

Government Arts College for Men, Krishnagiri-635001

PG & Research Department of Botany

Program Outcome

**B.Sc Botany**

2015-2016

### **Programme Outcomes**

Name of the Programme : B.Sc. Botany  
Academic Frame Work & Content : Following / Adhering to the Curriculum, syllabus and evaluation system designed by Periyar University, Salem-7, Tamilnadu

### **Objectives**

1. To gain knowledge of the importance of plants in balancing our Eco system.
2. To know the importance of plants in terms of environment, agriculture, medicine and food.
3. To create awareness on solve problems in a sustainable environment; to conserve the endangered and economically important plant species.
4. To develop the students skills growing plants by various methods.
5. To train in techniques of vegetative propagation and gardening.
6. To Motivates for self-employment by knowledge and practicing in the preparation of Mushroom technology and various floricultural practices.
7. To gain knowledge for exploration of new plants of unknown value and known plants of known value of their secondary metabolites.
8. To understand the entrepreneurship skills of various ventures in Botany using plant resources, biological techniques and marketing of bioproducts.

### **Programme Outcomes**

1. Implement the concept of science and technology to improve the traditional and modern techniques for solving the complex problems in Plant Biology.
2. Be more curious towards biodiversity conservation and environmental protection in context with public health, safety, cultural and societal development.
3. Design and execute experiments in academia and industries using appropriate techniques, plant resources, and modern ICT tools for the conservation of natural resources.
4. Apply the ethical principles and social responsibilities along with socio-economic innovations to understand the value of plant kingdom.

5. Know the contextual knowledge in plant science research and communicate effectively with stakeholders with the society at large for enhancing the quality of life.

#### Programme specific outcomes

#### **Plant Diversity –I** **Algae & Bryophytes**

##### Learning Objectives:

1. To study the range of variation, habit & Habitat of Algae and bryophytes.
2. To study the economic importance, Role of the organisms in ecological balance.
3. To study the importance of Algae and bryophytes in the eco system.

##### Learning Outcomes:

1. Knowledge on the characteristic features, types, habitat and thallus structure of Algae & Bryophytes.
2. Understand the mode of reproduction, life cycles of Algae and bryophytes.
3. Students gain the knowledge of Algal and Bryophyte biodiversity in India and their economic uses.

#### **Plant Diversity- II** **Fungi, Lichens, Bacteria and Viruses**

##### Learning Objectives:

1. To study the thallus structure, distribution and habitat of Fungi and Lichens.
2. To study the cell structure and mode of reproduction of Bacteria and viruses.
3. To study the economic importance of Fungi, Lichens, Bacteria and viruses.

##### Learning Outcomes:

1. Learn about the morphology, structure, reproduction and life cycle and variations in life cycles and life histories of Fungi, Lichen Bacteria and Virus.
2. Understand the fundamentals of economic importance and biomedical applications of selected species of Fungi, Lichen, Bacteria and Viruses.

#### **Mushroom culture Technology** (Skilled Based Elective Course-I)

##### Learning Objectives

1. To study the economic importance and nutritive values of mushrooms.
2. To study the production of spawn.
3. To study the cultivation, harvesting and marketing of mushrooms.

##### Learning Outcomes

1. Students gain the knowledge on importance of mushrooms as food.
2. Gain various techniques on Mushroom cultivation.
3. Students know the market and nutritive value of mushrooms.

### **Anatomy and Embryology of Angioperms**

#### **Learning Objectives**

- To study the structure and functional development of cells , tissues and organs
- To know the tools and techniques used in Anatomical studies
- To study the male and female gametophyte development in angiosperm plants

#### **Learning outcome**

- Learn the structures, functions and roles of apical, lateral meristems in monocot and dicot plant growth
- Study the function and organization of woody stems derived from secondary growth in dicot and monocot plants
- Understand the development process of tissue form spermatogenesis, organogenesis to embryo formation

### **Horticulture**

(Skilled Based Elective Course-II)

#### **Learning Obectives**

1. To study the horticulture practice.
2. To study the different types of plant propagation methods.
3. To study the garden types and management.

#### **Learning outcomes**

1. Gain the knowledge on Horticulture practice and propagation methods.
2. Students gain the knowledge on importance on Gardens and garden management.

