptive, diagnostic research, c) Hypothesis testing research – experimental studies. Basic principles of experimental designs – Principle of replication, Principle of randomization, Principle of local control. IPR and patents

### **Unit III**

**6 hrs**

Sampling: Deliberate sampling, simple random sampling, systematic samples, stratified sampling, quota sampling, cluster sampling, multistage sampling, sequential sampling. Sampling errors and sample size. Data collection – by observation, through personal interviews, telephone interviews, mailing questionnaires, through schedule. Processing and analysis of data – editing, classification, tabulation, statistical analysis – DMRT, and ANOVA. Correlation and regression. Introduction to SPSS.

### **Unit IV**

**6 hrs**

Report writing – logical analysis of the subject matter, preparation of final outline, preparation of rough draft, rewriting and polishing Bibliography – books and pamphlets; magazine and newspapers; thesis and dissertations. Final draft – layout – A) Preliminary pages, title, name of author, year; acknowledgement, declaration, preface/foreword; table of contents, list of tables and figures. B) Main text – introduction, review of literature; methods adopted, results, discussions, summary, bibliography. C) Appendices includes plates, publications of author. Research publications: Format of a research paper – preparation, submission of manuscripts to journals- local, national and international. Plagiarism, Impact factor, citation index. Safety measures in a research laboratory

### **Unit V**

**6 hrs**

Research Ethics and Responsible Conduct in Research

Brief history and analytical basis of research ethics, responsible conduct in research (Honesty in Science: Integrity, Authorship, Conflicts of Interest, Privacy and Confidentiality, Informed Consent, Risk/Benefit Assessment), The legal regulation of research ethics in India (From UGC, MHRD and other governing agencies), Regulatory requirements relevant to international research. Ethical conflicts in biological sciences - interference with nature, for experiments involving animals and humans.

### **Text Books**

1. Gurumani.N., 2007. Research Methodology for Biological Science. MJP Publishers, Chennai.
2. Kothari, C. R., 1990. Research Methodology – Methods and techniques 2<sup>nd</sup> edition. Wishwa Prakashan, New Age International (P) Ltd.,New Delhi.
3. Saravanel, P., 2003. Research methodology, 1<sup>st</sup> edn. Kitab Mahal, Allahabad.

### **References**

1. Ganguli, P. (2001). *Intellectual Property Rights: Unleashing the Knowledge Economy*. New Delhi: Tata McGraw-Hill Pub.
2. *National IPR Policy*, Department of Industrial Policy & Promotion, Ministry of

Commerce, GoI

3. *Complete Reference to Intellectual Property Rights Laws*. (2007). Snow White Publication Oct.
4. Kuhse, H. (2010). *Bioethics: an Anthology*. Malden, MA: Blackwell.
5. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. <http://www.ipindia.nic.in/>
6. Karen F. Greif and Jon F. Merz, *Current Controversies in the Biological Sciences -Case Studies of Policy Challenges from New Technologies*, MIT Press
7. World Trade Organisation. <http://www.wto.org>
8. World Intellectual Property Organisation. <http://www.wipo.int>
9. International Union for the Protection of New Varieties of Plants. <http://www.upov.int>
10. National Portal of India. <http://www.archive.india.gov.in>
11. National Biodiversity Authority. <http://www.nbaindia.org>
12. *On Being a Scientist*, A Guide to Responsible Conduct in Research: Third Edition (2009)
13. Role of the Ethics Committee: Helping To Address Value Conflicts or Uncertainties  
Author links open overlay panel Mark P.Aulisio, Robert M.Arnold
14. <https://www.glos.ac.uk/docs/download/Research/handbook-of-principles-and-procedures.pdf>
15. Research Regulatory Compliance 1st Edition (Mark Suckow, Bill Yates eBook ISBN: 9780124200654)
16. Recent research ethics policy from Government of India.

