WAIKHOM MANI GIRLS' COLLEGE, THOUBAL

Department of Botany Programme: B.Sc. Botany

Programme Outcomes (PO)

PO1. Knowledge and understanding: 1. Diversity of plants in terms of structure, function, reproduction and ecological roles. 2. The evaluation and assessment of plant diversity. 3. Plant systematics and classification including flora of India and major biomes of the world. 4. The role of plants in the functioning of the global ecosystem. 5. Application of Statistics in biological data. 6. Application of computer and bioinformatics.

PO2. Intellectual skills – able to: 1. Logical interpretation of ideas and concepts into a organized form. 2. Accumulate and organize knowledge and ideas through reading and searching in internet. 3. Transformation of knowledge based concepts from one area to another within the subject. 4. Plan hypothesis and test. 5. Propose and carry out independent survey or research in various areas of the subject.

PO3. Practical skills: Giving opportunities to students to conduct experiments practically both in field and laboratory. Hands on practical helps the students to gain proficiency and skills in different topics of modules offered to them. 1. Study of plant morphology and anatomy. 2. Character correlation for Plant identification. 3. Study of structure and composition of vegetation. 4. Phyto-chemical analyses of plant materials to establish the presence of various chemicals with reference to plant physiology and biochemistry. 5. Study of plant diseases with reference to economic crops. 6. Accumulation and analysis of biological data using statistical methods. 7. Knowledge and use of computers.

PO4. Modern tool usage: Select and application of proper techniques and modern instruments for Biochemical experiments, Molecular Biology, Biotechnology, in vitro culture techniques, cytogenetically and physiological activities of plants.

PO5. The Botanist and society: Apply resource based knowledge to assess and access plant diversity, its importance for society and ecology, health and hazards, legal and environmental issues and conservation of biodiversity practice with responsibility.

PO6. Environment and sustainability: Aware and understand the role of the plants in environmental issues, and propagate the knowledge for sustainable development.

PO7. Individual and team work: Work with responsibilities as an individual, or as a member or leader in team works, or in multidisciplinary approaches.

Course Outcomes (CO) of B.Sc. Botany

CO1. Critically evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenetic level.

CO2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field of Plant Identification.

CO3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.

CO4. Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.

CO5. Students will be able to apply statistical tools for the analysis of relevant biological situations.

CO6. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework. Students will be able to

compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and from other forms of life.

CO7. Students will be able to explain how Plants function at the level of the gene, genome, cell, tissue, Flower development. Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and mode of life cycle followed by different forms of plants.

CO8. Students will be able to explain the ecological interconnectedness of life on earth by tracing energy and nutrient flow through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

Programme Specific Outcomes: B.Sc. Botany

SEM	COURSE	Course Learning Outcomes (CLO)
	SEMESTER -I	
	BOT-101-Virus,Bacteria and Crytograms	**1.** Understand the microbial diversity along with its mode of nutrition, reproduction and its economic importance. **2.** Understand the difference between beneficial and harmful viruses or bacteria. **3.** Knowledge on the systematics of viruses, algae, bacteria and their various metabolic processes. **4.** Understand the Fungal diversity and their application in various industries. Also know how to cultivate the mushroom and their values. knows about distinct classes of Lichen and their utilization **5.** Knows about character, classification and reproduction of bryophytes and pteridophytes.
	BOT-101(P)	**1.** Develop the practical knowledge on vegetative

		and reproductive structure of algae, fungi bryophytes and pteriodophytes by having a clear observation of their life cycles. **2.** Practical knowledge on the structure, reproduction of bacteria and to know the staining of the gram positive and gram negative bacteria, thus further help in the differentiation among them. 3. Developing a knowledge on locally important diseases and their causes
SEMESTER-II		
	BOT-202 Gymnosperm, Angiosperm, Applied Botany& Embryology	1.Knowlwdge on the general account of Gymnosperm and its classification 2. Understand the fossil formation and its types. 3. Knowledge on the Objectives, Principles and Evolutionary Trends in Taxonomy. 4. Know the origin and evolution of crop plants with special reference to process of cultivation and utilization of products. 5. Ethnobotany- utilization of plants by various communities for their day to day life and their documentation. 6. Understand the structure and distribution of simple and complex tissues, primary and secondary growth in plant. 7. Understand the process of development of micro and mega spores and its involvement in the process of plant development. 8. Knowledge on the historical perspective of palynology and its aspects and prospects.
	BOT202(P)	1. Knowledge on the preparation of temporary slide on the reproductive structure of Gymnosperm. 2. Understand the fossil plants by examining the