### **Mushroom Cultivation**

(Non-Major Elective Course-I)

#### **Learning Objectives**

1. To study the economic importance and nutritive values of mushrooms.
2. To study the production of spawn.
3. To study the cultivation, harvesting and marketing of mushrooms.

#### **Learning Outcomes**

1. Students gain the knowledge on importance of mushrooms as food.
2. Gain various techniques on Mushroom cultivation.
3. Students know the market and nutritive value of mushrooms.

### **Plant Diversity III**

#### **Pteridophytes, Gymnosperms and Paleobotany**

##### **Learning objective:**

- To study the distribution of lower vascular plants and their characteristics
- To understand the character and salient features of fossil and living forms Pteridophytes and gymnosperms
- To study the concept of fossil and fossilization

##### **Learning Outcome:**

- Knowledge on the classification and life cycle of Pteridophytes and Gymnosperms
- Understand distribution and economic importance of Pteridophytes and Gymnosperms
- Knowledge on salient features' of fossil forms of Pteridophytes and Gymnosperms
- Familiar with morphology, anatomy, reproduction, phylogeny and Economic importance of living Pteridophytes and Gymnosperms
- Learn the concept of Paleobotany and the economic importance of fossil plants.

### **Herbal Botany (Non-Major Elective Course-II)**

##### **Learning Objectives**

1. To learn the different types of Indian traditional medicinal system
2. To study the value and importance of medicinal plants for human welfare.
3. To explore the uses of plants as medicine ranging from medicinal to modern
4. To learn the preparation of herbal formulation to cure various ailments

##### **Learning Outcomes**

1. Knowledge on application traditional medicine for cure various disease.
2. Acquired knowledge on some important medicinal plants and their usage.
3. To acquire knowledge on phytochemicals and their applications various health care.

## **Morphology & Taxonomy of Angiosperms**

### **Learning Objectives**

1. To familiarize the students with plant morphological and reproductive characters
2. To understand the basic nomenclature criteria of plant taxonomy
3. To develop a skill to identify the plants and recognize the major plant families and their representative species using Regional Floras.
4. To familiarize the important families of angiosperms
5. To know about the economic importance of selected families

### **Learning outcome**

1. Understand the different classification in plant systematic
2. Familiar with plant nomenclature and rules
3. Knowledge on molecular tool in taxonomy
4. Do research and also get hands-on training in herbarium taxonomy through the process of preserving the plant specimens for herbarium which is a biological tool and store house of plants for taxonomic research.
5. Examine the recent developments in the field of plant systematic and reflect upon the learning programs related to net based applications which will make the students amused towards the subject.

## **Cytology and Genetics**

### **Learning Objectives**

1. Enable to learn various cell structures and functions of eukaryotes and understand the salient features and functions of cellular organelles.
2. To study the fundamental principles of Genetics.

### **Learning out come**

1. Recognize the general features and organization of Ultra structure of cell wall and cell organelles in eukaryote.
2. Understand the organization and function of organelle genome.
3. Knowledge on the fundamental principles of Genetics.

## **Plant Biotechnology**

### Learning objectives

1. To learn the fundamentals of plant biotechnology.
2. To learn the importance of gene transfer methods in plant systems.
3. Knowledge on the role of rDNA technology in agriculture.
4. To study the importance of Application of Biotechnology in industries and environment.
5. To know the techniques applied in biotechnology.

### Learning outcomes

1. Understanding the tools and enzymes used for gene transfer in plant systems.
2. Knowledge on transgenic plants and its importance.
3. Knowledge on the importance of Genetic engineering.

## **Agriculture Microbiology**

### Learning objectives

1. To learn the microbes used in agricultural practice.
2. To get knowledge on mass production of bio-fertilizers.
3. To learn the organic farming and compost preparation.
4. To learn the diseases causing agricultural crops.

### Learning Outcomes

1. Students understand the various non-harmful microbe used in agricultural practices.
2. To understand the role of microbes to enrich the productivity of agricultural crop.
3. Understand the mass production of bio-fertilizers.
4. Understand te Eco-friendly farming technology and recycling bio wastes.
5. Knowledge on diseases on agricultural crops.

## **Seed Technology(Skilled Based Elective Course-IV)**

### Learning Objectives

1. To know the structure and quality of seeds
2. To study seed sampling and germination methods.
3. To know the seed testing and certification.

