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 2019-2021 BATCH & ONWARDS]

(PASSED ON THE BOARD OF STUDIES HELD ON FEBRUARY 2019)

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, instil 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

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Our vision is to conduct innovative research, teaching and outreach on the patterns and process of life with a focus on plants and their environments.

Mission

Our mission is to foster an environment of excellence by attracting and supporting the outstanding students, faculty and staff needed to sustain our vision.

SCHEME OF EXAMINATION

Semester	Course Code	Course Title	Class hours /Week	Exam Hrs	Maximum marks			Credits
					Internal	External	Total	
III	19PBY309	**Core - 9** Plant Systematics	5	3	25	75	100	4
	19PBY310	**Core -10** Plant Biochemistry and Biophysics	5	3	25	75	100	4
	19PBY311	**Core -11** Research Methodology	4	3	25	75	100	4
	19PBY3E5/ 19PBY3E6	**Elective -5** Forestry/ **Elective -6** Herbal Technology	4	3	25	75	100	5
	19PBY312	**Core - 12 Core Practical - III** (for core paper 9)	6	4	40	60	100	4
	19PBY313	**Core - 13 Core Practical –IV** (for core papers 10 and 11)	6	4	40	60	100	4
IV	19PBY414	**Core - 14** Molecular Biology and Plant Biotechnology	5	3	25	75	100	5
	19PBY415	**Core - 15** Bioinformatics and Cyber Security	5	3	25	75	100	4
	19PBY416	**Core - 16 Core Practical -V** (for core papers 14 and 15)	6	4	40	60	100	4
	19PBY4P1	**Core - 17** Project Work and Viva -Voce	14	-	40	160	200	8
		Total					**2200**	**90**

List of elective papers offered

Semester	Course Code	Course Title
I	19PBY1E1	Elective -1 Ecology and phytogeography
	19PBY1E2	Elective -2 Economic Botany
II	19PBY2E3	Elective - 3 Horticulture
	19PBY2E4	Elective -4 IPR and Bioethics
III	19PBY3E5	Elective -5 Forestry
	19PBY3E6	Elective - 6 Herbal Technology

Programme Objectives

1. To bring out the scientific potentialities
2. To inculcate the teaching and technical skills in the subject
3. To create awareness in research and development.

Programme Outcomes

PO1 Postgraduate students are self confident, mastery in life sciences and ability to do practically every experiment by applying various biological instruments and techniques

PO2 Postgraduate students are employed in the core industry and also to form a bridge for research and development

PO3 Postgraduate students are prepared to apply new ideas in the field of biological science and to become an entrepreneur /self-employment.

PO4 Postgraduate students are trained to take up higher learning programmes.

PO5 Postgraduate students are enough competent and social responsible person of the country

Programme Specific Outcomes

PSO1 A source of knowledge of botanical terms, facts, concepts and principles

PSO2 Way to become a good academician/ researcher

PSO3 Opportunity to lead as a successful entrepreneur

PSO4 Chance to get awareness in advanced research in plant sciences

PSO5 Creating a technically skilled individual to practice modern agricultural techniques.

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:19PBY309		Title : Core - 9 Plant Systematics	Batch	2019 - 21
			Semester	III
Hrs/Week:	5		Credits	4

Course Objective

To learn the systems of nomenclature in plants and its economic value

Course Outcomes (CO)

K1	CO1	Remember the methods and principles of classification and plant nomenclature
K2	CO2	Understand the patterns in the evolution of seed plants
K3	CO3	Execute the distribution of seed plant diversity
K4	CO4	Evaluate the economic uses of plants

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 19PBY310		Title: Core - 10 Plant Biochemistry and Biophysics	Batch	2019 - 21
			Semester	III
Hrs/Week:	5		Credits	4

Course Objective

To understand the biomolecular basis of life

Course Outcomes (CO)