***Pedagogy: Power point presentation, Lecture, seminar, Assignment, quiz and discussion***

#### **Course Designers:**

Dr.K.S.Tamilselvi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL16P3	Practical III Theory paper X and XI	CORE	-	-	60	2

### Preamble

- Collection, identification and classification of plants.
- Preparation and maintenance of Herbarium
- Extraction of medicinal plants
- Qualitative analysis of chemical components
- Testing of plant extracts for antimicrobial properties

### Course Outcomes

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

Cos	CO Statement	Knowledge Level
CO1	Identify and classify the plants taxonomically	K3
CO2	Evaluate the medicinal plants for their phytochemical constituents	K4
CO3	Testing the ability of plant extracts for their antimicrobial properties	K5

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	M	S	S	S

**S- Strong; M-Medium**

### Syllabus

#### Taxonomy

**30 hrs**

Study of the morphological, floral characters, economic importance of the families- *Magnoliaceae, Menispermaceae, Polygalaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Vitaceae, Sapindaceae, Fabaceae, Combretaceae, Lythraceae, Aizoaceae, Oleaceae, Apocynaceae, Boraginaceae, Bignoniaceae, Nyctaginaceae, Aristolochiaceae, Santalaceae, Araceae and Cyperaceae.*

Preparation of artificial key with 4 species of a genus.

Preparation and submission of 25 herbarium specimens of common weeds/wild plants.

Two or Three days field visit for herbarium preparation

### Medicinal Botany

30hrs

1. Collection of any five medicinal plants mounted on herbarium sheets and recording their medicinal properties.
2. Analysis of morphological features and medicinal importance of the following
  - a. Bark – *Cinnamomum zeylanicum*
  - b. Rhizome – *Alpinia galanga*
  - c. Root - *Vetiveria zizanoides*
  - d. Bulb – *Gloriosa superba*
  - e. Gum – *Cyamopsis tetragonolobus*
  - f. Mucilage – *Trigonella foenum-graecum*
  - g. Leaves – *Solanum trilobatum*
3. Qualitative phytochemical studies-
  - i. Group experiments
    - a. Soxhlet extraction and estimation of extractive values of polar and non polar solvents
  - ii. Individual experiment
    - Qualitative analysis of powder of any 2 medicinal plants
    - a. Alkaloids, b. Tannins, c. Flavonoids d. Glycosides.
4. Antimicrobial properties of any two plant extracts.

### Course designers

Dr.C. Krishnaveni

Dr.M.Kamalam

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL16P4	Practical IV (Theory XII and XIII)	Core	-	-	60	2

### Preamble

- To gain knowledge about the fundamental processes of genetic engineering
- To be skilled in handling various equipments
- To acquire the capability of performing immunological studies.

### Course Outcomes

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

CO's	CO Statement	Knowledge Level
CO1	Assess the various aspects of genetic engineering	K3
CO2	Categorize and handle the scientific equipments	K4
CO3	Explain immunological processes	K5
CO4	Resolve, criticize and defend problems at molecular level	K6
CO5	Examples of vegetation patterns and processes, including a class walk to visit and discuss the vegetation ecology.	K5
CO6	Recognize the complexity of ecological interactions at different spatial and temporal scales in plant communities.	K6
CO7	Gain appreciation for the importance of proper sampling design in ecological field studies.	K6

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	S	S
CO5	S	M	S	M	S
CO6	S	S	S	S	M
CO7	S	S	S	S	M

S- Strong; M-Medium

### Syllabus

**Genetic Engineering****30hrs**

1. Restriction and Digestion of DNA
2. Polymerase Chain Reaction
3. Southern Blotting
4. Protein isolation
5. SDS PAGE

**Spotters:** RNA isolation, Western Blotting, gene Gun, *Agrobacterium* mediated gene transformation, Bt Cotton, Golden rice.

**Plant Ecology and Phytogeography****30 hrs**

To determine the quantitative characters in the community by using quadrat method.

a) Frequency    b) abundance    c) density    d) basal cover    e) IVI.