		slides of the fossils plants. 3. Practical knowledge on taxonomy through field study and methods to identify the plant species and further techniques of herbarium preparation. 4. Practical observation of the morphology and types of pollen grains of different plant species under palynological studies. 5. Know the origin and evolution of crop plants with special reference to process of cultivation and utilization of products. 6. Understand the secondary growth in plants by preparing the slide in stem of some plants.
SEMESTER-III		
	BOT-303 Plant Geography, Ecology, Plant Physiology and Molecular Biology	1. Knowledge on the different physiogeographic regions of India, factors serving for the geographic divisions and its vegetation. 2. Understand the structure of an ecosystem, functions and its various components. 3. Develop understanding on Community ecology along with its characteristics and structure. 4. Understanding of physiological processes involved in the plant sciences. 5. Mineral nutrition, energy conservation through photosynthesis, breakdown of stored foods through respiration. 6. Provide knowledge on nitrogen metabolism and role of plant regulator. 7. Students will know about the genetic organization of an organism and its expression, replication of genetic materials. 8. Provide knowledge about various biomolecules and enzymes in cellular metabolism. 9. Gain knowledge about various carbohydrates,

		protein, lipids, amino acids, nucleic acids and vitamins and their use in cellular metabolism.
	BOT-303(P) Practical	1. Practical knowledge on how to measure the abundance, frequency of a species, population or community using quadrate method. 2. Know the various physiological processes of plants through practical. 3. Separation of plant pigments through chromatography. 4. Extraction and estimation of sugar, protein, chlorophyll and other phytochemical contents. 5. Know about biological, DNA and Protein Database of the world
	SEMESTER-IV	
	BOT-404 Cytogenetics, Biotechnology and Biometrics	1. Knowledge on accounts of organization and function of cell and its components. 2. Understand on significance of mitosis and meiosis in cell division. 3. Understand the law of segregation and independent assortment and different cross. 4. Understand the structure of Gene, linkage and crossing over. 5. Gain knowledge on the principle and methods on plant breeding. 6. Understand the basic aspect of plant tissue culture and application of plant biotechnology. 7. Understand the use of statistical tools and various biometric processes in biological data analysis.
	BOT-404(P)	1. Practical knowledge of studying cell structure and also understands the distribution of plant pigment. 2. Practically learn the various stages of mitosis and meiosis. 3. Learn how to prepare culture media, tools and

		techniques of micro propagation including aseptic culture. 4. Practical idea on how to work out the biological data analysis using various statistical tools
SEMESTER-V(HONOURS)		
	BOT-505 Microbial Diversity, Plant Pathology and Embryology	1. Students will gain knowledge of the microbial world along with its diversity, nutrition, types and their occurrence. 2. Understand the application of microbes in sustainable agriculture and environment free of pollutants. 3. Knowledge on the significance of microbes for pollution management especially that of water, air and soil. 4. Students on the completion of this paper will gain a clear view of the plant disease causing pathogens and their life cycle. 5. Students will know the symptoms of various plants diseases and their by undertake different control measures to protect plants or crops from disaster. 6. Knowledge on the different disease management and usage of various control agent's against various pathogens. 7. Gain knowledge on the origin and economic importance of bryophytes and pteridophytes.
	BOT-506 Advance plant Taxonomy, Plant Anatomy, Embryology and Palynology.	1. Gain knowledge on the concept of primitive seed plants and palaeobotany. 2. Understand the different system of taxonomic classification of plants proposed by different renowned taxonomist and the system of classification followed in the present. 3. Understand the modern trend in plant taxonomy 4. Knowledge on the affinities, phylogeny,