### Learning Objectives

1. Understanding the screening of seed quality
2. Gain the knowledge on seed sampling and send germination

3. Know the seed viability test and certification.

### **Plant Physiology**

#### **Learning objectives**

1. To acquire the knowledge on the functional aspects of plants
2. To study the metabolism of plants
3. To learn the plant growth regulation
4. To know the adaptive mechanism of plants in adverse environment conditions

#### **Learning outcome**

1. Knowledge on the functional aspect of plants
2. Understanding on the biophysical and biochemical process and their significant for plant growth
3. Knowledge on the metabolism of plants
4. Knowledge on the role of plant growth regulator for plant growth and development
5. Understanding on the adaptive mechanism of plants in adverse environment condition

### **Plant Ecology and Phytogeography**

#### **Learning objective**

1. Empower the student to know the concept and principle of ecology.
2. Study the plant communities and stages of plant succession
3. Know the causes, effects and control measures of pollution.
4. Learn Biodiversity conservation and management.
5. Learn the principle and concept of phytogeography

#### **Learning Outcomes**

1. To understand the basic concepts of ecosystem and energy flow
2. To acquire knowledge on population dynamics and plant succession
3. To understand the causes and consequences of climate change.
4. To learn the conservation strategies of biodiversity
5. To study the principle and concepts of Phytogeography

### **Plant Protection**

#### **Learning Objectives**

1. To study the details of various plant pathogens affecting agricultural crops
2. To study the various plant diseases.



3. To study the plant disease management.

#### Learning Outcomes

1. Knowledge on plant diseases and their impact on various crop plants  
Understand the biological and chemical method of plant disease management.

### **Medicinal Botany**

#### Learning Objectives

1. To learn the various traditional medicinal practices used in India.
2. To study the value and importance of medicinal plants for human welfare.
3. To learn the preparation of herbal formulation to cure various ailments
4. To study the collection, harvesting, storage and marketing of plant derived drugs.

#### Learning Outcomes

1. Knowledge on application traditional medicine for cure various disease.
2. Acquired knowledge on some important medicinal plants and their usage.
3. To acquire knowledge on phytochemicals and their applications various health care.
4. To Gain the knowledge on collection, harvesting, storage and marketing of plant derivatives.

### **Plant Breeding and plant utilization as food**

(Skill Based Elective Course-V)

#### Learning Objectives

1. To learn the principles of Plant Breeding in crop improvement.
2. To learn the techniques in plant hybridization.
3. To study the nutritive value and cultivation practice of cereals, pulses, sugar crops oil crops, fruits and vegetables.

#### Learning Outcomes

1. Students understand the need of plant breeding in crop improvement.
2. Knowledge on various techniques in hybridization of plants.
3. Gain knowledge on nutritive value and cultivation practice of highly utilizing native crop.

### **Biofertilizer**

#### Learning objectives

5. To learn the microbes used in agricultural practice.
6. To get knowledge on mass production of bio-fertilizers.

7. To learn the organic farming and compost preparation.

#### Learning Outcomes

6. Students understand the various non-harmful microbe used in agricultural practices.
7. To understand the role of microbes to enrich the productivity of agricultural crop.
8. Understand the mass production of bio-fertilizers.

Understand te Eco-friendly farming technology and recycling bio wastes.

### **Allied Botany- I**

#### **External Morphology, taxonomy of angiosperms, cytology, Genetics, Anatomy and Embryology**

#### Learning Objectives

1. To study the outline of Morphology and taxonomy of Angiosperms.
2. To study the outline of Cytology and Genetics in Plant systems
3. To study the plant Anatomy an Embryology of Angiosperms

#### Learning Outcomes

1. Students understand the structure and function of plants parts
2. Gain knowledge on plant classification
3. Gain knowledge on plant cell structure and principles on genetics
4. Understands the development and differentiation of reproductive structure
5. Understand the internal details of a plant body

### **Allied Botany-II**

#### **Thallophytes, Bryophytes, Pteridophytes, Gymnosperms, plant Physiology and Ecology**

#### Learning Objectives

1. To study structure life cycles and economic importance of lower plants
2. To study to functional aspects of a plant
3. To know the outline of Plant ecology

#### Learnig Outcomes

1. Gain the knowledge on distribution, life cycle of lower plants like algae, fungi, bryophytes, Pteridophytes and Gymnosperms.
2. Understand the physiological activities of a plant cell

