

## **POSTGRADUATE PROGRAMME OUTCOMES (PO)**

After the completion of the postgraduate Programme, the student will be able to accomplish the following outcomes:

**PO1. Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO2. Problem solving:** Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired from humanities/sciences/mathematics/social sciences.

**PO3. Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**PO4. Global Perspective:** Understand the economic, social and ecological connections that link the world's nations and people.

**PO5. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

### **Program Specific Outcomes (PSO)**

**PSO1:** Understand the identification, classification, structure, development and reproduction of cryptogams and phanerogams.

**PSO 2:** Understand the diversity, evolution, interrelationship among lower and higher group of plants and their economic importance.

**PSO 3:** Understand the concepts and applications of biology in cell and molecular biology, biotechnology, bioinformatics, biostatistics, biophysics, plant breeding, horticulture, plant physiology, biochemistry, genetics and microbiology.

**PSO 4:** Perform lab procedures as per standard protocols in the areas of biochemistry, biophysics, biotechnology, Microtechnique, plant physiology, taxonomy, ecology, bioinformatics and microbiology.

## Course Outcome (CO)

Course Name	Course Code	Course Outcome
<b>SEMESTER I</b>		
Microbiology & Phycology	BY010101	<ol style="list-style-type: none"> <li>1. Summarize milestones in Microbiology</li> <li>2. Describe general features of bacteria with special reference to Bergey's Manual</li> <li>3. Discuss bacterial systematics , phenotypic, biochemical &amp; molecular features</li> <li>4. Understand sterilization techniques of bacteria &amp; method and maintaining of pure culture</li> <li>5. Describe features of viral &amp; sub viral particles</li> <li>6. Understand distribution, classification, morphology, anatomy, reproduction, life cycle and evolution of Algae.</li> <li>7. Understand the ecological economical and experimental importance of Algae</li> <li>8. Understand the technique of collection, isolation &amp; preservation of Algae</li> </ol>
Mycology and Crop pathology	BY010102	<ol style="list-style-type: none"> <li>1. Understand the general characters and classification of different fungal groups with examples</li> <li>2. Understand the thallus structure and reproduction of various classes of fungi</li> <li>3. Examine the fungal interaction in nature and predict their adaptive strategies</li> <li>4. Understand the economical importance of fungi and assess their useful and harmful nature</li> <li>5. Recognize, compare and distinguish the processes and mechanisms involved in pathogenesis by various microbes</li> <li>6. Identify and interpret the major diseases of crop plants and propose their control measures</li> </ol>
Bryology and Pteridology	BY010103	<ol style="list-style-type: none"> <li>1. Understand the diversity, distribution and classification of Bryophytes and Pteridophytes with examples</li> <li>2. Understand the ecological and economical importance of Bryophytes and Pteridophytes</li> <li>3. Recognize, compare and distinguishing thallus structure and reproductive mechanisms of Bryophytes</li> <li>4. Compare and distinguish the anatomy of sporophytic and gametophytic generation of Pteridophytes</li> <li>5. Recognize and compare reproductive structures of different classes of Pteridophytes</li> </ol>

		6. Understand the mechanisms of spore dispersal, heterospory, apogamy and apospory of Pteridophytes
Gymnosperms, Paleobotany and Evolution	BY010104	<ol style="list-style-type: none"> <li>1. Understand origin, general characters, distribution and classification of Gymnosperms</li> <li>2. Understand vegetative and reproductive lifecycle of Gymnosperms mentioned in the syllabus</li> <li>3. Understand the economic significance of Gymnosperms</li> <li>4. Understand the evolutionary time scale and techniques used in fossil study</li> <li>5. Generalize the evolution and phylogeny of biomes and categorize the evidences for evolutionary process</li> <li>6. Describe the concept of natural selection and factors affecting natural selection</li> <li>7. Discuss mutation as an evolutionary force and interrelation between mutation and natural selection</li> <li>8. Understand concept of speciation and distinguish types of speciation and co- evolution of species interaction</li> </ol>
<b>SEMESTER II</b>		
Plant Anatomy, Developmental biology and Horticulture	BY010201	<ol style="list-style-type: none"> <li>1. Develop an understanding of concepts and fundamentals of plant anatomy and its interrelation with major disciplinary</li> <li>2. Examine the internal anatomy of plant systems and organs</li> <li>3. Develop critical understanding on evolution of concept of organization of shoot and root apex</li> <li>4. Evaluate the adaptive and protective systems of plants.</li> <li>5. Summarize the basic concepts of plant development</li> <li>6. Discuss the process of morphogenesis and organogenesis in plants</li> <li>7. Understand principles and applications of horticulture and floriculture</li> <li>8. Discuss and analyze modern trends in techniques in horticulture</li> </ol>
Cell Biology, Genetics and Plant Breeding	BY010202	<ol style="list-style-type: none"> <li>1. Understand structural organization of plant cell , ultra structure of cell organelles, chromosomal and cytoskeleton structure</li> <li>2. Understand the basic concept of cell signaling and cell- cell interaction</li> <li>3. Understand stages of cell cycle and its regulations</li> <li>4. Understand and apply the principles of inheritance, gene introduction and linkage</li> <li>5. Understand and analysis the basic concept of human</li> </ol>