K1	CO1	Remember the fundamentals of biochemistry
K2	CO2	Get the idea on Biochemical pathways and its significance
K3	CO3	Execute the biophysical laws
K4	CO4	Analyze and apply the biomolecular techniques

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 19PBY311		Title: Core - 11 Research Methodology	Batch	2019 - 21
			Semester	III
Hrs/Week:	5		Credits	4

Course Objective

To provide the knowledge on research and interpretation

Course Outcomes (CO)

K1	CO1	Remember the basic knowledge on research
K2	CO2	Get the idea in the developing strong hypothesis and methodology for research
K3	CO3	Evaluate scientific findings through various statistical tools
K4	CO4	Execute the basic research activities using biophysical instruments

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 19PBY312		Title : Core - 12 Practical - III (Plant Systematics)	Batch	2019 - 21
			Semester	III
Hrs/Week:	4		Credits	4

Course Objective

To acquire practical skills in plant identification

Course Outcomes (CO)

K3	CO1	Identify salient features of families
K4	CO2	Understand the key characters for identification of plants
K5	CO3	Apply techniques to conserve importance of forests

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code:19PBY313		Title : Core - 13 Practical - IV (Plant Biochemistry and Biophysics and Research Methodology)	Batch	2019 - 21
			Semester	III
Hrs/Week:	5		Credits	4

Course Objective

To get a hands on experience biomolecular and plant tissue culture techniques

Course Outcomes (CO)

K3	CO1	Understand the nature of bio molecules in plants
K4	CO2	Analyze the plants for its biochemical components
K5	CO3	Access recent techniques in molecular biology

Programme code	**M.Sc.**	**Programme Title : Master of Science in Botany**		
Course Code: 19PBY3E5		**Title: Elective - 5 Forestry**	**Batch**	**2019 - 21**
			Semester	**III**
Hrs/Week:	**5**		**Credits**	**5**

Course Objective

To understand the components and role of forest ecosystem

Course outcomes (CO)

K1	CO1	Recollect the importance of forests
K2	CO2	Understand various forests types and to impart conservation strategy
K3	CO3	Apply the forest units in the manufacturing of value added products
K4	CO4	Review the laws for the protection of forest and its resources

Programme code	**M.Sc.**	**Programme Title : Master of Science in Botany**		
Course Code: 19PBY3E6		**Title: Elective - 6 Herbal Technology**	**Batch**	**2019 - 21**
			Semester	**III**
Hrs/Week:	**5**		**Credits**	**5**

Course Objective

To understand the components and role of forest ecosystem

Course outcomes (CO)

K1	CO1	Recollect the importance of herbal technology
K2	CO2	Understand various plant based drugs from ayurvedha, unani, homeopathy, siddha etc.
K3	CO3	Apply the knowledge to medicinal plant cultivation
K4	CO4	Review the the protection of biodiversity

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 19PBY414		Title: Core - 14 Molecular Biology and Plant Biotechnology	Batch	2019 - 21
			Semester	IV
Hrs/Week:	5		Credits	5

Course Objective

To acquire knowledge on molecular basis of life and applications of plant biotechnology

Course Outcomes (CO)

K1	CO1	Students will keep in mind the knowledge on techniques in plant tissue culture
K2	CO2	Understand the fundamentals of gene regulation
K3	CO3	Execute knowledge on molecular achievements in environmental stress management in plants
K4	CO4	Analyze and apply the important of nanoparticles in plant diversity

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 19PBY415		Title : Core - 15 Bioinformatics and Cyber security	Batch	2019 - 21
			Semester	IV
Hrs/Week:	5		Credits	4

Course Objective

To provide an *insilico* platform for biomolecular study.