### **Major Practical –I**

#### **Algae, Fungi, bryophyte, Lichen, Bacteria and viruses**

##### **Learning Objectives**

1. To know the technique of micro-preparation
2. To observe the morphology and internal structure of Algae, Fungi, Bryophytes and Lichen
3. To observe the morphology of Bacteria and Viruses.
4. To study the economic importance of algal product

##### **Learning Outcomes**

1. Students acquire knowledge on structural detail of various forms through live specimens.

### **Major Practical –II**

#### **Plant anatomy, Embryology of Angiosperms, Pteridophytes, Gymnosperms and Paleobotany**

##### **Learning Objectives**

1. To know the technique of micro-preparation
2. To observe the internal structure of a plant tissue system
3. To observe the structure of various stages of monocot, dicot embryo and endosperms.
4. To observe the morphology and anatomy of Pteridophyte and Gymnosperm forms.
5. To study the details of fossil plants

##### **Learning Outcomes**

1. Gain knowledge on structural and functional features of plant tissues
2. Gain knowledge on detail structure of embryos and endosperms.
3. Understand detail study on Pteridophytes, gymnosperms and fossil plants.

### **Major Practical –III**

#### **Morphology of Taxonomy of Angiosperms, cytology and genetics**

##### **Learnig Objectives**

1. To know the morphological aspects of plants
2. To study the family character of plants
3. To study the various cell organelles.

4. To study the Mendelian genetics and its variations

#### Learning Outcomes

1. Students gain the knowledge on identification of plants through floral and vegetative characters.
2. Student gain knowledge on structure and shape of cell organelles.
3. Understand the interactions of genes

### **Major Practical –IV**

#### **Plant Physiology, Plant Ecology, Plant geography and Plant Protection**

#### Learning Objectives

1. To learn the physiological activity through experiments
2. To study the ecological adaptation and primary productivity of plants
3. To study the Vegetation types in Tamilnadu.
4. To study the various plant diseases

#### Learning Outcomes

1. Students gain the knowledge on plant physiological activity.
2. Student gain knowledge on ecological adaptation.
3. Understand the Phytogeographic region of Tamilnadu
4. Understand the various plant diseases and control measures.

## Allied Botany Practical

### Thallophytes, Bryophytes, Pteridophytes, Gymnosperms, plant Physiology and Ecology, External Morphology, taxonomy of angiosperms, cytology, Genetics, Anatomy and Embryology

#### Learning Objectives

1. To study the classification and identification of plants
2. To observe the internal and external structure of lower and higher plants
3. To study the activity of plants.

#### Learning Outcomes

1. Students gain the knowledge on characteristic features of plants.
2. Student gain knowledge on internal and external features of lower and higher plants.
3. Gains plants physiological knowledge.

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**PG & Research Department of Botany**

Program Outcome

**M.Sc. Botany**

2015-2016

## **Biodiversity of Plants - I**

(Algae, Fungi, Lichens, Bacteria and Viruses)

### **Learning Objective**

- To study the classification, character feature, distribution and reproductive cycle of Algae, fungi, lichens and bryophytes
- To study the ecological and economic importance of Algae, fungi and lichens
- To study the characteristic features of Bacteria and viruses.

### **Learning Outcomes**

- Comprehend the General features, classifications, biology and distribution and evolution of different algal forms with their ecology and ecological importance with their counterpart lichen
- Recognize characteristic features, classification and commercial importance of fungi and their interactions
- Connect the link between algae with their terrestrial counterpart bryophytes through studying the features, ecology and variations of gametophytes and sporophytes and their evolutionary significance.
- Students gain the knowledge on bacteria and viruses.

## **Biodiversity of Plants – II**

(Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)

### **Learning objective:**

- To study the lower vascular plants and their characteristics
- To understand the character and salient features of fossil and living forms Bryophytes, Pteridophytes and gymnosperms
- To study the concept of fossil and fossilization

### **Learning Outcome**

- Knowledge on the classification and life cycle of Pteridophytes and Gymnosperms
- Understand phylogeny and evolutionary trends of Pteridophytes and Gymnosperms

- Knowledge on salient features' of fossil forms of Pteridophytes and Gymnosperms
- Familiar with morphology, anatomy, reproduction, phylogeny and Economic importance of living Bryophytes, Pteridophytes and Gymnosperms
- Learn the concept of paleobotany and the economic importance of fossil plants.

