PSGR
Krishnammal College for Women

DEPARTMENT OF BOTANY

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

(Semesters– I&II)

MASTER OF BOTANY
(2023 – 2025 Batch)

PROGRAMME L E A R N I N G OUTCOMES (PLOs)

PLO 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.

PLO 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.

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

PLO 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.

PLO 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 scientificthinking and critical problem solving skills.

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

PSGR Krishnammal College for Women

College of Excellence, nirf 2023-4th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with A++ grade by NAAC, An ISO 9001:2015 Certified Institution
Peelamedu, Coimbatore-641004

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

MASTER OF BOTANY (2023-2025 Batch)
SYLLABUS & SCHEME OF EXAMINATION
Applicable to students admitted during the academic year 2023-2024 onwards (I &II Sem)

Sem	Subject Code	Title of the Paper	Inst Hrs/ week	Total Hours		Duration of exam	Maximum Marks			Credits
				Contact Hrs	Tutorial Hrs		CA	ESE	Total	
I	MPL2301	Paper I – Plant Diversity	5	73	2	3	25	75	100	5
	MPL2302	Paper II –Plant Anatomy, Embryology and Tissue Culture.	5	73	2	3	25	75	100	5
	MPL2303	Paper III – Applied Microbiology	5	73	2	3	25	75	100	5
	MPL2304	Paper IV – Cell Biology and Genetics	5	73	2	3	25	75	100	5
	MPL23P1	Practical I – (Paper I-IV)	3+3+2 +2	150	-	-	25	75	100	5
II	MPL2305	Paper- V - Plant Physiology	5	73	2	3	25	75	100	4
	MPL2306	Paper- VI – Biochemistry	5	73	2	3	25	75	100	4
	MPL2307	Paper –VII- Molecular Biology	5	73	2	3	25	75	100	5
II/III	MPL23CE/	Coursera - Genomics and Drug Discovery/	3	45	-	-	100	-	100	3
	MPL2308	Paper- VIII- Bioinformatics		43	2	3	25	75		
II	MCP19A1	IDC -Clinical Microbiology & Biochemistry	4	60	-	3	-	100	100	4
	MPL23P2	Practical II (Paper V, VI, VII & VIII)	3+3+2	120	-	4	25	75	100	6

Assessment pattern for 2023- 24 batch

CA Pattern

Section A – 3 x 2 = 6
Section B – 3 x 5 = 15 (either or – same CLO Level)
Section C – 3 x 8 = 24(either or – same CLO Level)
Total = 45

One question with a weightage of 2 Marks :2 x 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :5 x 3=15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :8 x 3=24
Total : 45 Marks

ESE Pattern

Section A – 5 x 2 = 10
Section B – 5 x 5 = 25 (either or – same CLO Level)
Section C – 5 x 8 = 40(either or – same CLO Level)
Total = 75

ESE Question Paper Pattern: 5 x 15 = 75 Marks
Question from each unit comprising of One question with a weightage of 2 Marks : 2 x 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5=25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5=40

CIA Test	-		Conducted for 45 marks after 50 days
Model Exam	-		Conducted for 75 marks
(Q.P. Pattern (2,5,8) Each Unit 15 Marks)			
Sem/Ass/Quiz	-	5	
Class Participation	-	5	
Attendance	-	3	
		25	**+ ESE 75 Marks**

Practical
Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

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

ALC
End Semester for PG - Advance Learner Courses
Section A 5 questions out of 8 - open choice 5x5:25 marks
Section B 5 questions out of 8-open choice 5x10:50 marks

IDC and Special Course:
Section A 5 questions (Internal choice) :25 marks
Section B 5 questions (Internal choice) :75 marks
Total :100 marks

Project:
Evaluation of Individual / Group Project & Viva Voce for PG
I Review - Selection of the field of study : 5 Marks Topic&literature collection
II Review - Research Design: : 10 Marks &Data Collection
III Review - Analysis&Conclusion : 10 Marks & Preparation of rough draft
Total : 25 Marks