Course Outcomes (CO)

K1	CO1	Apprehend the ideas on molecular biology
K2	CO2	Apply various tools for genomic and proteomic studies
K3	CO3	Figure out the characteristics of biomolecules *insilico*
K4	CO4	Keep in mind the threats to cyber security and related social issues

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 19PBY416		Title: Core - 16 Practical - V (Molecular Biology and Plant Biotechnology and Bioinformatics & Cyber security)	Batch	2018 - 19
			Semester	IV
Hrs/Week:	6		Credits	4

Course Objective

To provide hands on experience on biomolecular *insilico* analysis and to enrich the research analysis and interpretation skills

Course Outcomes (CO)

K3	CO1	Implement research execution, data interpretation and thesis writing
K4	CO2	Evaluate the principles and techniques for conducting research
K5	CO3	Validate the experimental results using statistical tools

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2019
Subject Code : 19PBY4P1 Title : PROJECT		Semester:IV
Hrs/Week :	14	Credits: 8

Course Objective

To identify innovative modules in research and to develop the thesis writing skills

Course Outcomes (CO)

K3	CO1	Execute the advanced research areas
K4	CO2	Apply the methodology for the development of societal needs in the present scenario
K5	CO3	Validate the research process.

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SCHEME OF EXAMINATION

Semester	Course Code	Course Title	Class hours /Week	Exam Hrs	Maximum marks			Credits
					Internal	External	Total	
I	20PBY101	**Core – 1**Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)	6	3	30	70	100	4
	20PBY102	**Core – 2**Plant Diversity II (Pteridophytes, Gymnosperms and Palaeobotany)	6	3	30	70	100	4
	20PBY103	**Core - 3**Applied Microbiology and Plant Pathology	6	3	30	70	100	5
	20PBY104	**Core - 4 Laboratory course-I** (for core papers 1, 2, 3)	6	4	40	60	100	4
	20PBY1E1/ 20PBY1E2	**Elective -1** Ecology and Phytogeography/ **Elective -2** Economic Botany	6	3	30	70	100	4
II	20PBY205	**Core - 5** PlantAnatomy and Reproductive Biology	6	3	30	70	100	4
	20PBY206	**Core - 6** Plant physiology	6	3	30	70	100	4
	20PBY207	**Core – 7**Cytology, Genetics and Plant Breeding	6	3	30	70	100	5
	20PBY208	**Core - 8 Laboratory course-II** (for core papers 5,6,7)	6	4	40	60	100	4
	20PBY2E3/ 20PBY2E4	**Elective-3** Horticulture and Landscaping / **Elective-4** IPR and Bioethics	5	3	30	70	100	4
	20PBY2N1	**Non- Major Elective** Entrepreneurship Botany	1	3	-	100	100	2

List of elective papers offered

Semester	Course Code	Course Title
I	20PBY1E1/ 20PBY1E2	Elective -1 Ecology and phytogeography
		Elective -2 Economic Botany
II	20PBY2E3/ 20PBY2E4	Elective-3 Horticulture and Landscaping / Elective-4 IPR and Bioethics
III	20PBY3E5/ 20PBY3E6	Elective -5 Forestry and Wood science / Elective -6 Herbal Technology

Programme Objectives

1. To bring out the scientific potentialities
2. To inculcate the teaching and technical skills in the subject
3. To learn about the organization of plants and their role in functioning of plant system
4. To understand the biological principles and their importance
5. To create awareness in research and development

Programme Outcomes

PO1 Postgraduate students are to be exposed to technical, analytical and creative skills.

PO2 Postgraduate students are to be employed in the core industry and also to form a bridge for research and development

PO3 Postgraduate students are prepared to apply new ideas in the field of biological science and to become an entrepreneur.

PO4 Postgraduate students are trained to take up higher learning programmes.

PO5 Postgraduate students are trained to acquire enough competent to be anenvironmentalist

Programme Specific Outcomes

PSO1 Graduates will acquire knowledge on botanical terms, facts, concepts and principles

PSO2 Graduates will become a good academician/ researcher

PSO3 Graduates will get Opportunity to lead as a successful entrepreneur

PSO4 Graduates will get a Chance to be aware of advanced research in plant sciences

PSO5 Graduates will hone their skills to practice modern agricultural techniques.