### **Core Course –III**

#### **Taxonomy of Angiosperms**

#### **Learning objective**

- To understand the basic nomenclature criteria of plant taxonomy
- To develop a skill to identify the plants and recognize the major plant families and their representative species using Regional Floras.
- To familiarize the important families of angiosperms

#### **Learning out come**

- Understand the different classification in plant systematic
- Familiar with plant nomenclature and rules
- Knowledge on molecular tool in taxonomy
- Do research and also get hands-on training in herbarium taxonomy through the process of preserving the plant specimens for herbarium which is a biological tool and store house of plants for taxonomic research.
- Examine the recent developments in the field of plant systematic and reflect upon the learning programs related to net based applications which will make the students amused towards the subject.



## Core Course-IV

### Practical-I

#### **Algae, Fungi, Lichens, Bryophytes, Bacteria, Viruses, Pteridophytes, Gymnosperms and Paleobotany**

##### Learning Objectives

1. To know the morphological and anatomical features of plant bio diversity
2. To study the herbarium techniques for all plant groups
3. To know the various habitat of plants by field visit

##### Learning Outcomes

1. Gain the knowledge on variation in morphology and anatomy of plant diversity
2. Knowledge on techniques of herbarium and its importance
3. Knowledge on various habitat, climatic factors and variation between plant bio diversity

## Elective Course I

### **Plant Resource and Utilization**

##### Learning Objectives

1. To know the origin and economic value of lower plants and higher plants.
2. To study the economic importance of agricultural crops
3. To know the cultivation and medicinal usage of plants
4. To know the strategy of plant conservation

##### Learning Outcomes

1. Gain the knowledge on the economic importance of lower and higher plants
2. Knowledge on medicinally important plants and their cultivation
3. Knowledge on conservation of economically and medicinally important plants

## Core Course - V

### **Plant Pathology and Microbial Technology**

#### **Learning objective**

- To teach the basic information and general feature of bacteria and viruses
- To study the bacteria cultivation and identification method
- To study the fundamental of microbial genetics
- Highlight the role of microorganisms in human welfare.
- To study the details of plant pathogenic microbes and disease management

#### **Learning outcome:**

- Basic knowledge on bacteria and viruses
- Fundamental understanding the microbial genetics
- Knowledge on eco friendly microbes and their uses
- Knowledge on plant disease and their impact on various crop plants
- Understanding on biological and chemical methods of plant disease management

## Core Course –VI

### **Anatomy of Angiosperms, Plant Microtechniques and Embryology of Angiosperms**

#### **Learning objective**

- To study the structure and functional development of cells, tissues and organs
- Trace the development of male and female gametophyte in angiosperm plants
- To know the tools and techniques used in Anatomical studies
- To study the male and female gametophyte development in angiosperm plants
- Understand the incompatibility barriers and evolve methods to overcome
- Highlight the physiological role of endosperm in the morphogenesis of embryo.

#### **Learning outcome**

- Learn the structures, functions and roles of apical, lateral meristems in monocot and dicot plant growth
- Study the function and organization of woody stems derived from secondary growth in dicot and monocot plants

- Learn the micro techniques skills to observe the anatomical structure of a plant
- Understand the development process of tissue from spermatogenesis, organogenesis to embryo formation

Core Course – VII  
**Cell and Molecular Genetics**

**Learning objectives**

- 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
- Learn the different principles of plant breeding and the application of molecular genetics techniques in crop improvement

**Learning out come**

- Recognize the general features and organization of Ultra structure of cell wall and cell organelles in prokaryotes and eukaryotes
- Understand the organization and function of organelle genome
- Knowledge on the fundamental principles of Genetics.
- Understanding the principles and significant of plant breeding for crop improvement

Core Course-VIII

Practical-II

**Taxonomy of Angiosperms, Plant Pathology and Microbial Technology**

**Learning Objectives**

1. To know how to classify a plant
2. To know usage of floras to identify a plant
3. To make micro preparation of Microbes

4. To study various plant diseases

#### Learning Outcomes

1. Gains knowledge on various hierarchy levels in plant classification
2. Knowledge of various floras and their uses
3. Knowledge of various culture media and their compositions
4. Differentiate the symptoms of various diseases