1. Synthetic characters: Similarity index, FICC, dominance index, diversity index.
2. Raunkiaer's life form classes and percentage distribution of species in vegetation.
3. Stratification, Zonation – Demonstration.
4. Field visit – Report preparation on vegetation types, conservation measures under taken in biosphere reserves/ national parks/ sanctuaries etc.

**Immunology**

Demonstration: Antibiotic sensitivity test – Penicillin, Ampicillin, Cefotoxin, Kanamycin. Immunoprecipitation, Double Immunodiffusion, Single Radial Immunodiffusion, Electroimmunoassay (Rocket Immunoelectrophoresis), Hemagglutination Assay.

**Course designers**

Dr. M. Kanchana  
Dr. K.Gajalakshmi  
Dr. B. S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MNM15CS	Cyber Security	-	26	4	-	Grade

### Objective

This course presents the principles of Cyber Security and its attack. It covers all aspects of cyberspace, botnet, cyber crime and its case studies.

### Unit I 5hrs

**Cyberspace:** Introduction- Web Threats for Organizations - Security and Privacy Implications from Cloud Computing - Social Media Marketing - Social Computing and the Associated Challenges for Organizations - Protecting People's Privacy in the Organization- Organizational Guidelines for Internet Usage- Safe Computing Guidelines and Computer Usage Policy.

### Unit II 5hrs

**Security Threats:** Malicious Software, Types of Attacks, Threats to E-commerce, e-cash, Credit/Debit Cards.

### Unit III 5hrs

**Cyber Security:** Introduction - An Essential Component of Cyber security - Forensics Best Practices for Organizations - Media and Asset Protection - Importance of Endpoint Security in Organizations

### Unit IV 5hrs

**Cyber Attacks:** Introduction - How Criminals Plan the Attacks - Social Engineering - Cyberstalking -Cybercafe and Cybercrimes - Botnets: The Fuel for Cybercrime - Attack Vector - Cloud Computing

### Unit V 6hrs

**Case Study on Cyber Crime & Security:** Introduction on Cyber Crime - Trends in Mobility - Credit Card Frauds in Mobile and Wireless Computing Era. Illustrations, Examples and Mini-Cases - Introduction - Real-Life Examples - Mini-Cases Illustrations of Financial Frauds in Cyber Domain - Digital Signature-Related Crime Scenarios - Digital Forensics Case Illustrations - Online Scams.

### Text Books

1. Faculty of Computer Science – PG. 2016. Essentials of Cyber Security, KalaiKathir Achachagam, PSGR. Krishnammal College, Coimbatore.

### Reference Books

1. Nina Godbole and Sunit Belpure, 2011. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Publication Wiley.
2. William Stallings, 2011. Network Security Essentials – Applications and Standards, Pearson Education.

**Pedagogy:** Power point presentation, Lecture, seminar, Assignment, quiz and discussion

### Course Designers:

Department of Computer Science



COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1916	Paper XVI– Energy Science	Core	71	4	-	5

#### Preamble

- To know the different forms of energy resources
- To study the need for alternative energy sources

#### Course Outcomes

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

Cos	CO Statement	Knowledge Level
CO1	Understand the current status of the energy sources in the world	K2
CO2	Identify the alternative energy sources	K3
CO3	Maintain the natural resources	K4

#### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	M
CO2	S	S	S	S	M
CO3	S	M	M	S	M

S- Strong; M-Medium

#### Syllabus

##### Unit I

14hrs

Nonrenewable energy resources: Definition, types of fossil fuels – coal, oil shale, Natural gas and petroleum; Atomic energy – Thorium and Uranium as sources of atomic energy.

##### Unit II

14hrs

Renewable energy resources: Definition, types – solar energy, wind energy, tidal energy, geothermal energy and hydroelectric energy. Hydrogen as energy resources.

