COURSE OUTCOMES

DEPARTMENT OF BOTANY

I B.Sc. Botany

SEMESTER: I

Subject Name: Cell Biology and Plant Anatomy **Subject Code: U2BYC1**

In this course the students will

CO1:	Study the internal structure and organization of the various parts of the plants – stem, root and leaves.
CO2:	Understand the structures and purposes of basic components of prokaryotic and eukaryotic cells

Subject Name: Lab: Cell Biology and Plant Anatomy **Subject Code: U1BYC1P**

In this course the students will

CO1:	Gain knowledge on the ultrastructure of the cell organells and their functions.
CO2:	Develop skills in sectioning, observation and identification of cell and tissue types
CO3:	Observe the position and nature of chromosome during cell division.

Subject Name: Horticulture **Subject Code: U2BYS11**

In this course the students will

CO1:	Impart the knowledge on skill various techniques in horticulture and they develop various types of nursery gardening.
CO2:	Promote the Horticulture in food and ornamental plant production

Subject Name: Embryology of Angiosperms **Subject Code: U2BYS12**

In this course the students will

CO1:	Impart knowledge about plant reproductive organs and its development
CO2:	Get insight in to the fruit and seed development.

Subject Name: **General Chemistry-I**

Subject Code: **U2CHA1Y**

In this course the students will

CO1:	Knowing the basics of colloids.
CO2:	Studying the fundamental ideas about organic chemistry.
CO3:	Acquiring a knowledge about petrochemical products and polymers.

SEMESTER: II

Subject Name: Algae and Bryophytes **Subject Code: U1BYC2**

In this course the students will

CO1:	Understanding the salient features, life cycle pattern of selected Algae and Bryophytes and their economic importance
CO2:	Identify the promising characteristics of plants.

Subject Name: Lab: Algae and Bryophytes **Subject Code: U1BYC2P1**

In this course the students will

CO1:	Gains knowledge on various groups of Algae and Bryophytes.
CO2:	Develop skills in microtechniques to study the internal morphology.
CO3:	Acquires knowledge how environments support the growth and distribution of algae and bryophytes through field trips.

Subject Name: Plant Ecology and Phytogeography **Subject Code: U2BYS21**

In this course the students will

CO1:	Provide students with an understanding of the basics of plant –environment.
CO2:	Know the plant-plant/plant-microbe/plant –animal interactions and their influences plant abundance and diversity

Subject Name: Medicinal Botany **Subject Code: U2BYS22**

In this course the students will

CO1:	Explore the uses of medicinal uses of plants as medicine ranging from traditional to modern pharmaceuticals, also learn the home made herbal drug preparation.
CO2:	Identify the plants to be conserved/cultivated *in-situ* at the different agro-climatic regions of the State and those to be cultivated /conserved in the fields *(Ex-situ)*

Subject Name: **General Chemistry –II**

Subject Code: **U3CHA2Y**

In this course the students will

CO1:	Learning the basics of chemical calculation.
CO2:	Gaining adequate knowledge about dyes.
CO3:	Studying the separation of chemical by chromatography techniques.
CO4:	Knowing the structure of protein and function of hormones.

Subject Name: **Volumetric Analysis**

Subject Code: **U2CHA2PX1**

In this course the students will

CO1:	Studying the applications of volumetric analysis.

SEMESTER: III

Subject Name: Fungi, Lichens and Plant Pathology **Subject Code: U2BYC3**

In this course the students will

CO1:	Discuss the ecological role and economic importance of fungi.
CO2:	Study the unique characteristics of a lichen and the role of each partner in the symbiotic relationship of a lichen
CO3:	Study of diseases of plants, their development and control

Subject Name: Lab: Fungi, Lichens and Plant Pathology **Subject Code: U2BYC3P**

In this course the students will

CO1:	Provides a broad view of various groups of organism.
CO2:	Gain knowledge about fungal ecology, diversity and its significance.
CO3:	Provides student with the basics of lichen biology and ecology.
CO4:	Helps the students to understand the principles of host-pathogen interaction and the defense mechanisms of plants against plant pathogens.

Subject Name: **General Chemistry-III**

Subject Code: U2CHA3Y

In this course the students will

CO1:	Gain the basic knowledge of photochemistry and nuclear chemistry.
CO2:	Understand the concept data analysis.
CO3:	Acquire basic knowledge in water quality parameters.
CO4:	Study the versatility of insecticides.

