NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
(AUTONOMOUS) POLLACHI - 642 001.

M.Sc., BOTANY

SYLLABUS
&
SCHEME OF EXAMINATION

OUTCOME BASED EDUCATION (OBE)

[FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2023-2025 BATCH & ONWARDS]

NGM COLLEGE (AUTONOMOUS)

Vision

Our dream is to make the College an Institution of Excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading extension through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

PG AND RESEARCH DEPARTMENT OF BOTANY

Vision

Our vision is to perform cutting-edge education, research and outreach on the patternsand processes of life, with a particular emphasis on plants and their habitats.

Mission

Our mission is to make students become scientifically well-trained and highly skilled botanists and on cutting edge technologies in life sciences and make good citizens with environmental and social concern.

Program Educational Objectives (PEOs)	
The M. Sc. Botany program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO 1	Postgraduate students are prepared to apply new ideas in the field of biological science and to become an entrepreneur
PEO 2	Postgraduate students are trained to take up higher learning programmes in research
PEO 3	Postgraduate students are known about the organization of plants and their role in Human Welfare
PEO4	Postgraduate students are prepare for competitive examinations, especially UGC-CSIR NET, SET and TNPSC Examinations.
PEO5	Postgraduate students are perform their competency with professional ethics in their working place.

Programme Outcomes

On successful completion of the M. Sc. Botany program to	
PO1	**Disciplinary knowledge:** Apply the fundamental knowledge of science and technology for solving complex problems.
PO2	**Research-related skills** : Ensure the use of advanced tools and techniques in understanding the scope and significance of Botany.
PO3	**Problem solving:** Develop the scientific problem solving skills during experimentation, research projects, analysis and interpretation of data.
PO4	**Life long learner** : Exploration of diverse plant life-forms, anatomical, Physiological and Biochemical disciplines and to conserve the biodiversity.
PO5	**Critical thinking:** Enhanced capacity to think critically; ability to understand, design and execute experiments independently and/or team under multidisciplinary settings
PO6	**Multicultural competence:** Design and standardize protocols for public health and safety, and cultural, societal and environmental considerations.
PO7	**Information/digital literacy:** Apply appropriate techniques, resources, and modern ICT tools for understanding plant resources.
PO8	**Reflective thinking:** Demonstrate the contextual knowledge in sustainable exploitation of medicinal, economically important and endangered plants as per the National Biodiversity Act.
PO9	**Professional ethics:**Follow the concept of professional ethics and bioethics norms for practicing the value of plant kingdom
PO10	**Communication Skills:** Communicate proficiently with various stakeholders and society, to comprehend and to write and present reports effectively

Programme Specific Outcomes	
After the successful completion of M.Sc., Botany program the students are expected to	
PSO1	acquire deep knowledge on botanical terms, facts, concepts, theories and principles of plant sciences and become a good academician and a successful researcher
PSO2	become highly skilled in advanced techniques in biological science and become suitable for various careers.

MAPPING

PEOs / POs/PSOs	**PEO1**	**PEO2**	**PEO3**	**PEO4**	**PEO5**
PO1	M	H	M	H	M
PO2	H	H	M	M	M
PO3	M	M	L	M	M
PO4	L	M	M	H	L
PO5	M	M	M	L	M
PO6	M	M	H	L	L
PO7	L	M	L	L	M
PO8	M	L	M	M	L
PO9	L	L	M	L	L
PO10	L	L	M	M	H
PSO1	M	M	M	H	M
PSO2	H	M	M	H	M

OBE Rubric Mapping System

The attainment level of the students as Low, Medium, High is replaced by the numerals as 1, 2 and 3

HOD	CDC	COE
Name: Dr. R. Rakkimuthu Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr. R. Manicka Chezhian Signature:

SCHEME OF EXAMINATION

Semester	Course Code	Course Title	Class hours /Week		Exam Hrs	Maximum marks			Credits
			T	P		CIA	ESE	Total	
I	23PBY101	**Core – I** Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)	6	3	3	25	75	100	4
	23PBY102	**Core – II** Plant Diversity II (Pteridophytes, Gymnosperms and Palaeobotany)	6	2	3	25	75	100	4
	23PBY103	**Core - III** Applied Microbiology and Plant Pathology	6	1	3	25	75	100	4
	23PBY104	**Core - 4 Laboratory course-I** (for core courses I, II, III)	-	6	4	40	60	100	4
	23PBY1E1/ 23PBY1E2/ 23PBY1E3	**Elective -I** Ecology and Phytogeography/ Ethano Botany/ Seed technology	6	-	3	25	75	100	4
		Total	**24**	**6**		**140**	**360**	**500**	**20**
	23PBY205	**Core - V** Plant Anatomy and **Embrology**	6	3	3	25	75	100	4
	23PBY206	**Core - VI** Plant physiology	6	2	3	25	75	100	4
	23PBY207	**Core – VII** Cytology, Genetics and Plant Breeding	5	1	3	25	75	100	4
	23PBY208	**Core - VIII Laboratory course II** (for core courses V,VI.VII)	-	6	4	40	60	100	4
	23PBY2E4/ 23PBY2E5/ 23PBY2E6	**Elective –II** Horticulture and Landscaping /IPR and Bioethics/ Organic forming	5	-	3	25	75	100	4
	23PBY2N1	**Non- Major Elective-** Industrial Botany	2	-	2	-	100	100	2
		Total	**24**	**6**		**140**	**460**	**600**	**22**
III	23PBY309	**Core - IX** Plant Taxonomy of Angiosperms and Economic Botany	6	3	3``	25	75	100	4
	23PBY310	**Core -X** Plant Biochemistry and Biophysics	6	2	3	25	75	100	4
	23PBY311	**Core -XI** Plant Biotechnology	6	1	3	25	75	100	4
	23PBY312	**Core – XII Laboratory course – III** (for core course IX,X and XI)	-	3	4	40	60	100	4
	23PBY3E7/ 23PBY3E8/ 23PBY3E9	**Elective-III** Forestry and Wood science /Herbal technology/ Pharmacognosy	6	-	3	25	75	100	4
	23PBY3IN	**Industrial Training / Internship**	-	-	-	25	75	100	4
		Total	**24**	**6**		**165**	**435**	**600**	**24**
IV	23PBY413	**Core - XIII** Research Methodology	6	3	3	25	75	100	4
	23PBY414	**Core - XIV** Bioinformatics and Cyber Security	6	3	3	25	75	100	4
	23PBY415	**Core - XV Laboratory course –IV** (for core courses XIII and XV)	-	6	4	40	60	100	4
	23PBY4P1	**Core - XVI** Project Work and Viva – Voce	6	-	-	80	120	200	12
		Total	**18**	**6**	**-**	**170**	**330**	**500**	**24**
		Grand Total	**90**	**24**	**-**	**590**	**1610**	**2200**	**90**

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY101		Title: Core - 1 Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)	Batch	2023 -2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Study the classification, characteristic features, distribution, and reproduction cycle of algae, fungi, lichens and bryophytes.
- Know the ecological and economic importance of algae, fungi, lichens and bryophytes
- Understand the concept of lichens and bryophytes as indicator for air pollution

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the values of lower plant forms and its diversity	K1
CO2	Get an idea on evolution of lower plants and its architectural specialization in cells	K2
CO3	Apply economic values of lower plants to manufacture value added products	K3
CO4	Review the developmental stages of lower group of plant diversity	K4
CO5	Understand and learn the classification and economic importance of lower plants	K2&K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY102		Title: Core – 2 Plant Diversity II (Pteridophytes, Gymnosperms and Palaeobotany)	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are:

- To understand the composition level of plant diversity emphasized in ecological, organizational, genetic and cultural.
- To realize the fundamental values of diversity and their importance of human welfare.
- To define and characterize diversity of lower vascular plants to understand the dynamics of diversity to realize the significance of diversity.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the diverse forms of plants in the plant kingdom	K1
CO2	Understand the life cycles of vascular plants	K2
CO3	Discover the importance of vascular plants to the Human community	K3
CO4	Connect the lower plants and higher plants by phylogenetic study	K4
CO5	Review the evolutionary idea of fossil diversity	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

.Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY103		Title : Core – 3 Applied Microbiology and Plant Pathology	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Provide students with the latest information in the field of microbiology and plant pathology.
- Explain the theoretical basis of the tools, technologies and methods commonly used in microbiology and plant pathology.
- Develop practical skills in the use microbiological methodologies, tools and techniques.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recognize the different types of microorganisms present in an environment and their importance.	K1
CO2	Characterize and culture microorganisms present in soil,water and infectedplant tissue using appropriate techniques.	K2
CO3	Demonstrate the role of microorganisms in food processing and spoilage	K3
CO4	Apply the microbial culture in manufacturing of value added products	K3
CO5	Assess the role of microorganisms in plant diseases commonly occurring in crops	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY104		Title : Core - 4 Laboratory course -I (Phycology, Mycology, Lichenology and Bryology, Pteridophytes, Gymnosperms andPalaeobotany Applied Microbiology and Plant Pathology)	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Acquire practical skills in the use of instruments, technologies and methods in microbiology, thallophytes and non-flowering plant groups.
- Provides opportunities to collect and examine samples from various environments.
- Compare the structural diversity of fossil and extant plant species.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Demonstrate practical skills in microbiology, thallophytes, pteridophytes and gymnosperms.	K3
CO2	Classify bacteria based on staining techniques as well as isolate, culture and characterize microorganisms from different substrates.	K4
CO3	Apply practical skills for Manufacturing of value added products from microbes and lower plants	K3
CO4	Analyze the morphological and anatomical features of lower plants.	K4
CO5	Execute the culture techniques in laboratories	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:	23PBY1E1	Title : Elective -1 Ecology and Phytogeography	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Empower the student to know the concept and principle of ecology.
- Know the causes, effects and control measure of pollution.
- Learn Biodiversity conservation and management

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recall or remember environmental condition influenced by many factors	K1
CO2	Understand the applied aspect of environmental botany	K2
CO3	Apply their idea to protect the biodiversity	K3
CO4	Analyze insight into the vegetation types, species interaction and their importance and the factors influencing the environmental conditions	K4
CO5	Evaluate skills in biodiversity conservation through In- situ and Ex- situ.	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:	23PBY1E2	Title : Elective -1 Ethno Botany	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are:

- To conserve the indigenous knowledge of the region and create awareness in the young generation.
- To develop new products for food, herbal, and pharmaceutical companies and assist in managing biological resources

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Understand the ethnic knowledge of tribes	K2
CO2	Be familiar with the methodology and procedure for collecting information from ethinic communities	K2
CO3	Apply and use of different plants for human welfare	K3
CO4	Evaluate the medicinal and economic importance of plants used by indigenous communities	K5
CO5	Understand and analyze about the ethinic plants for modern drug manufacture	K2 ,K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:	23PBY1E3	Title : Elective -1 Seed technology	Batch	2023-2025
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

The main objective of this course is:

- To refresh the basic knowledge of seed development and structures and apprise students with its relevance to production of quality seed.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Express knowledge gained on the principles of seed technology	K1
CO2	Understand biological bases of technologies used in modern seed science and technology.	K2
CO3	Apply knowledge on the seed multiplication and certification.	K3
CO4	Gaining knowledge on principles of seed processing, Seed drying and methods.	K2
CO5	Get aware on biological and technological aspects of seed production.	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY205		Title: Core – 5 Plant Anatomy and Embryology	Batch	2023-2025
			Semester	II
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are to:

- Understand the mechanism underling the shift from vegetative to reproductive phase.
- Trace the development of male and female gametophyte.
- Highlight the physiological role of endosperm in the morphogenesis of embryo.
- Classify meristems and identify their structures, functions and roles in monocot and dicot plants growth and secondary growth of woody plants.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recall and remember the relationship between Plant anatomy and Embryology	K1
CO2	Understand the vascular system, cellular development and reproduction in various plant system of angiosperm	K2
CO3	Learn the structures, functions and roles of meristems, pre and post fertilizational change and embryological tissues in angiospermic plants	K2, K4
CO4	Apply the idea on study of plant anatomical structures and reproduction in plants growth and development for attaining green cover.	K3
CO5	Get aware of applied aspects and techniques for making profitable cultivationin agriculture.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY206		Title: Core – 6 Plant Physiology	Batch	2023-2025
			Semester	II
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are to:

- Learn physiological mechanisms underlying plant metabolism.
- Be familiar with the phytohormones and its metabolism in plants generating plant growth.
- Study about the movements in plants.
- Know the various responses of plants against stress and its mechanism of resistance.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the basic metabolism in plants	K1
CO2	Deduce the biological pathways	K2
CO3	Execute the molecular based modification of metabolism in plants	K3
CO4	Able to identify the plant stress based on its responses and anti-oxidative defense.	K4
CO5	Validate the plant physiological scientific hypothesis by using various experiments	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 23PBY207		Title : Core – 7 Cytology, Genetics and Plant Breeding	Batch	2023-2025
			Semester	II
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Enable to learn various cell structures and functions of prokaryotes and eukaryotes and understand the salient features and functions of cellular organelles.
- To study the fundamental principles of Genetics and understand the structure, function and changes in the genetic materials.
- To learn the principles of Plant Breeding and the application of molecular techniques in crop improvement.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the general features and organization of Ultra structure of cell wall and cell organelles in prokaryotes and eukaryotes	K1
CO2	Understand the structure and function of cell organelles in prokaryotes and eukaryotes	K2
CO3	Gain knowledge on chromosome structure and cell cycle process	K3
CO4	Gain knowledge on various types of genes and mutation	K3
CO5	Learn the different principles of plant breeding and the application of molecular marker techniques in crop improvement	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 23PBY208		Title : Core – 8 Laboratory course – II (Plant Anatomy and Embrology, Plant Physiology, Cytology, Genetics and Plant Breeding)	Batch	2023-2025
			Semester	II
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are to:

- Get knowledge on plant and water relations, chromatographic techniques and *in vitro* antioxidants quantification.
- Gain knowledge on various plant anatomical features through free hand sections, microtome sections and maceration method.
- Get adequate knowledge in internal structure of anther, pollen types and germination behaviors, L.S. of ovule, types of endosperms and dicot embryo dissection.
- Observe the different stages of mitosis and chromosome behaviour and organization during various stages and to learn staining techniques of various plant tissues.
- Understand the principles of genetics and plant breeding to apply crop improvement programmes.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recall or remember the various aspects of plant physiology, embryology, plant tissue culture, anatomy and cytology	K1
CO2	Understand and apply various concepts of plant physiology, embryology, anatomy and cytology.	K3
CO3	Analyze the theory knowledge gained from Plant Anatomy and Reproductive Biology, Plant Physiology, Cytology into practical mode in order to acquire applied knowledge by hands-on experiences.	K4
CO4	Analyze or interpret the results achieved in practical session in the context of existing theory and knowledge	K4
CO5	Evaluate the theory and practical skills gained during the course to make any new product	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY2E4		Title : Elective -2 Horticulture and Landscaping	Batch	2023-2025
			Semester	II
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Know about the brief history, divisions, classification and structure of horticultural plants.
- Understand the plant growth environment in relation to soil, nutrients, fertilizers, and bio inoculants.
- Study the sexual and vegetative propagation methods including propagation through specialized vegetative structures.
- Highlight the aesthetics of horticulture and postharvest handling of horticultural products.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Understand about the importance of horticulture	K2
CO2	Apply knowledge on soil, climate and reclamation of soil	K3
CO3	Apply and analyze knowledge on crop establishment activities	K3,K4
CO4	Analyze plant growth structures in horticulture	K4
CO5	Understand about the importance of bio-organic fertilizers and crop establishment methods	K2,K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY2E5		Title : Elective – 2 IPR and Bioethics	Batch	2023-2025
			Semester	II
Hrs/Week:	5		Credits	4

Course Objective

The main objectives of this course are to:

- Cater to the needs of the stakeholders of knowledge economy is designed for those interested in Managers and the like.
- Create awareness about current trends in IPR and Innovation
- Disseminate knowledge on patents, patent regime in India and abroad and registration aspects
- Pursue a career in IPR, which opens opportunities in the fields of IP Attorneys and IP Consultants

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the basic knowledge of IPR	K1
CO2	Understand the types of applications of IPR	K2
CO3	Apply the knowledge on patenting of the product	K3
CO4	Gain an insight into the biosafety and farmers rights	K4
CO5	Acquire knowledge on Protection of Plant Varieties and Farmers' Rights Act	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY2E6		Title : Elective-2 Organic farming	Batch	2023-2025
			Semester	II
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Know the about the organic farming and its practice for sustainable agriculture.
- Know the about the marketing and export potential of organic farming products

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remembering the importance and practice of organic farming	K1
CO2	Will get an idea on organic farming and eventual characterization	K2
CO3	Apply economic values of organic way for holistic development	K3
CO4	Review the various stages of organic farming to make eco-friendly agriculture	K4
CO5	Understand and learn the organic farming multidimensional improvement of society	K2 &K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

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Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 23PBY2N1		Title : Non Major Elective – 1 INDUSTRIAL BOTANY	Batch	2023-2025
			Semester	II
Hrs/Week:	2		Credits	2

Course Objective

The main objectives of this course are to:

- To learn the applied aspects of industrial application of algae, fungi, bacteria, plants, molecular biology and recombination technology.
- The student would be competent to work in industries.
- To educate people about the widespread commercial uses of fungi.
- To know about the economic importance of plants.
- To acquire knowledge on *in vitro* cultivation techniques to develop protocols targeted towards commercialization.