#### Core Course-IX

#### Practical- III

### **Anatomy of Angiosperms, Plant Microtechniques, Embryology of Angiosperms, Cell biology and Molecular Genetics**

#### Learning Objectives

1. To study the operation of microscopes, Micrometers and Microtome for anatomical study
2. To examine properties of various woods and their commercial uses
3. To get knowledge on plant sex organs like androecium and gynoecium
4. To study techniques on Squash and smear
5. To study the interaction of genes in a character determination

#### Learning Outcomes

1. Gains knowledge on principles and function of Microscopes and Micrometers
2. Knowledge on Chromosomal behaviours
3. Knowledge on genes and its importance in a character determination
4. Gains knowledge on gene regulation and protein synthesis

## Core Course - X

### **Plant Physiology and Biophysics**

#### **Learning objectives**

- To acquire the knowledge on the functional aspects of plants
- To understand the biophysical and biochemical process of plants
- To study the metabolism of plants
- To learn the plant growth regulation
- To know the adaptive mechanism of plants in adverse environment conditions

#### **Learning out come**

- Knowledge on the functional aspect of plants
- Understanding on the biophysical and biochemical process and their significant for plant growth
- Knowledge on the metabolism of plants
- Knowledge on the role of plant growth regulator for plant growth and development
- Understanding on the adaptive mechanism of plants in adverse environment condition

## Core Course - XI

### **Environmental Biology**

#### **Learning objective**

- To understand the basic concepts of ecosystem and energy flow
- To acquire knowledge on population dynamics and plant succession
- To understand the causes and consequences of climate change.
- To study the principle and concepts of Phytogeography

#### **Learning Outcomes**

- Empower the student to know the concept and principle of ecology.
- Study the plant communities and stages of plant succession
- Know the causes, effects and control measures of pollution.

Learn the principle and concept of phytogeography

Core Course- XII

Practical\_ IV

**Plant Physiology, Biophysics and Environmental Biology**

Learning Objectives

1. To Study various physiological aspects of a plant by experiments
2. To demonstrate various techniques on physiological activity
3. To study various ecological parameters of a plant
4. To study geographical regions
5. To visit various land areas to know the ecological adaptations

Learning Outcomes

1. Students gains knowledge on behavior of a plant depending on the environmental changes
2. Gains the techniques for estimates physiological parameters
3. Knowledge on the interaction of ecological factor and Biosphere
4. Get knowledge on factors of land area and adaptations of plant to its habitat

Elective Course - II

**Herbal Technology**

**Learning objective**

- To learn the different types of Indian traditional medicinal system
- To study the value and importance of medicinal plants for human welfare
- To explore the uses of plants as medicine ranging from medicinal to modern pharmaceuticals
- To learn the preparation of herbal formulation to cure various ailments.

### **Learning outcomes**

- Knowledge on application traditional medicine for cure various disease
- Acquired knowledge on some important medicinal plants and their usage
- To acquire knowledge on phytochemicals and their applications various health care
- To understand the herbal formulation and practice by ethnic community

## Elective Course - III **PLANT BIOTECHNOLOGY**

### **Learning objectives**

- To learn the fundamentals of plant biotechnology.
- Knowledge on the role of rDNA technology in agriculture.
- To study the importance of plant tissue culture.

### **Learning outcomes**

- Knowledge on plant tissue culture.
- Knowledge on transgenic plants and its importance.
- Knowledge on the importance of Genetic engineering.

## CORE COURSE - XIII

### **Biochemistry and Nanobiotechnology**

#### **Learning objectives**

- Learn structural and functional properties of carbohydrates, proteins , lipids and nucleic acid
- Learn the biosynthetic pathway of carbohydrates, amino acid, lipids and secondary metabolites
- Learn the functional role secondary metabolite
- Study about the mechanism of enzyme action and inhibition.
- To learn the basics of Nanoscience and Nanobiotechnology.

#### **Learning outcomes**

- Understanding on the structure and properties of plant biomolecular.
- Understand the biosynthetic pathway of primary and secondary metabolites
- Knowledge on plant enzymes and their role.
- Knowledge on characterization of nanoparticles and nanomaterials.
- To learn nano biotechnological applications in Agriculture, Medicine and environment.

#### Core Course - XIV

#### **Bioinstrumentation, Biostatistics and Bioinformatics**

##### **Learning objectives**

- To study the interdisciplinary areas of life sciences.
- To develop laboratory skill by various biochemical experiments.
- To create awareness about bioinformatics tools in solving biological problems.
- To provide an overview of the applications of bioinformatics.