End semester examination:
Evaluation of the project : 25 Marks
Viva Voce : 50 Marks
Total : 75 Marks

Mapping with Programme Learning Outcomes

Course 1-MPL2301

CLOs	PLO 1	PLO2	PLO3	PLO 4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	M	S	M	S	M
CLO4	M	M	S	M	S
CLO5	S	S	M	S	S

Course 2.- MPL2302

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

Course 3.- MPL2303

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

Course 4.- MPL2304

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

Course 5.- MPL23P1

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

Course 6- MPL2305

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

Course 7- MPL2306

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

Course 8- MPL2307

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

Course 9- MPL2308

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	M	S	S	M	S
CLO3	S	S	M	S	M
CLO4	S	M	S	S	M
CLO5	M	M	M	S	L
CLO6	S	S	M	M	S

Course 10- MPL23SBCE

COURSE 11- MCP19A1

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	S	M	S	S
CLO2	S	S	S	S	L	L
CLO3	S	S	M	S	M	M
CLO4	S	M	M	M	S	S
CLO5	S	M	M	S	S	S

Course 12- MPL23P2

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2301	Paper I - Plant Diversity	CORE	73	2	--	5

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

CLOs Number	CLO Statement	Knowledge Level
CLO1	Classification of different plant forms	K2
CLO2	To understand the relationship among Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms	K2
CLO3	Understand the life pattern of plants	K3
CLO4	Able to identify the plants	K4
CLO5	Distinguish different fossilized life forms with that of the present plants	K5

Mapping with Programme Outcomes

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

S- Strong; M-Medium

Syllabus

Unit: I **Phycology** **15 hrs**

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 **14hrs**

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 **15 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 Lycopsida, Sphenopsida, Pteropsida. Heterospory and seed habit.

Unit:VGymnosperms **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, 1st edn. CBS PublishersShadara, Delhi.
2. Singh, R.S, 2005. Introduction to principles of Plant pathology, 4thedn., 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 2nd Edition, Newyork.
3. Chamberlain C.J, 1986. Gymnosperms-Structure Evolution. Ist 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. Prempuri, 1985. Bryophyes –A Broad Prospective –2nd Edition. Atma Ram & Sons, New Delhi.

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

Course Designers:

Dr. R. Sumathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2302	Paper II –Plant Anatomy, Embryology and Tissue Culture	Core	73	2	-	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

CLOs	CLO Statement	Knowledge Level
CLO1	Illustrate the internal structure of plant tissue	K2
CLO2	Interpret anomalous secondary growth in plants	K3
CLO3	Critically analyze the embryological process in plants	K3
CLO4	Appraise the knowledge of tissue culture	K4
CLO5	Apply tissue culture techniques to conserve plants	K5

Mapping with Programme Outcomes

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

S- Strong; M-Medium

Syllabus

Unit: I **15 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 **15 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 – Ceratocephalusfalcatum, monocot embryo – Najaslacerata, anomalous embryo development – Triticum.

Unit: IV **14hrs**

Tissue and cell culture techniques: Types of media, preparation of Murashigeand Skoog medium, macro and micro nutrients, Growth hormones.Explantcultre: Selectionof 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. KatherineEsau, 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

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
MPL2303	PAPER-III- Applied Microbiology	Core	73	2	--	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

CLOs	CLO Statement	Knowledge Level
CLO1	Identify the microbes and to preserve microbes	K2
CLO2	Understand the fermentation technology and its application	K3
CLO3	Know the application of microbial products at pharmaceutical level	K4
CLO4	Use microbes for biofertilizers	K5
CLO5	Apply microbes to clean the polluted environment	K5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	M	S	M	S	S
CLO4	S	M	S	S	M
CLO5	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 – Bacteria, Cyanobacteria, Phosphate solubilisers and mobilisers, Zinc solubilisers, PGPR, Effective microorganisms (EM), Bio-pesticides – Bacteria and Fungi

Unit V : Environmental Microbiology **15hrs**

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 (1th Ed). New age Intl (P) Limited, New York.
2. Prescott, Harley and Klein, 2005. Microbiology (VIth Ed). McGraw Hill, Higher education, New York.
3. Stainer R.Y, 1984. General Microbiology. (IVth Ed). The Macmillan Press Ltd, Hong kong.
4. Sathyanarayana, U.2012. Biotechnology, Books & Allied (P) Ltd, Kolkata.