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY101		Title: Core - 1 Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)	Batch	2020 -2022
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

To know the diversity and the chrematistic features of the non-flowering group of plants

Course Outcomes (CO)

K1	CO1	Remembering the values of lower plant forms and its diversity
K2	CO2	Will get an idea on evolution of lower plants and its architectural specialization in cells
K3	CO3	Apply economic values of lower plants to manufacture value added products
K4	CO4	Review the developmental stages of lower group of plant diversity
K4	CO5	Understand and learn the classification and economic importance of lower plants

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY102		Title: Core – 2 Plant Diversity II (Pteridophytes, Gymnosperms and Palaeobotany)	Batch	2020-2022
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

To know the various dynamics and characteristic features of lower vascular plants

Course Outcomes (CO)

K1	CO1	Remember the diverse forms of plants in the plant kingdom
K2	CO2	Will understand the vascular plants and fossils
K3	CO3	Study the classification, phylogeny and economic importance of Pteridophytes
K4	CO4	Study the classification, phylogeny and economic importance of Gymnosperms
K4	CO5	Review the evolutionary idea of fossil diversity

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY103		Title : Core – 3 Applied Microbiology and Plant Pathology	Batch	2020-2022
			Semester	I
Hrs/Week:	6		Credits	5

Course Objective

To introduce the various aspects of microbial techniques for agriculture, food and medicinal industry

Course Outcomes (CO)

K1	CO1	Students will recollect the basics of microbiology
K2	CO2	One can understand the interaction of microorganism with the environment and food
K3	CO3	Apply the microbial culture in the manufacturing of value added products
K4	CO4	To understand the various types of defence mechanism
K4	CO5	Analyze the plant diseases commonly occurring in crops

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY104		Title : Core - 4 Laboratory course -I (Phycology, Mycology, Lichenology and Bryology, Pteridophytes, Gymnosperms and Palaeobotany Applied Microbiology and Plant Pathology)	Batch	2020 - 22
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

To understand the organization of plant forms and get hands on experience on microbial and algal culture techniques

Course Outcomes (CO)

K3	CO1	Manufacturing of value added products from microbes and lower plants
K4	CO2	Understand the morphological and anatomical features of lower plants.
K5	CO3	Execute the culture techniques in laboratories

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:	20PBY1E1	Title : Elective -1 Ecology and Phytogeography	Batch	2020 - 22
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

To create awareness about the environmental problems and their consequences

Course Outcomes (CO)

K1	CO1	Students will keep in mind the ecosystem concepts and functions
K2	CO2	Able to understand the importance of biodiversity
K3	CO3	They can execute the remedies of pollution in the environment
K4	CO4	Evaluate the geographical distribution of plants
K4	CO5	Learn the conservation strategies of biodiversity

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code:	20PBY1E2	Title : Elective -2 Economic Botany	Batch	2020 – 22
			Semester	I
Hrs/Week:	6		Credits	4

Course Objective

To enable the students to study the economic importance of vegetables, fruits, spices, condiments, fibres, timber and oil yielding plants

Course Outcomes (CO)

K1	CO1	Understand the applied facet of botany
K2	CO2	Be familiar with the various commercial products of plant origin
K3	CO3	Understand the utility of different plant families
K4	CO4	To have a first- hand knowledge on economic Botany
K4	CO5	Acquire the knowledge on marketing of oil products

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY205		Title: Core – 5 Plant Anatomy and Reproductive Biology	Batch	2020 – 22
			Semester	II
Hrs/Week:	6		Credits	4

Course Objective

To acquire knowledge on the anatomical structure and reproductive phase of Angiosperms

Course Outcomes (CO)

K1	CO1	Keep in mind the basic terminologies in anatomy of plants
K2	CO2	Understand the vascular system and cellular developmental
K3	CO3	Implement the techniques for *in vitro* culture by understanding the ontogeny
K4	CO4	Understand the polyembryony and its uses.
K4	CO5	Get aware of economically viable fruit crops and techniques

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY206		Title: Core – 6 Plant Physiology	Batch	2020 – 22
			Semester	II
Hrs/Week:	6		Credits	4

Course Objective

To understand the metabolic components involved in the functioning of plants.