SEMESTER: IV

Subject Name: Pteridophytes and Gymnosperms **Subject Code: U1BYC41**

In this course the students will

CO1:	Understand the general characters, reproduction and economic importance of pteridophytes.
CO2:	Impart the Knowledge in characters, reproduction of Gymnosperms

Subject Name: Pteridophytes and Gymnosperms **Subject Code: U2BYC4P**

In this course the students will

CO1:	Gain knowledge on the various groups of Pteridophytes and Gymnosperms.
CO2:	Understand the phylogenetic relationships among Pteridophytes and Gymnosperms.
CO3:	Observe the distribution of sori on the sporophylls of ferns.

Subject Name: **General Chemistry-IV**

Subject Code: U2CHA4Y

In this course the students will

CO1:	Study the mode of action of drugs.
CO2:	Learn some chemicals in day- to- day life utility.
CO3:	Acquire basic idea about the alkaloids and Terpenoids.
CO4:	Gain knowledge about the soil chemistry.
CO5:	Study the role of catalyst in chemical reactions.

Subject Name: **LAB: Organic Analysis**

Subject Code: U2CHA4YP

In this course the students will

CO1:	Gain the fundamental knowledge about organic analysis.

SEMESTER: V

Subject Name: Biochemistry **Subject Code: U2BYC51**

In this course the students will

CO1:	Provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.
CO2:	Develop students understanding of three areas of widely used and advanced scientific methods – spectroscopic tools, molecular imaging and applications.

Subject Name: Genetics and Plant Breeding **Subject Code: U2BYC52**

In this course the students will

CO1:	Know and describe variations from Mendel's Principles and to solve genetics problems that involve monohybrid and dihybrid crosses
CO2:	Improve the characteristics of plant so that they become more desirable agronomically and economically.

Subject Name: Taxonomy of Angiosperms **Subject Code: U2BYC53**

In this course the students will

CO1:	Identify all the kinds of plants on earth with their names, distinctions, distribution, habit, characteristics and affinities
CO2:	Arrange the kinds of plants into a scheme of classification or an orderly arrangement.

Subject Name :Lab:Biochemistry, Genetics and Plant Breeding & Taxonomy of Angiosperms

Subject Code: U2BYC5P

In this course the students will

CO1:	Students acquire knowledge about basic principles of instruments like pH meter, colorimeter, TLC, etc.
CO2:	Students will learn and demonstrate the techniques of chromatography, estimation of various biomolecules from plant tissues.
CO3:	Students will be able to acquire knowledge of Monohybrid, Dihybrid cross and test cross ratios.
CO4:	Students will acquire knowledge on the polygenic inheritance in plants and learn the techniques of hybridization.
CO5:	Students will acquire knowledge on morphology of Angiosperms and importance of herbarium.

Subject Name: Plant Utility and Exploitation (NME) **Subject Code: U1BYSL1**

In this course the students will

CO1:	Enhancing the utility of crop plants to mankind and to increase in economic worth of the plants
CO2:	Gain the Knowledge about ethno botany and the preparation of crude drugs

Subject Name:SLS: Food science and Nutrition **Subject Code: U2BYN51**

In this course the students will

CO1:	Gain knowledge on the nutritive values of different types of food.
CO2:	Learn the techniques of preservation of food.
CO3:	Understand the ICDS programmes for women and children.

SEMESTER: VI

Subject Name: Plant Physiology **Subject Code: U2BYC61**

In this course the students will

CO1:	Understand basic principles of plant physiological form and functions as well as processes and its importance in crop production.
CO2:	Build up the knowledge of the students in pertinent plant physiological processes such as photosynthesis, respiration, transport, growth, flowering, growth substances and the physiological aspects of crop yield

Subject Name: Biotechnology and Bioinformatics **Subject Code: U2BYC62**

In this course the students will

CO1:	Know about the DNA and RNA functions.
CO2:	Understand the Knowledge in DNA and Protein databases

Subject Name: Microbiology **Subject Code: U2BYC63**

In this course the students will

CO1:	Impart Knowledge on culture techniques of Microorganisms, Morphology and Reproduction of Bacteria, Virus and, Fungi, and Diseases in Plants
CO2:	Provide students with the latest information in scientific microbiological methods and to provide advanced knowledge, understanding, and critical judgment appropriate in microbiology

Subject Name:Lab: Plant Physiology, Biotechnology and Bioinformatics &Microbiology

Subject Code: U2BYC63

In this course the students will

CO1:	Students acquire knowledge on the various metabolic pathways by which plants prepare their food .
CO2:	Students acquire knowledge and understand the physiological applications of phytohormones .
CO3:	Students acquire knowledge and demonstrate the applications of modern softwares in biotechnology.
CO4:	Develops basic skills necessary to work in the field of microbiology.
CO5:	Knows different types of culture media, sterilization methods and their applications.