		economic importance and comparative studies of different plant families both monocotyledons and dicotyledons. 5. Know the origin and evolution of crop plants with special reference to process of cultivation and utilization of products. 6. Knowledge on medicinal plants and pharmacognosy, preparation of crude drug and possibility of modification of drugs. 7. Understand the importance of ethnobotany in genepool and germplasm. 8. Understand the Anatomy of Angiosperm. 9. Understand the process of development of micro and mega spores and its involvement in the process of plant development. 10. Knowledge on the process of embryo development and pollen production. 11. Understand the role of pollen in taxonomy.
	BOT-507(P)	1. Practical knowledge on the different methods of isolation of microbes and its culture using different culture media. 2. Develop understanding on the maintenance of aspectic condition for growth and maintenance of microbes. 3. Understand the methods of microbial cell count and its staining using gram stain for its differentiation. 4. Practical knowledge on the theory studied in regarding various plant pathogens and their symptoms in different plants. 5. Field study knowledge on collection and identification of various plant pathogens in different plants. 6. Understand in details with practical knowledge of the

		morphology of different angiosperm families. 7. Embryological understandings of the different types of ovules, anthers and hands on training of the different techniques to study the pollen grains and further differentiate among them. 8. Field study knowledge on collection and identification of various plant that are used as a source of carbohydrate, protein, wood, oil-seed ,spice and condiments
SEMESTER-VI(HONOURS)		
	BOT-608 Ecology, Plant Physiology and Molecular Biology	1. Gain knowledge on the vegetation and floristic region of India, natural and mineral resources. 2. Understand the structure of an ecosystem, functions and its various components. 3. Develop understanding on pollution, climate change, global warming and biodiversity. 4. Mineral nutrition, energy conservation through photosynthesis. 5. Provide knowledge on nitrogen metabolism with special reference to assimilation of nitrogen in amino acids and protein. 6. Role of plant growth regulators and their application in agriculture and horticulture. 7. Growth and other related physiological aspects such as photoperiodism and vernalization. 8. Understand the principle of stress physiology. 9. Students will gain knowledge about mutation which is responsible genetic variations among organisms and various diseases caused by genetic mutations. 10. Provide knowledge about various biomolecules and enzymes in cellular metabolism. 11. Gain knowledge about various carbohydrates and their use in cellular metabolism.

	BOT-609 Cell Biology, Genetics, Plant Breeding, Biotechnology and Computer Application	1. Understand the structure and function of cell wall, plasma membrane, cell organelles. 2. Gain a clear view of the mechanism of heredity and transfer of genetic material. 3. Knowledge on the basic processes of plant breeding and crop development using different breeding techniques 4. It provides knowledge about plant tissue culture and transgenic production. 5. Increase student's knowledge about biological databases. 6. This paper will provide knowledge about molecular phylogeny and drug development process to the students. 7. This paper will introduce students with basic computer technologies. 8. It enlightens students with the knowledge of development of new molecular biological techniques and their use for human benefit
	BOT-610(P)	1. Practical knowledge on how to measure the abundance, frequency of a species, population or community using quadrate method. 2. Knowledge on the biological oxygen content of polluted and non-polluted water; thereby understand the demand of oxygen in a particular ecosystem for the organisms present. 3. Know the various physiological processes of plants through practical 4. Extraction and estimation of sugar, protein, chlorophyll and other phytochemical contents. 5. Practical knowledge on the chromosomal study of organisms using karyotyping. 6. Understand the numerical and structural changes

		occurring in plants by various chromosomal aberrations. 7. Gain knowledge on the interactions of gene controlling different quantitative traits. 8. Practical idea on how to work out the biological data analysis using various statistical tools. 9. Learn how to prepare culture media, tools and techniques of micro propagation including aseptic culture. 10. Modern biotechnological and genetic engineering tools and techniques, their application and limitations.