Reference Books

1. Dubey, R.C. 1993. (Ist Ed). Text book of Biotechnology. S.Chand and Company Ltd, New delhi.
2. Pelczer,JR, 1988. Microbiology. (Vth Ed). Mc Graw Hill company. New Delhi.
3. Rita singh, 2004. (Ist 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.K.S. Tamil Selvi
Dr. B.S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2304	Paper- IV – Cell Biology and Genetics	Core	73	2	-	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

CLOs	CLO Statement	Knowledge Level
CLO1	Differentiate Structure and functions of cell organelles and cell membrane	K2
CLO2	Relate the cell signalling pathways and cell communication	K3
CLO3	Compare and contrast the mendelian inheritance with non-Mendelian inheritance	K4
CLO4	Classify the mutation types, structural and numerical alterations of chromosomal implication	K5
CLO5	Compare the horizontal and vertical gene transfer mechanism and genetic disorders	K5

Mapping with Programme Outcomes

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

S- Strong; M-Medium

Syllabus

Unit – I **15 hrs**

Structural organization and function of cell organelles - cell wall, nucleus, mitochondria, ER, golgibodies, chloroplast, lysosomes, exosomes, 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 **15 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. 5th 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
MPL23P1	Practical I Theory paper (I, II, III& IV)	CORE	-	-	150	5

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.
- To gain knowledge about the fundamental processes of cell division
- To be skilled in solving problems in genetics

Course Outcomes

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

CLOs	CLO Statement	Knowledge Level
CLO1	Learn and compare different life forms of the plants	K2
CLO2	Identify the anatomical characters	K3
CLO3	Identify the embryological characters	K3
CLO4	Examine the explants and callus culture	K4
CLO5	Isolation of microbes from various samples in different media	K5
CLO6	Assess the biological processes of cells and Calculate and categorize problems in genetics	K6

Mapping with Programme Outcomes

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

45 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.

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.

Course designers

Dr. M. Kamalam, Dr. K.S.Tamil SelviDr. R. Sumathi

Dr. E. Uma\

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2305	Paper V - Plant Physiology	CORE	73	2	-	4

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

CLOs	CO Statement	Knowledge Level
CLO1	Understand the structure and function of plant organelles	K2
CLO2	Understand the symbiotic relationship between plants and microbes	K2
CLO3	Interpret lipid metabolism with the physiological function	K3
CLO4	Application of growth hormones to regulate the life cycle of plants	K4
CLO5	Apply various stress factors to produce stress resistant plants	K5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	M	S	M	S	S
CLO4	S	M	S	M	S
CLO5	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_3 and C_4 plants. Photorespiration and Glycolate metabolism (C_2- 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

15hrs

Lipid metabolism- Fats, distribution in plants, Breakdown of fats, Oxidation of glycerol, Breakdown of fatty acids-α-oxidation, β- oxidation. Glyoxylate cycle, significance. Fat synthesis-synthesis of Glycerol, synthesis of Fatty acids, Condensation of Fatty acids and Glycerol. Phosolipids.

Unit IV **15 hrs**

Growth and Movements: Natural growth hormones in plants- physiological effects and Biosynthesis of Auxins, Gibberllins, 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.1st 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.4th Edition, Wards worth Pvt. Co. California.
3. Trivedi,P.C., Trivedi,P.C. and Gusmao K.S. 2006. Advances in Plant Physiology. I.K.InternationalPvt., Ltd., India.