Subject Name: Biodiversity and Conservation **Subject Code: U2BYS61**

In this course the students will

CO1:	Conserve the essential ecological diversity to preserve the continuity of food chains
CO2:	Ensure the sustainable utilization of life support systems on earth and it provides a vast knowledge of potential use to the scientific community.

VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
[Re-accredited with 'A' Grade by NAAC]
Virudhunagar – 626 001.

Subject Name: Mushroom Cultivation (NME) **Subject Code: U2BYN61**

In this course the students will

CO1:	Strengthen the promotion of mushroom cultivation by establishing a well-equipped laboratory and to provide the Unit with appropriately trained personnel for the promotion of mushroom production.
CO2:	Help create new employment opportunities for our students through mushroom cultivation.
CO3:	Empower rural communities with entrepreneurial skills through the production and sale of mushrooms.
CO4:	Create exploration on mushroom cultivation technology and developing small scale industries for nutritional and medicinal values of Human health

I M.Sc. Botany
SEMESTER: I

Subject Name: Taxonomy of Angiosperms **Subject Code: P3BYC11**

In this course the students will

CO1:	Identify, study the distribution and salient features of angiospermic plants.
CO2:	Understand the principles of plant taxonomy
CO3:	Understand the evolution of Angiosperm plants
CO4:	Develop a skill to identify the plants and recognize major plant families and their representative species using regional Floras.
CO5:	Know about the economic importance of families

Subject Name: Pteridophytes and Gymnosperms **Subject Code: P3BYC12**

In this course the students will

CO1:	Identify various species of Pteridophytes and Gymnosperms.
CO2:	Classify and understand their evolutionary relationships.
CO3:	Gain knowledge on their economic importance.

Subject Name: Cell Biology and Internal Morphology **Subject Code: P3BYC12**

In this course the students will

CO1:	Understand the cell organelles of prokaryotic and eukaryotic cells.
CO2:	Study the cell division and cell cycle
CO3:	Know the complexity of tissue organization and its functions
CO4:	Understand the anatomy of wood and its seasonal variations.

Subject Name: Lab: Pteridophytes and Gymnosperms & Taxonomy of Angiosperms:

Subject Code: P2BYC1P1

In this course the students will

CO1:	Impart knowledge on vegetative and floral characters, which enable them to acquire skill on identification of flowering plants.
CO2:	Provide hands on training to make use of punch cards keys and floras to identify the given plant.
CO3:	Offer knowledge on the tropical plant families and their phylogenetic relationships.

Subject Name: Lab: Cell Biology and Internal Morphology **Subject Code: P2BYC1P2**

In this course the students will

CO1:	Gain knowledge on the ultrastructure of the cell organells and their functions.
CO2:	Understand the various stages and concepts of cell division.
CO3:	Acquire the basic knowledge about internal tissues of higher plants through microtomy.

Subject Name: Pharmacognosy **Subject Code: P3BYE1**

In this course the students will

CO1:	Gain knowledge in various systems of medicine.
CO2:	Know the methods of cultivation, collection and processing of herbal drugs.
CO3:	Study about crude drugs of vegetables and mineral origin
CO4:	Understand the pharmacological action of plant drugs.

SEMESTER: II

Subject Name: Algae, Lichens and Bryophytes **Subject Code: P3BYC21**

In this course the students will

CO1:	To understand the diversity, distribution, classification.
CO2:	To identify Algae, Lichens and Bryophytes by microscopic studies.
CO3:	To compare the life cycle patterns of thallophytes.
CO4:	To study about their phylogeny and evolutionary relationship.
CO5:	To study about their ecological significance and economical importance.

Subject Name: Genetics and Molecular Biology **Subject Code: P3BYC22**

In this course the students will

CO1:	To understand the basic concepts of Mendelian genetics
CO2:	To understand the molecular basis of genetics (Replication, Transcription, Translation and Mutation)
CO3:	To understand the basic concepts of population genetics.