Course Outcomes (CO)

On completion of this course, the students will be able to:		
CO1	Understand the basics of algae in industrial applications.	K1
CO2	Demonstrate and to recollect the uses in fungi in industries.	K2
CO3	Explain bacterial role in industries.	K3
CO4	Compare and contrast the use of plants in industries.	K4
CO5	Discuss and develop skills for working in industries specializing in biomolecules.	K5&K6
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate		

HOD

Dr. R. Rakkimuthu, M.Sc., Ph.D.,
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Principal

PRINCIPAL
N G M COLLEGE, POLLACHI

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:22PBY309		Title : Core - 9 Taxonomy of Angiosperms	Batch	2022-2024
			Semester	III
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are:

- To know about the basic concepts and principles of plant systematics.
- To establish a suitable method for correct identification and adequate characterization of plants.
- To be aware of the importance of taxonomic relationships in plant systematic studies.
- To enable knowledge on various classification systems

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the basic principles of systematics, including identification, nomenclature, classification, and the inference of evolutionary patterns from data.	K1
CO2	understand of evolutionary processes and patterns in the major plant groups	K2
CO3	Apply scientific terminology accurately through effective oral and written communication and the use of dichotomous keys in a regional floristic manual.	K3
CO4	Analyze and ability to handle plant materials in the laboratory and herbarium and in the field.	K4
CO5	Evaluate the medicinal and economic importance of plants.	K5
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY310		Title: Core - 10 Plant Biochemistry and Biophysics	Batch	2022-2024
			Semester	III
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Emphasize functions of plants biomolecules and their metabolism.
- Learn structural and functional properties of carbohydrates, proteins and lipids.
- Study about the mechanism of enzyme action and inhibition.
- Provide specific knowledge of compounds and biochemical pathways that occur in plants.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the fundamentals of biochemistry	K1
CO2	Get an idea on Biochemical pathways and its significance	K2
CO3	Learn the structure and functions of carbohydrates, Lipids, Proteins	K3
CO4	Analyze and apply the biomolecular techniques	K4
CO5	Execute the biophysical laws	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate		

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 22PBY311		Title: Core – 11 Plant Biotechnology and Nanobiology	Batch	2022-2024
			Semester	III
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Know about the Genome organization in plants
- Understand the Principles and culture techniques of cells, callus, organs, pollen, anthers, embryos, and protoplasts
- Know the applications of nanoparticals

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Students will keep in mind the knowledge on techniques in plant tissue culture	K1
CO2	Understand the fundamentals of DNA Replication and central dogma of life	K2
CO3	Execute knowledge on molecular achievements in environmental stress management in plants	K3
CO4	Apply the basic concepts of Nanotechnology to synthesis the nanoparticles from plants	K3
CO5	Analyze the important of nanoparticles in Environment	K4
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code:22PBY312		Title : Core – 12 Laboratory course – III Taxonomy of Angiosperms,Plant Biochemistry and Biophysics and Plant Biotechnology	Batch	2022-2024
			Semester	III
Hrs/Week:	3		Credits	4

Course Objectives

The main objectives of this course are to:

- Understand and develop skill sets in plant morphological, floral characteristics and artificial key preparation
- Expedite skilled workers to carry out research in frontier areas of plant sciences
- Understand the basic principle and methodology in biochemistry experiments
- Expose the students to gain recent advances in molecular biology and plant biotechnology

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Identify salient features of families	K3
CO2	Understand about different floral characteristics and artificial key preparation which employed for plant identification and conservation	K4, K5
CO3	Apply the various techniques to produce disease free plants	K3
CO4	Analyze the conditions that are suitable for direct and indirect plant regeneration	K4
CO5	Analyze the plants for its biochemical components	K4
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY3E7		Title: Elective -3 Forestry and Wood science	Batch	2022-2024
			Semester	III
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Understand the importance of forests.
- Enable them to contribute meaningfully in the conservation of the forest.
- Make students aware of the current global problems in forestry related to human intervention and the need of developing a sustainable way of life.
- Provide a platform to appreciate biodiversity and the importance of conservation strategies

