

**DEPARTMENT OF BOTANY  
(Postgraduate and Research)  
Maharaja's College, Ernakulam**

**M.Sc. BOTANY (CBCS)**

**PROGRAMME SPECIFIC OUTCOME**

The student after completing the post graduate programme in Botany will be able to

- acquire core competency in differentiating the diverse world of microbes and other lower groups and higher groups of plants, their significance, plant diseases & its control measures
- identify and classify all taxonomic groups in the field and also to understand their evolutionary relationships.
- understand the core concept of ecology and environment globally and acquire problem solving skills in environmental monitoring, pollution abating and biodiversity conservation
- gain knowledge in understanding the importance of research, its methodology, use of library & digital resources, use of sophisticated equipments and to demonstrate analytical ability to tackle the scientific research problems and also to maintain a high level of botanical research.
- acquire the ability to understand life processes at cellular as well as molecular level
- acquire core competency in distinguishing the internal structure of various groups of plants and know the concept, process, physiology of plant development.
- learn the basic biostatistics, experimental statistics, biotechnology and bioinformatics and to acquire application knowledge in high level of scientific excellence
- outline the different biochemical pathways of life and make use of it for human welfare
- understand different types of immunity and acquire the skills to stain bacteria and to study antibiotic sensitivity
- understand the production methods of industrially important products like Antibiotics, Amino acids, Enzymes Organic acids, Biofuels, Biopolymers, Alcoholic beverages and Microbial cells.
- aware of ethical issues and regulatory considerations while addressing society needs for growth with honesty and perform different functions that demand higher competence in national/international organizations with high spirits and helping each other.

## **COURSE OUTCOME**

### **Semester I**

#### **Course 1 – PG1BOTC01 – Microbiology and Phycology**

##### **Learner is able to**

1. develop the understanding of the concept of microbial nutrition
2. classify viruses based on their characteristics and structure
3. examine the general characteristics of bacteria and their reproduction
4. enhance their awareness and appreciation of human friendly viruses, bacteria and their economic value
5. understand and distinguish the diverse group of algae
6. infer the economic value of different types of algae
7. outline the ecological significance of algae
8. build the skills for collection, identification and artificial culture of algae.

#### **Course 2 – PG1BOTC02 - Mycology and Crop Pathology**

##### **Learner is able to**

1. understand the diversity of fungi.
2. Classify fungi based on different classification system and recognize recent trends in classification of fungi
3. distinguish fungal group with their characteristic features
4. understands the interaction of fungi with other living organisms.
5. understands economic importance of different fungal groups.
6. identify the different types of fungi with reason.
7. understand the basic principles of plant pathology and plant protection
8. identify the different plant diseases and their quarantine measure.
9. Familiarize with the basic skills and techniques related to mycology and plant pathology

#### **Course 3 – PG1BOTC03- Bryology and Pteridology**

##### **Learner is able to**

1. interpret different groups of Bryophytes and Pteridophytes.
2. analyze the different theories regarding the origin of both Bryophytes and Pteridophytes and develop ideas regarding their evolution.
3. compare the structural evolution of gametophytes and sporophytes in both Bryophytes and Pteridophytes.
4. clarify organization of different types of steles, sori and sporangial characters in an evolutionary perspective
5. validate the ecological and economical roles played by both Bryophytes and Pteridophytes.

#### **Course 4 – PG1BOTC04 - Environmental Biology**

##### **Learner is able to**

1. have an idea about the major ecosystem of the world
2. understand the population ecology and community ecology system in the world
3. get meticulous knowledge in ecological succession and phytogeography

4. get knowledge in environmental pollution, global environmental problems, their mitigation and remedies and to acquire knowledge about the importance of biodiversity conservation

## **Semester II**

### **Course 5 – PG1BOTC05 - Gymnosperms, Evolution and Developmental biology**

#### **Learner is able to**

1. understand the classification of Gymnosperms
2. make use of the economic value of Gymnosperms
3. acquire the skills for field identification of Gymnosperms
4. infer the various theories of evolution
5. illustrate the organogenesis
6. acquire the basic concepts of developmental biology
7. summarise the embryogenesis

### **Course 6 – PG1BOTC06 - Cell and Molecular biology**

#### **Learner is able to**

1. get an idea of intracellular components and cell communication.
2. understand the life cycle of cell
3. infer various aspects of cytoskeleton
4. analyze the chromosome organization in eukaryotes
5. familiarize the DNA replication, repair and recombination
6. examine the various plant growth regulators
7. understand the basic concepts of mechanism of gene expression
8. familiarize the control of gene expression