Course Outcomes (CO)

K1	CO1	Remember the basic metabolism in plants
K2	CO2	Deduce the biological pathways
K3	CO3	Execute the molecular based modification of metabolism in plants
K4	CO4	Understand the physiological processes and apply in agriculture.
K4	CO5	Understand the physiology of flowering

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 20PBY207		Title : Core – 7 Cytology, Genetics and Plant Breeding	Batch	2020 – 22
			Semester	II
Hrs/Week:	6		Credits	5

Course Objective

To acquire knowledge on genetic traits and breeding techniques in plants

Course Outcomes (CO)

K1	CO1	Remember the principles of genetics
K2	CO2	Understand the role of genes in expression of characters
K3	CO3	Gain knowledge on chromosome structure and cell cycle
K4	CO4	Review the innovative techniques in plant breeding
K4	CO5	Learn the hybridization techniques

Programme code	M.Sc.	Programme Title: Master of Science in Botany		
Course Code: 20PBY208		Title : Core – 8 Laboratory course – II (Plant Anatomy and Reproductive Biology, Plant Physiology, Cytology, Genetics and Plant Breeding)	Batch	2020 – 22
			Semester	II
Hrs/Week:	6		Credits	4

Course Objective

To experimentally study the anatomical, physiological and breeding techniques in plants

Course Outcomes (CO)

K3	CO1	Applying the plant anatomical characters in techno based designing
K4	CO2	Estimate the physiological carbon transition forms in plants and carbon budgeting
K5	CO3	Validate the scientific hypothesis by using various experiments

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY2E3		Title : Elective – 3 Horticulture and Landscaping	Batch	2020 – 22
			Semester	II
Hrs/Week:	5		Credits	5

Course Objective

To understand the principles, aspects of horticulture

Course Outcomes (CO)

K1	CO1	Remember the importance of horticultural crops
K2	CO2	Understand the propagation methods of commercially important crops
K3	CO3	Apply the horticultural techniques in self-employment
K4	CO4	Figure out the principles of various types of landscaping
K4	CO5	Acquire knowledge on floriculture

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY2E4		Title : Elective – 4 IPR and Bioethics	Batch	2020 – 22
			Semester	II
Hrs/Week:	5		Credits	4

Course Objective

To enable the students know the importance of Biosafety, Bioethics and IPR

Course Outcomes (CO)

K1	CO1	Remember the basic knowledge of IPR
K2	CO2	Understand the types of applications of IPR
K3	CO3	Apply the knowledge on patenting of the product
K4	CO4	Gain an insight into the biosafety and farmers rights
K4	CO5	Acquire knowledge on Protection of Plant Varieties and Farmers' Rights Act

Programme code	M.Sc.	Programme Title : Master of Science in Botany		
Course Code: 20PBY2N1		Title : Non Major Elective - 1 Entrepreneurship Botany	Batch	2020 - 22
			Semester	II
Hrs/Week:	1		Credits	2

Course Objective

To impart mushroom cultivation, horticulture techniques and vermicompost making skills to promote entrepreneurship

Course Outcomes (CO)

K1	CO1	Apply the mushroom cultivation technique in improving the economic status of society
K2	CO2	Acquiring knowledge on Horticulture techniques and land scaping for self employment
K3	CO3	Acquire knowledge on floriculture to become
K4	CO4	Acquire knowledge on fruit and vegetable preservation
K4	CO5	Acquire knowledge on production of vermin-compost