Subject Name: Environmental Biology **Subject Code: P2BYC23**

In this course the students will

CO1:	To understand the effect of various environmental factors
CO2:	To study the occurrence of succession among various plant communities
CO3:	To learn about the methods and techniques of environmental impact assessment
CO4:	To analyze and approach the social and environmental issues

Subject Name: Lab: Algae, Lichens, & Bryophytes **Subject Code: P3BYC2P1**

In this course the students will

CO1:	Gains knowledge on the various forms of microscopic fresh water and marine algae.
CO2:	Understands the distribution of seaweeds on the various zones of sea, and also distribution of lichens and bryophytes on higher altitudes through field trips.
CO3:	Develop skills in preparing algal herbarium.
CO4:	Learn morphological variations of bryophytes.

CO5:	Gain knowledge for preparing microsections and to proficiently draw plants sketches, to identify fossil specimen and slides.

Subject Name: Lab: Genetics, Molecular Biology and Environmental Biology

Subject Code: P3BYC2P2

In this course the students will

CO1:	Knows the basic principles in genetics.
CO2:	Gains knowledge about variation and heredity in living organisms.
CO3:	Understand the mechanism of inheritance, sex chromosome, sex determination, gene structure and function and molecular genetics.
CO4:	Gains knowledge to solve genetic problems.
CO5:	Understands the effect of changes in the environmental factors.
CO6:	Gains knowledge on the occurrence of plant succession.
CO7:	Learns the methods and techniques of environmental impact assessment.
CO8:	Able to analyse and approach the social issues.

Subject Name: NME: Mushroom Cultivation **Subject Code: P3BYN2**

In this course the students will

CO1:	Gain basic knowledge on mushrooms and various agricultural waste used as substrate for mushroom cultivation.
CO2:	Develop skills in preparing spawn, preparation of bed, manuring and harvesting of mushrooms.
CO3:	Enable the student to become an entrepreneur in mushroom cultivation.

II M.Sc. Botany
SEMESTER: III

Subject Name: Microbiology, Fungi and Plant Pathology **Subject Code: P2BYC31**

In this course the students will

CO1:	Know the contributions of microbiologists.
CO2:	Learn the structure, growth and culture of bacteria.
CO3:	Acquire knowledge on the classification of microbes.
CO4:	Know the characteristics of Viruses.
CO5:	Learn the morphology and reproduction of Fungi.
CO6:	Have a knowledge on the diseases caused by fungi, bacteria and viruses and the measures of its control.

Subject Name: Biotechnology **Subject Code: P2BYC32**

In this course the students will

CO1:	Enhance knowledge on the applications of modern biotechnology.
CO2:	Enrich knowledge about the industrial production with waste minimization and reduced energy consumption.

Subject Name: Bio-chemistry **Subject Code: P2BYC33**

In this course the students will

CO1:	Have a wide knowledge on the inter disciplinary programme that focuses on the chemistry of living systems.
CO2:	Analyse the chemical combinations and reactions in biological processes.

Subject Name: Lab: Microbiology, Fungi, Plant Pathology & Biotechnology
Subject Code: P2BYC3P1

In this course the students will

CO1:	Develop the practical skills in staining procedure and hanging drop method.
CO2:	Know the various fungal morphology of diseased plant parts.
CO3:	Understand the nature of pathogen, etiology and preventive measures of various plant diseases.
CO4:	Gains knowledge on vector, methods of gene transfer, cloning, restriction enzymes and applications of DNA technology.
CO5:	Acquire knowledge on instruments and biotechnological methods.
CO6:	Gains knowledge on biopatents, biosensor, biopesticides and transgenic plants.

Subject Name: Lab: Biochemistry **Subject Code: P2BYC3P1**

In this course the students will

CO1:	Provide an opportunity to learn and understand the biochemical principles, qualitative and quantitative assessment of various biomolecules.
CO2:	Offers a technical competence of students about the skillfull usage of equipments.
CO3:	Provide opportunity to gain skills like observation, recording experimental data, analyzing, logical reasoning and criticizing.
CO4:	Provide opportunity to enable them to become an independent researcher.