		<p>genetics and cancer</p> <ol style="list-style-type: none"> <li>6. Understand the basic concept of mutation and carry out problems related to population genetics</li> <li>7. Understand the objectives, achievements, future prospect and methods of plant breeding</li> <li>8. Acquire knowledge on modern trends in plant breeding</li> </ol>
Plant Physiology & Biochemistry	BY010203	<ol style="list-style-type: none"> <li>1. Understand the basic process of absorption of water and solutes</li> <li>2. Understand plant metabolic process in depth</li> <li>3. Understand and evaluate responses of plant to biotic and abiotic stresses</li> <li>4. Understand and analyze the mechanisms involved in plant growth and development</li> <li>5. Understand classification, structure, function and metabolism of biomolecules</li> <li>6. Understand and evaluate the classification mechanism of action and application of enzyme</li> </ol>
Molecular Biology	BY010204	<ol style="list-style-type: none"> <li>1. Understand the structure, function and diversity of nucleic acids in organisms</li> <li>2. Distinguish genome organization in prokaryote and eukaryotes</li> <li>3. Explain concept of replication of RNA &amp; DNA in eukaryotes and prokaryotes</li> <li>4. Compare and contrast the process of transcription and translation in eukaryotes and prokaryotes</li> <li>5. Understand the concept of gene expression and control mechanism in prokaryotic and eukaryotic systems</li> <li>6. Describe the concept of recombination and epigenetic inheritance</li> <li>7. Categorize DNA repair mechanisms</li> </ol>
<b>SEMESTER III</b>		
Research Methodology, Microtechnique, Biostatistics and Biophysical Instrumentation	BY010301	<ol style="list-style-type: none"> <li>1. Remember the basic concepts of research and its methodologies.</li> <li>2. Understand and apply the concept of literature review, preparation of project report/proposal, thesis and research paper.</li> <li>3. Understand the basic principles of Microtechnique.</li> <li>4. Develop skill in techniques of staining and slide preparation.</li> <li>5. Understand common statistical designs in Biological experiments.</li> <li>6. Analysis and application of different statistical tools in research.</li> <li>7. Understand the principles and application of</li> </ol>

		<p>various instruments in biological research.</p> <p>8. Understand the basic principles and applications of microscopy and chromatography.</p>
<p>Biotechnology, Bioinformatics and Nanotechnology</p>	<p>BY010302</p>	<ol style="list-style-type: none"> <li>1. Understand the steps involved in recombination DNA technology</li> <li>2. Understand the procedure and application of microbial biotechnology</li> <li>3. Understand different stages of plant tissue culture technique</li> <li>4. Understand the tools and techniques in genetic engineering and its applications</li> <li>5. Apply and analyze bioinformatics tools in DNA and protein analysis</li> <li>6. Overview on concepts and tools in nanobiotechnology and its applications</li> <li>7. Create awareness about ethical issues relating to rDNA techniques</li> <li>8. Familiarize with cells involved in immunity, its interaction and auto immune disorders</li> </ol>
<p>Angiosperm Taxonomy, Economic Botany and Ethnobotany</p>	<p>BY010303</p>	<ol style="list-style-type: none"> <li>1. Understand the scope, significance and major classification systems of taxonomy</li> <li>2. Categorize general sources for taxonomic studies</li> <li>3. Understand the concept of taxonomical hierarchy and general phylogenetic terms related to angiosperm taxonomy</li> <li>4. Identify major tools and methodology used for plant identification</li> <li>5. Understand the concept, rules and regulation of botanical nomenclature</li> <li>6. Examine the angiosperm families mentioned in syllabus with reference to tropical flora as per Bentham and Hooker classification and their economic importance</li> <li>7. Generalize study on economically important plantation crops and their products in Kerala</li> <li>8. Understand the importance, sources and methods of Ethnobotany</li> </ol>

Environmental Science	BY010304	<ol style="list-style-type: none"> <li>1. Understand scope, interdisciplinary nature of environmental science</li> <li>2. Analyze the concept of population and community ecology, dynamics of ecology</li> <li>3. Examine ecosystem types and its conservation efforts and perceive knowledge about biosphere</li> <li>4. Understand basic principles of phytogeography and applications of remote sensing</li> <li>5. Discuss pollution type (water, air, noise, radioactive and thermal ), sources , effects and control measures to mitigate it</li> <li>6. Analyze global environmental problems and biotechnological tools in tracking it</li> </ol>
<b>SEMESTER IV</b>		
Food, Agriculture and Environmental Microbiology	BY020401	<ol style="list-style-type: none"> <li>1. Understand basic principles of food spoilage, preservation and storage</li> <li>2. Understand and apply the technology of fermented food and products</li> <li>3. Recognize food borne diseases</li> <li>4. Understand the role of microorganisms in agriculture and analyze significance of organic farming and biofertilizers</li> <li>5. Understand the microbial diversity in the environment and apply techniques of microbiology in agriculture</li> <li>6. Understand and apply the role of microorganisms in soil and aquatic environment</li> </ol>
Clinical Microbiology	BY020402	<ol style="list-style-type: none"> <li>9. Understand the basic concept of immunology</li> <li>10. Understand cells involved in immune systems, B cells &amp; T cells development and differentiation</li> <li>11. Understand types and structure of antigen and antibody and their interactions in -vivo and in - vitro</li> <li>12. Familiarize common immune disorders and its therapy</li> <li>13. Explain the process of epidemiology, prevention and control measures of microbial disorders</li> <li>14. Familiarize viral, bacterial, fungal and protozoal diseases</li> <li>15. Understand mode of action of viral chemotherapy, vaccination and antibiotics</li> </ol>
Industrial Microbiology	BY020403	<ol style="list-style-type: none"> <li>1. Classify the sources and characters of industrially important microbes</li> <li>2. Applications of methods for isolation, selection and preservation of industrially important</li> </ol>

		<p>microorganisms</p> <ol style="list-style-type: none"><li>3. Understand the concept of fermentation and categorize principle, working procedure, and applications of fermentation and downstream processing</li><li>4. Summarize the principle, structure and applications of bioreactors</li><li>5. Understand the principle and procedures involved in production of industrially important products using microorganisms</li><li>6. Explain methods and applications of immobilization of cells and enzymes</li></ol>
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