##### Unit III

14hrs

Biomass energy resources: Types – terrestrial and aquatic biomass. Energy plantation. Bio fuel Production by chemical and enzyme catalysis. Methods for energy production- biogas and electricity. Advantages and disadvantages of using biomass as energy source.

#### **Unit IV**

**14hrs**

Natural resources and their management: Classification of natural resources. Land resource management – soil erosion, water erosion, wind erosion and their management; Water resource management – surface water resources and ground water resources. Problems of water management. Forest resource management.

#### **Unit V**

**15 hrs**

Phytoremediation: Definition, phytostabilization, phytodegradation, phytofiltration, rhizodegradation, phytoextraction. Strategies to enhance phytoremediation. Advantages and disadvantages of phytoremediation. Application of genetic engineering in phytoremediation. Case studies of the above types of phytoremediation.

#### **Text Books**

1. Purohit, S.S. and Ranjan, R, 2003. Ecology, Environment and Pollution. Agrobios India.
2. Purohit, S.S, 2005. Biotechnology – Fundamentals and Applications (IV Edn.). Agrobios India.
3. Abbasi, S.A. and Naseema Abbasi, 2006. Renewable energy sources and their environmental impact. 1<sup>st</sup> edn. 4<sup>th</sup> reprint. Prentice Hall of India Pvt. Ltd., New Delhi.

#### **Reference Books**

1. Trivedi, R.K. and Sadhana Sharma (Eds.), 2005. Biotechnological application in Environmental management. BS Publication, Hyderabad.
2. Jefferson W Tester, 2006. Sustainable energy – Choosing among options. Indian Reprint. Prentice Hall of India Pvt. Ltd., New Delhi.
3. John Twindell and Tony Weir, 2007. Renewable energy resources (II edn.). Taylor and Francis group, London and New York.

***Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion***

#### **Course designers**

Dr.M.Kamalam

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL1917	Paper XVII- Forestry	Core	71	4	-	5

### Preamble

- To learn the fundamental aspects of forestry
- To know the silviculture of trees and propagation techniques, Nursery techniques
- To learn the utilization of forest
- To learn about forest tree improvement practices
- To study about the role of forests in environment and forest protection measures

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	To learn the fundamental aspects of forestry	K2
CO2.	To know the silviculture of trees and propagation techniques, Nursery techniques	K3
CO3.	To apply the knowledge of sustainable utilization of forest	K4
CO4.	To apply the knowledge in forest tree improvement practices	K5

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	S	S	M
CO2.	S	S	S	M	S
CO3.	M	S	M	S	M
CO4.	S	M	S	M	S

S- Strong; M-Medium

### Syllabus

#### Unit I

14 hrs

**Introduction to Forestry**– Forest - Definition, types of forest - natural and manmade: tropical, temperate, evergreen, semi evergreen, deciduous; monoculture, agroforestry, social and

plantation forestry. Classification of world forests and Indian forests. Classification based on site quality density, tolerance, crown; water cycles of forest.

**Silviculture:** Concept, Ecological and physiognomic factors influencing vegetation, natural and artificial regeneration of forests Seed dynamics in forest: seed production, dissemination, germination, establishment and mortality.

#### **Unit II**

**14 hrs**

Methods of propagation, grafting techniques; nursery and planting techniques - seed dormancy and seed treatment, nursery beds, polybags and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending. Silviculture of some of the economically important species in India such as *Bamboo* spp, *Casuarina equisetifolia*, *Santalum album*, *Shorea robusta*, *Tectona grandis*.

#### **Unit III**

**14 hrs**

**Forest utilization:** Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation system, storage and sale; Timber and Non-Timber Forest Products (NTFPs) definition and scope; gums, resins, oleo-resins, fibres, oil seeds, nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac collection; processing and disposal. Pulp-paper and rayon.