Subject Name: Biodiversity and Conservation **Subject Code: P1BYE3**

In this course the students will

CO1:	Characterize biological traits leading to RET and invasive population
CO2:	Prioritize ecosystem and landscape biodiversity conservation
CO3:	Develop habitat management strategies to maintained threatened populations or to assist populations to adapt.
CO4:	Understand landscape biodiversity conservation policies and the services they provide.

Subject Name: SLS: Forestry **Subject Code: P1BYSL1**

In this course the students will

CO1:	Gains knowledge on the various types of forests in India.
CO2:	Understands the role of forest in the ecological restoration and habitat ecology of flora and fauna.
CO3:	Learns the importance of social forestry, agroforestry and the importance of afforestation.
CO4:	Knows the values and economic importance of forest based products.

SEMESTER: IV

Subject Name: Plant Physiology **Subject Code: P2BYC41**

In this course the students will

CO1:	Understand the physiological functions of plants.
CO2:	Recognize the methods, plants use to sequester nutrients with reference to climate change
CO3:	Analyse the morphogenetic potential pertaining to the development of various organs in plants.
CO4:	Understand plant adaptations to different environments and their impacts on plant physiology.

Subject Name: Bioinformatics and Biostatistics **Subject Code: P2BYC42**

In this course the students will

CO1:	Provide expertise in study design, randomization procedures, data collection report regeneration, interim reviews and final analysis.
CO2:	Provide analyses and informatics support for all biological research projects using statistical and computing methodologies by softwares.
CO3:	Understand the applications of neural networks, probability and statistics to support and enhance molecular analysis.

Subject Name: Developmental Botany **Subject Code: P2BYC43**

In this course the students will

CO1:	Understand the structure and development of reproductive organs of the angiosperms.
CO2:	Analyze the morphogenetic potentials pertaining to development of various organs of plant system.

Subject Name: Lab: Plant Physiology **Subject Code: P2BYC4P1**

In this course the students will

CO1:	Provides knowledge on common methods and techniques used in physiological experiments.
CO2:	Enables the student to assimilate with critical insight and indepth analysis of main themes of plant physiology such as photosynthesis, plant metabolism, stress physiology, and hormonal regulation.

Subject Name: Lab: Bioinformatics and Biostatistics, Developmental Botany

Subject Code: P2BYC4P2

In this course the students will

CO1:	Aims to provide students with a practical and hands-on experience with common bioinformatics tools and databases. Students will be trained in the basic theory and application of programs used for database searching, protein and DNA sequence analysis,
CO2:	Intends to acquire students with terminologies and techniques in statistics and provide hands on training to calculate measures of central tendency and measures of dispersion, probability distribution, correlation, regression and hypothesis testing.
CO3:	Acquire the embryo and endosperm development and fertilization in higher plants.
CO4:	Learn the internal structure of fruit wall, seed coat and microsporangium.
CO5:	Gains the hands on training for preparation of paraffin wax method of serial sections.

Subject Name: ME: Project Work **Subject Code: P2BY4PV**

In this course the students will

CO1:	The project needs to be completed by working across the regular teaching hours and under the supervision of the faculty. The final evaluation of the Project work is based on submission of the dissertation, presentation of work and Viva-voice. Maintains a high level of scientific excellence in botanical research with specific emphasis on the role of plants in the structure and functioning of all communities and ecosystems.
CO2:	Develops problem-solving skills to carry out innovative research projects thereby enkindling them with the spirit of knowledge creation in all fields of Botany.
CO3:	Proficiency in the use of recent and advanced biological technologies.
CO4:	Develops appreciates and practice ethical principles in research in the field of biological science.
CO5:	Develops skill in practical work, experiments, handling laboratory equipment and to interpret correctly on biological materials and data.

M.Phil. Botany

Subject Name: Research Methodology **Subject Code: M1BYC11**

In this course the students will

CO1:	Gain familiarity with a research article writing phenomenon or to achieve new insights into it
CO2:	Portray accurately the characteristics of a particular individual, situation or a group
CO3:	Determine the Knowledge in principles, working mechanism and applications of Different instruments.

Subject Name: Plant Biotechnology **Subject Code: M1BYC12**

In this course the students will

CO1:	Give students new knowledge and widening of the knowledge acquired in other course by handling of classical and modern plant biotechnology processes, including breeding of healthy plants, plants with improved characteristics and plants for biomolecule production.
CO2:	Develop molecular strategies to support plant breeding programs, including molecular biodiversity analysis, quantitative genetics and molecular marker-trait associations.