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

Course Designers:

Dr.C.Krishnaveni

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2306	Paper VI – Biochemistry	CORE	73	2	--	4

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

CLOs	CO Statement	Knowledge Level
CLO1	Apply the knowledge of thermodynamics in biochemical reactions	K2
CLO2	Interpret the structure and functions of carbohydrates in living systems	K3
CLO3	Analyze and appraise the role of proteins in biological systems	K4
CLO4	Categorize and deduce the effects of lipids in biological systems	K5
CLO5	Reconstruct immunological events	K5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	M	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CLO5	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 **14hrs**

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 **15 hrs**

Lipids – Classification and functions, Fatty acids – Saturated, unsaturated, Nomenclature, essential fatty acids; Triacylglycerols- properties. Test to check purity of fat and oils, Phospolipids- types and functions, Glycolipids- cholesterol- structure and occurance, 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 **15 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. B.S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2307	Paper-VII- Molecular Biology	CORE	73	2	--	5

Preamble

- To obtain in depth understanding of the organizationof 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 naotechnology

Course Outcomes

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

CLOs Number	CO Statement	Knowledge Level
CLO1	Understand the process of DNA replication	K2
CLO2	Apply the knowledge of transcription and translation processes	K3
CLO3	Investigate and question the experimental conclusions	K4
CLO4	Experiment in nanobiotechnology	K5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	S
CLO2	S	S	M	M	S
CLO3	S	S	M	S	S
CLO4	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 **15 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 tRNAsynthetase, and translational proof-reading, translational inhibitors.

Unit IV **15 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. 1st edition, Tata McGraw-Hill, New Delhi.
3. Richard Booker and Earl Boysen, 2008. Nanaotechnology, 1st 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. 1st 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. 2nd 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. S. Chithra Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL23SBCE	**Coursera – Genomics and Drug Discovery**	**ELECTIVE**	**45**	**-**	**-**	**3**

S.No.	Topic of the Course	Link of the Course	Duration in hrs
1.	Drug Discovery	https://www.coursera.org/learn/drug-discovery	**9**
2.	Genomics: Decoding the Universal Language of Life	https://www.coursera.org/learn/genomics-research	**36**

1. Drug Discovery

Week 1 - Pharmaceutical & Biotechnology Industry Landscape **3 hours**

Week 2 - Drug Discovery: Proteomics, Genomics **3 hours**

Week 3 - Challenges in Fragment Based Drug Discovery for Protein Kinases **3 hours**

2. Genomics: Decoding the Universal Language of Life

Week 1 - What Is a Genome and Why Do We Care? **6 hours**

Week 2 - What Were the First Genomes Like and How Do They Work Now? **4 hours**

Week 3 - How Can We Use Genomes to Understand the Healthy Body and Fight Diseases? **5 hours**

Week 4 - What Can Genomes Tell Us About How to Grow New Organs or New Crops? **7hours**

Week 5 - How Might Genomes Allow Us to Predict Health Problems Before They Occur? **7 hours**

Week 6 - How Do the Genomes of Ecosystem Members Cooperate or Conflict? **7 hours**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MPL2308	Paper VIII- Bioinformatics	Elective	43	2	-	3

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

CLOs Number	CO Statement	Knowledge Level
CLO1	Differentiate nucleic acid and protein databases and their formats	K2
CLO2	Identify the regions of similarity	K2
CLO3	Inferred the homology and the evolutionary relationships between the sequences studied.	K3
CLO4	Generate the evolutionary tree	K4
CLO5	Identify the gene annotation	K5
CLO6	Compare the protein structure and function	K6

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	M	S	S	M	S
CLO3	S	S	M	S	M
CLO4	S	M	S	S	M
CLO5	M	M	M	S	L
CLO6	S	S	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **8 hrs**

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 **8 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 **9 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 **9 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 **9 hrs**