#### **Unit IV**

**14 hrs**

**Tree Improvement and Seed Technology:** General concept of tree improvement, methods and techniques, variation and its use, provenance, seed source, exotics; quantitative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement, genetic testing programming, selection and breeding for resistance to diseases, insects, and adverse environment; the genetic base, forest genetic resources and gene conservation in situ and ex-situ. Forest economics and Cost benefit ratio.

#### **Unit V**

**15 hrs**

**Forest and Environment:** Role of forests in conserving soils. Maintenance and build up of soil organic matter, forest leaf litter and composting; Role of microorganisms in ameliorating soils; N and C cycles, Role of forest in environmental amelioration. Climate change and Forests.

**Forest protection:** Forest protection – injuries to forest – biotic and abiotic agencies, control measures. Major pest and disease problems in forestry. General forest protection against fire. Forest policies and laws for protection of forests.

#### **Text Books**

1. Reginald D Forbes and Arthur B. Meyer., 2001. Forestry handbook, Greenworld Publishers, Lucknow.
2. Pankaj Panwar and S.D. Bharadwaj., 2007. Handbook of Practical Forestry, Agrobios(India). Jodhpur
3. Singh,M.P., B.C. Oraon and Narendra Prasad., 2009. Afforestation, APH Publishing Corporation, New Delhi.
4. Tek Bahadur Subba., 2010. Forest Ecosystem in Modern world, Cyber Tech Publications, New Delhi

#### **Reference Books**

1. Gary L. Rolfe, Johan M. Edington, I. Irving Holland, Gayle C. Fortenberry., 2005. Forests and Forestry, International Book. Distributor, Dehra Dun.
2. Dhanai. R., 2011. Forest and urban environment Planning and Development. Cyber Tech Publications, New Delhi

***Pedagogy: Power point presentation, Lecture, seminar, quiz and discussion***

**Course designers**

Dr. K.S. Tamilselvi  
Dr. K. Gajalakshmi

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
<b>MPL1418</b>	<b>Paper – Advanced Learners Course-Food Science and Nutrition</b>	<b>Core</b>	<b>Self study</b>	-	-	<b>5</b>

### **Preamble**

- To understand the nutritional importance of food substances and dietary allowances.
- To acquire knowledge about toxic effects and adulteration of food substances.

### **Course outcomes**

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	To understand recommended dietary allowances	K2
CO2	To know the composition and nutritive value of food groups	K2
CO3	Create awareness about macronutrients and their malnutrition	K3
CO4	To understand the nutritional importance of vitamins and minerals	K4
CO5	To evaluate food toxicants and food spoilage	K5

### **Mapping with Programme Outcomes**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1.</b>	M	M	M	M	S
<b>CO2.</b>	S	S	S	S	S
<b>CO3.</b>	M	M	M	M	S
<b>CO4.</b>	M	M	M	M	M
<b>CO5.</b>	M	M	M	M	S

S- Strong; M – Medium

### **Syllabus**

#### **Unit I**

Introduction to food science and nutrition. Recommended Dietary Allowances (RDA): Factors affecting RDA, methods used for deriving RDA, requirement and RDA. Reference man and Woman. Indian standards for height and weight. Comparison of Indian recommended allowances with that of FAO\WHO standards.

## **Unit II**

Composition and nutritive value of different food groups: cereals, pulses, nuts, fruits, vegetables, meat and egg. Milk – composition, physical properties, nutritive value. Effect of heat, acid and enzyme on milk. Processing of milk- Pasteurisation. Milk products: non fermented and fermented milk products. Methods of cooking – Objectives, moist heat method, pressure cooking, dry heat method and microwave cooking.

## **Unit III**

Nutritional importance, digestion and absorption of macronutrients: Carbohydrates, proteins and lipids. Detailed study of diabetes- 2 types, glucose tolerance, diagnosis and control, diabetes and hypoglycemia; Amino acid requirement, and essential amino acids; indices of protein quality evaluation, protein and iron malnutrition-kwashiorkore, essential fatty acids, deficiency and excess of fats, role of fats in heart disease – atherosclerosis.