### **Course 7 – PG1BOTC07 - Plant anatomy and Principles of angiosperm systematics**

#### **Learner is able to**

1. retrieve different types of tissues, non-living inclusions in plant cells.
2. interpret structure, function and roles of vascular cambium and cork cambium.
3. categorize different types of Anomalous secondary growth and their anatomical peculiarities and adaptational significance.
4. illustrate significance and properties of wood & fibres used commercially.
5. analyze leaf initiation, types of stomata and trichomes and appraise anatomical peculiarities in C3, C4 and CAM plants.
6. compare Nodal anatomy, Floral anatomy and their evolutionary significance.
7. utilize anatomical tools in solving taxonomic disputes and their pharmacognostic significance.
8. recognize concepts of taxonomic hierarchy and phylogeny of angiosperms.
9. illustrate sources of taxonomic characters in solving taxonomic disputes.
10. recall the principles, rules and recommendations of ICN in plant taxonomy.

## **Semester III**

### **Course 8 – PG1BOTC08 - Genetics and Biochemistry**

**Learner is able to**

1. understand the history of genetics
2. familiarize the concepts of linkage and genetic mapping
3. outline the basic concepts of quantitative genetics
4. understand the genetics behind cancer
5. familiarize the basic concepts of population genetics
6. understand the structure and function of biomolecules
7. familiarize different types of secondary metabolites

**Course 9 – PG1BOTC09 - Research methodology, Biophysical instrumentation, Biostatistics and Microtechnique**

**Learner is able to**

1. Understand the methodology of research.
2. Understand the use of library resources.
3. prepare dissertation, research paper and short communications and review articles
4. carry out proof reading and presentation of research findings in seminars and workshops.
5. prepare project proposals
6. understand the basic statistical methods for biological research.
7. familiarizes with biological instrumentation and plant micro technique

**Course 10 – PG1BOTC010 - Plant physiology and Plant breeding**

**Learner is able to**

1. get an idea about the plant water relations
2. understand the transport of ions, solutes and other macromolecules
3. infer various aspects of photosynthesis.
4. understand respiratory metabolism in plants
5. analyze the nitrogen metabolism in plants.
6. familiarize the affects different types of stresses in plants
7. outline the basic knowledge in sensory photobiology
8. examine the various plant growth regulators
9. understand the basic concepts of plant breeding
10. familiarize the mechanism of hybridization in plants
11. outline the methods of breeding resistance in plants
12. familiarize the modern plant breeding methods.

**Course 11 – PG1BOTC011 - Biotechnology and Bioinformatics**

**Learner is able to**

1. get a thorough knowledge in plant tissue culture
2. familiar with genetic engineering and advanced tools
3. get knowledge in genomic and proteomics
4. get basic knowledge in bioinformatics
5. The students will be able to familiarize with social issues in biotechnology

**Course 12 – PG1BOTC012 - Taxonomy of angiosperms**

**Learner is able to**

1. conceptualize the plant classification system proposed by different taxonomists
2. develop critical understanding of the different tools in taxonomy
3. develop critical evaluation of taxonomic keys
4. recognize the importance of digital resources of taxonomy and virtual herbarium
5. enhance their observation capacity by dissecting different floral structures and to improve their taxonomic illustrations and floral imaging
6. critically evaluate the interrelationships and evolutionary trends of angiosperm families
7. develop methodology in ethno botanical studies and to enhance their knowledge on IPR and benefit sharing.

**Semester IV****Course 13 – PG1BOTC013 - Food, Agricultural and Environmental microbiology****Learner is able to**

1. recall the role of microbes in food deterioration and food spoilage and principles of food preservation techniques.
2. interpret the role of microbes in the production of fermented foods.
3. analyze role of microbes in food borne diseases and diseases caused by food additives.
4. appraise techniques of microbial examination of food.
5. discover the role of microbes as biofertilizers and biopesticides.
6. categorize microbes in the formation of different types of soils, in mineral cycling and in biodegradation processes.

**Course 14 – PG1BOTC014 - Clinical microbiology****Learner is able to**

1. understand different types of immunity
2. illustrate the different techniques in antigen identification
3. compare and distinguish the bacterial and viral diseases.
4. compare the different types of antibiotics.
5. distinguish the diagnostic techniques for infectious diseases.
6. acquire the skills to stain bacteria and to study antibiotic sensitivity.

**Course 15 – PG1BOTC015 - Industrial microbiology****Learner is able to**

1. understand the basic principles of fermentation.
2. isolate antibiotic resistant /organic acid producing bacteria from soil.
3. maintain microbial cultures.
4. understands the constituents of fermentation media.
5. understands the basic instrumentation and sterilization techniques.
6. understand the production methods of industrially important products like Antibiotics, Amino acids, Enzymes Organic acids, Biofuels, Biopolymers, Alcoholic beverages and Microbial cells.