##### **Learning outcomes**

- Knowledge on various biological techniques.
- Knowledge on the applications of various instruments used in botanical studies.
- Skill for the statistical analysis of experimental data.
- Skill for using various bioinformatics tools effectively.

#### Core Course- XV

#### Practical\_ V

#### **Biochemistry, Nano Biotechnology, Bioinstrumentation Biostatistics and Bioinformatics**

##### Learning Objectives

1. To study Biochemical parameters of plants by various experiments
2. To demonstrate biochemical parameters
3. To learn techniques on instrumentation on biological field
4. To study the application of Statistical analysis in biology
5. To learn the application of informatics in biology

##### Learning Outcomes



1. Gains knowledge on various biochemicals and their relations in plants
2. Knowledge on the principles and operation of biological instruments
3. Learn about statistical principles and its importance in biology
4. Knowledge on collection of information of biological data.

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## Elective Course - II

### **Horticulture and Forestry**

#### **Learning objectives**

- To understand the basic concept of horticulture
- To learn the various methods of plant propagation and management
- To understand the arts of floriculture and landscape gardening
- To know the arts of fruit crop and vegetable crop cultivation
- Enable the students to understand the importance of forests.
- To learn forestry and forest laws

#### **Learning outcome**

- Understand the importance and division of horticulture
- Demonstrate the propagation, growth, and maintenance of plants in horticulture systems.
- To know the art of indoor gardening
- Apply horticultural skills and knowledge to explore career opportunities in the horticulture industry.
- Understand the importance of forestry for social, ecological, economic, cultural and environmental purposes
- Apply the regeneration methods of forests

### **Project and Dissertation work**

#### Learning Objectives

- To make hands on experience in all the instruments and techniques related to Botany research.

#### Learning Outcomes

- Students gain knowledge on literature collection, instrumentation handling and field survey

### Extra Disciplinary Course – I

#### **Horticulture**

##### **Course objectives**

- To understand the basic concept of horticulture
- To learn the various methods of plant propagation and management
- To understand the arts of floriculture and landscape gardening
- To know the arts of fruit crop and vegetable crop cultivation

##### **Course outcome**

- Understand the importance and division of horticulture
- Demonstrate the propagation, growth, and maintenance of plants in horticulture systems.
- To know the art of indoor gardening
- Apply horticultural skills and knowledge to explore career opportunities in the horticulture industry.

### Extra Disciplinary Course - II

#### **Herbal Botany**

##### **Course objective**

- To learn the different types of Indian traditional medicinal system
- To study the value and importance of medicinal plants for human welfare
- To explore the uses of plants as medicine ranging from medicinal to modern pharmaceuticals
- To learn the preparation of herbal formulation to cure various ailments.

##### **Course outcomes**

- Knowledge on application traditional medicine for cure various disease
- Acquired knowledge on some important medicinal plants and their usage
- To acquire knowledge on phytochemicals and their applications various health care
- To understand the herbal formulation and practice by ethnic community

## **M.Phil Botany**

### **2015-2016**

#### RESEARCH METHODOLOGY

##### Objectives

1. To initiate the students into research activities.
2. To handle various instruments, principles and applications.
3. To study the application of statistics in Biological Research
4. To learn the literature collection and writing of dissertation

##### Outcomes:

1. To initiate the students into research activities.
2. To handle various instruments, principles and applications
3. To acquire knowledge on different types of microscope
4. To learn the principle and methodology of chromatography
5. To learn the principle and methodology of tracer technique
6. To acquire knowledge on statistics and its application in research.

#### ADVANCES IN BOTANY

##### Objectives

1. To create awareness on bio diversity conservation policy and acts.
2. To learn the outlines and applications of molecular biology, biochemistry and biotechnology.
3. To learn the nano biotechnology and its application.

##### Outcomes:

1. Student acquires the knowledge on need of biodiversity conservation.

2. Gain the knowledge on molecular biology, biochemistry and biotechnology in relevant to Botany.
3. Knowledge on recent trends in Nanobiotechnology.

### **Dissertation work**

#### Learning Objectives

- To make hands on experience in all the instruments and techniques related to Botany research.
- To expose the students to recent research and fulfill the social needs.

#### Learning Outcomes

- Students gain knowledge on literature collection, instrumentation handling and field survey
- Student gain the attitude towards the welfare of society based on his/her research work.