## **Unit IV**

Nutritional importance, cheaper sources, deficiency diseases and their control of micronutrients- vitamins and minerals : vitamins- Vitamin A-night blindness, B-Beriberi, C - Scurvy, D- Rickets, E and K. Heat sensitivity of vitamins. Minerals: Macro minerals: Calcium and Phosphorous - Osteoporosis. Microminerals: Iron and Iodine – anemia and goiter.

## **Unit V**

Naturally occurring food toxicants: protease inhibitors, haemeagglutinins, cyanogens, saponins, lathyragens. Allergy and allergens. Food spoilage and preservation: Role of microorganisms in food spoilage, health disorder – botulism. Food preservation – Methods of food preservation using low temperature, high temperature, osmotic pressure and dehydration.

### **Text Books**

1. Sheela Sharma., 2000. Human nutrition and meal planning. 1<sup>st</sup> edition, Jnananda Prakashan, P&D, New Delhi.
2. Swaminathan, M.S., 2002. Advanced text book on Food and Nutrition. 2<sup>nd</sup> edition Bangalore Printing and Publishing Company, Bangalore.
3. Srilakshmi, R., 2006. Nutrition Science. Revised 2<sup>nd</sup> edition. New Age International Limited, Publishers, New Delhi.

### **Reference Books**

1. Gitanjali Chatterjee., 1999. Hand book of Food and Nutrition, 1<sup>st</sup> edition. Rajat Publications, New Delhi.

2. Arti Bhatia., 2000. Nutrition and Dietetics, 1<sup>st</sup> edition Anmol Publications Pvt. Ltd., New Delhi.
3. Francis Sizer and Eleanor Whitney., 2000. Concepts and controversies. 8<sup>th</sup> edn. Thompson Learning, Wadsworth, U.S.A

***Pedagogy: Power point presentation, Lecture, seminar, Assignment, quiz and discussion***

**Course designers**

Dr. K. Gajalakshmi

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MPL16PROJ	Project	Category	L	T	P	Credit
		Core	--	--	300	5

### Preamble

To make the students understand the importance of experimental analysis, scientific approach in solving problems related to the environment and society and to educate and train the students to write scientific papers.

### Execution procedure for the allotment of students for the Project

Project students are assigned through lot system. Students are listed out based on their marks scored in the end semester examinations and segregated as student with distinction (Group 1) and below distinction (Group 2). Staff members are allowed to choose the project students from both the groups by lot system. Projects allotted based on the interest of the students.

### Execution of research

\*The research work can be carried at the department or any other organization approved by the staff coordinator and the Head of the Department.

\*One review meeting will be conducted in-between to monitor the progress of the research.

\*Viva voce examination will be conducted by external examiner and the staff co-ordinator guiding the project.

### Area of work

Taxonomy, Anatomy, Embryology, Physiology, Cytogenetics, Genetic engineering, Seed technology, Biotechnology, Microbiology, Enzyme technology, Bioremediation, Solid waste management, Organic Farming, Tissue culture & Medicinal Botany.

### Methodology

Each project should contain the following details

- Brief introduction about the topic
- Review of literature
- Materials and Methods
- Experimental Results and Discussion – evidences in the form of figures, tables, graphs and photographs can be enclosed.
- Summary
- References

The above content should not exceed 100 pages.

### Evaluation of the Project

Relevance of the topic to the academic / society	- 10 marks
Objectives	- 10 marks
Experimental design	- 30 marks
Expression of results and discussion	- 30 marks
<b>Total</b>	<b>- 80 marks</b>

<b>Viva voce: -</b>	Presentation - 10 marks
Discussion	- 10 marks
<b>Total</b>	<b>= 20 marks</b>
<b>Total</b>	<b>= 100 marks</b>