Course outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recollect the importance of forests and wood science on every aspects	K1
CO2	Understand the unique features of forests types and to impart conservation strategy	K2
CO3	Apply the forest units in the manufacturing of value added products	K3
CO4	Review the laws for the protection of forest and its resources	K4
CO5	Analyze the physical, chemical and mechanical properties of commercial wood	K4
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY3E8		Title: Elective – 3 Herbal Technology	Batch	2022-2024
			Semester	III
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Understand the concept , the life style and traditional practices of plants.
- Assess the various investigation methods to collect ethnobotanical knowledge of tribals.
- Apply methods to transform ethnobotanical knowledge into value added products.

Course outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recollect the importance of herbal technology and traditional system of medicine	K1
CO2	Understand various plant based drugs from ayurvedha, unani, homeopathy, siddha etc.	K2
CO3	Apply the knowledge to medicinal plant cultivation for sustainable supply	K3
CO4	Analyze the various steps in manufacturing of plant based drugs.	K4
CO5	Assess the methods to transform ethnobotanical knowledge into value added products.	K5
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY3E9		Title: Elective-3 Pharmacognosy	Batch	2022-2024
			Semester	III
Hrs/Week:	5		Credits	4

Course Objectives

The main objectives of this course are to:

- Enrich knowledge on some important medicinal plants and their usage.
- Afford information on extraction, separation, identification and evaluation techniques of plant derived drugs.
- Provide the scientific temper to find a suitable job in relevant industries or to become a potential entrepreneur by using medicinal plants in efficient commercialization way.

Course outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Recall the knowledge about modern concept and scope of Pharmacognosy.	K1
CO2	Identify their professional role in the healthcare system	K2
CO3	Design methods of standardization for herbal drug or formulations	K3
CO4	Analyze herbal extracts for the identification of phytoconstituents	K4
CO5	Analyze various pharrmacognostic parameters of crude drugs	K4
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY413		Title: Core — 13 Research Methodology	Batch	2022-2024
			Semester	IV
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are to:

- Understand the concepts and types involved in research
- Provide the student with a conceptual overview of statistical methods with emphasis on applications commonly used analysis research experiment value.
- Gain the knowledge about the graphical representation of data, estimation, elementary probability and statistical inference will be covered.

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Remember the basic knowledge on research	K1
CO2	Get the idea in the developing strong hypothesis and methodology for research	K2
CO3	Acquire knowledge on basic concepts in Biostatistics	K3
CO4	Evaluate scientific findings through various statistical tools	K4
CO5	Execute the basic research activities using biophysical instruments	K4
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** -Evaluate		

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 22PBY414		Title : Core – 14 Bioinformatics and Cyber security	Batch	2022-2024
			Semester	IV
Hrs/Week:	6		Credits	4

Course Objective

The main objectives of this course are to:

- Develop inter disciplinary skills in the application of computers in Botany to learn about the biological databases and machine learning techniques.
- Analyze the structure and functions of protein and nucleic acids using *in silico* tools and to apply the acquired programming knowledge in drug design for phytomedicines

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Apprehend the ideas on molecular biology	K1
CO2	Apply various tools for genomic and proteomic studies	K2
CO3	Figure out the characteristics of biomolecules *insilico*	K3
CO4	Know the importance of Bioinformatics in Biology for the welfare of society	K4
CO5	Keep in mind the threats to cyber security and related social issues	K5
K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate		

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 22PBY415		Title: Core – 15 Laboratory course- IV (Research Methodology and Bioinformatics & Cyber security)	Batch	2022-2024
			Semester	IV
Hrs/Week:	6		Credits	4

Course Objectives

The main objectives of this course are to:

- Write research proposal and dissertation in good manaer
- Provide hands on experience on biomolecular *insilico* analysis and to enrich theresearch analysis and interpretation skills

Course Outcomes (CO)

On the successful completion of the course, student will be able to:		
CO1	Apply plan, design and execute the dissemination of scientific knowledge	K3
CO2	Evaluate knowledge on Chromatgraphy,pH meter, SDS-PAGE and spectrophotometer	K4
CO3	Validate the experimental results using biological tools	K5
CO4	Apply the skills to write the research proposals	K3
CO5	Analyze the bimolecules using the Bioinformatics tools	K4
K3 – Apply; **K4** – Analyze; **K5** – Evaluate		

R. Rakkimuthu

HOD

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