Introduction to Proteomics - Proteomics 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. 1st ed, Pharma Book Syndicate, Adithya Art Printers, Hyderabad.
2. Arthur. M. and Lesk, 2002. Introduction to Bioinformatics, 1st ed, Oxford University Press, UK.
3. Attwood, T.K and Parry-Smith, D. J. 2002. Introduction to Bioinformatics. 3rd ed, Pearson education, New Delhi.
4. Chowdhary, K.R. and Bansal. V.S. 2011. Bioinformatics and Computational Technologies. Istedn., Scientific Publishers, New Delhi.
5. Mani. K and Vijayaraj. N. 2004. Bioinformatics A Practical Approach, 1st edn. Aparnaa Publication. Coimbatore.
6. Ranga, M.M. 2009. Bioinformatics, 2nd edn, Agrobios, Jodhpur.
7. Westhead, D.R., Parish, J .H and Twyman, R. M. 2003. Bioinformatics. 1st Indian ed, Viva Books Private Limited, New Delhi.

Reference Books

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

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

Course Designers:

Dr.B.S.Chithra Devi
Dr.H.RehanaBanu
Dr.E.Uma

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
MCP19A1	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

CLOs Number	CO Statement	Knowledge Level
CLO1	Differentiate the clinical specimens	K_3
CLO2	Classify the composition of blood, Perform analysis of chemical analytes in blood and other body fluids	K_2 ,K_3
CLO3	Calculate the test results and convert them to form meaningful in patient assessment	K_3
CLO4	Compare and contrast the different types of blotting techniques and vaccination.	K_6
CLO5	Correlate laboratory results with infectious diseases processes	K_4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	S	M	S	S
CLO2	S	S	S	S	L	L
CLO3	S	S	M	S	M	M
CLO4	S	M	M	M	S	S
CLO5	S	M	M	S	S	S

S- Strong; M-Medium

Syllabus

Unit I **12 Hrs**

Clinical 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, &Dysentry. 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. AmbikaShanmugam, 2005. Fundamentals of Biochemistry for Medical Students, Nagaraj and Company Private Limited.
2. Asim. K. Das, 2007. Bioinorganic chemistry 1st edn. Books & Allied Pvt Ltd.
3. Jayashree Ghosh, 2003. Textbook of Pharmaceutical Chemistry3rd edn, S. Chand & Co.
4. Jayashree Ghosh, 2006. Fundamental concepts of Applied Chemistry1st edn, S. Chand & Co.
5. Mallikarjuna Rao, N, 2006. Medical Biochemistry 6th 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,6th 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, 6thEdn. 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
MPL23P2	PRACTICAL - II Theory Papers (V, VI, VII& VIII)	Practical	-	-	120	6

Preamble

- 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
- To know the importance of Bioinformatics in Biology

Course Outcomes

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

CLOs	CO Statement	Knowledge Level
CLO1	Explain physiological processes and formulate biochemical experiments	K3
CLO2	Resolve, criticize and defend problems at molecular level	K4
CLO3	Identify the evolutionary relationship between organisms	K5
CLO4	Assess the prediction and visualization of the proteins	K5

Mapping with Programme Outcomes

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

S- Strong; M-Medium

Syllabus

Physiology and Biochemistry **45 hrs**

Physiology

Individual experiments

Separation of leaf pigments (Paper chromatography)
Separation of flower pigments (Thin Layer Chromatography)
Effects of CO_2 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_3 on amylase.

Biochemistry

Individual experiments:

Estimation of total carbohydratesand 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 C60, Gold nanoparticles, Carbon nano tube

Bioinformatics **30 hrs**

1. Familiarizing with biological data bases-nucleic acid databases- NCBI, DDBJ, EMBL and GenBank. Protein databases - SWISS-PROT and PDB.
2. Sequence similarity search using BLAST
3. Multiple Sequence Alignment- Clustal W
4. Gene finding tools - Genmark
5. Phylogenetic Analysis of protein and nucleic acids – Tree Top
6. Prediction of secondary structure of proteins
7. Prediction of tertiary structure of proteins
8. 3-D Molecular visualization using JMOL

Course designers

Dr.K.Gajalakshmi&Dr. B. S. Chithradevi
Dr. R. Sumathi
Dr. M. Kanchana&Dr. B.S. Chithradevi
Dr.Gajalakshmi&Dr.H.RehanaBanu