DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Phycology & Microbiology Class: B.Sc. (Botany) 1st Sem.

Sl. No.	Course Object	Course Outcomes
01	Economic importance of Viruses with reference to vaccine production, research, medicine.	Describe the cultural use of micro-organisms in food production, medicines, research and medicines.
02	Origin, evolution and genetic diversity of microbial life (Virus, Bacteria and Algae)	Describe cellular, biochemical and physiological aspects of micro-organisms and recognize the similarities and differences between microbial groups (Bacteria, Algae, Virus)
03	To study & observe algae and bacteria. (Practical)	Microscopic study of vegetative and reproductive structure of *Nostoc, Chlamydomonus, Volvox etc.* Practically difference between Gram Positive & Gram Negative bacteria

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Bio-molecules & Cell Biology Class: B.Sc. (Botany) 1st Sem.

Sl. No.	Course Object	Course Outcomes
01	To understand the structure and purpose of basic components of prokaryotic and eukaryotic cells, especially macro molecules, membranes and organelles.	Describe cytological bio chemical, physiological and genetic aspects of the cell, including cellular process common to all cells, to all eukaryotic cells. Describe the function and structure of cells including the metabolic reaction that occur in cell. Outline the structure of the bio molecules found in all living organisms.
02	Students will understand how these cellular components.	
03	Student will understand the cellular components mitotic cell division.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Mycology & Phyto-Pathology Class: B.Sc. (Botany) 2nd Sem.

Sl. No.	Course Object	Course Outcomes
01	Origin, Evolution and genetic diversity of Fungi (Zygomicota, Ascomycota, Basidiomycota, Oomycota)	Able to study various types of Fungi and application of fungi in food industry, secondary metabolites, agriculture etc.
02	Role of Fungi in biotechnology, food industry (Fermentation, baking), agriculture etc.	
03	To study different i) Bacterial disease – Citrus canker and angular leaf spot of cotton. ii) Fungal disease – Early Blight Of Potato. iii) Viral disease – Tobacco Mosaic Virus	To know different types of bacterial, fungal and viral diseases.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Archegoniate Class: B.Sc. (Botany) 2nd Sem.

Sl. No.	Course Object	Course Outcomes
01	To study the general characteristics of bryophytes and evolute sporophytes and economic importance of bryophytes.	Describe general account of bryophytes. Evolute importance of archegoniate. Practically study of bryophytes, pteridophytes and gymnosperm.
02	To study heterospory, apospory, apogamy and iconomic importance of pteridophytes and general account of steler evolution.	
03	To study morphology, anatomy and reproduction of gymnosperm.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Anatomy of Angiosperm Class: B.Sc. (Botany) 3rd Sem.

Sl. No.	Course Object	Course Outcomes
01	Summaries the role of each cells structure in plant development.	Students who successfully complete this course will be able to draw diagram and explain the major structure within the root, shoot, leaves and flowers of representative monocot & dicot of angiosperm. Practically observe different type of root, stem, leaves of monocot and dicot plant.
02	Evolute the importance of various plant tissues in plant development.	
03	Structural and functional organization, the stage of plant growth and development.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Economic Botany Class: B.Sc. (Botany) 3rd Sem.

Sl. No.	Course Object	Course Outcomes
01	Study origin, distribution, botanical description, brief idea of cultivation and economic importance of pulses, medicinal plants.	Learn the importance of plant identification.
		Participate in plant identification using observation skill.
02	Study botanical description, processing and uses of beverages, sugar, tea and coffee.	Practically study and microchemical test of cereals, pulses, legumes etc.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Genetics Class: B.Sc. (Botany) 3rd Sem.

Sl. No.	Course Object	Course Outcomes
01	The basic principle of inheritance at the molecular, cellular and organism levels.	Apply quantitative problem-solving skill to genetics problems and issues. Describe the chromosome theory.
02	To test deepen their mastery of genetics by applying this knowledge varieties of problems – solving situation.	molecular genetics and quantitative and evolutionary genetics.
03	Describe the mechanism governing mendelian inheritance, gene interaction and gene expression.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Ecology Class: B.Sc. (Botany) 4th Sem.

Sl. No.	Course Object	Course Outcomes
01	Describe the structure and function of ecological system and explain how ecological systems work at different spatial and temporal scales.	The identify and describe the structural features of plants.
		Discuss the basic process of plant metabolism, growth and reproduction.
02	Identify factors that affect biological diversity and the functioning of ecological systems.	
		Describe the cultural uses of plant food, fiber, medicines etc.
03	Apply concepts and theories from biology to ecological examples.	
04	List abiotic and biotic factors that affect, the distribution and behavior of organisms.	Explain model population community level dynamics.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Systematic Class: B.Sc. (Botany) 4th Sem.

Sl. No.	Course Object	Course Outcomes
01	Plant identification, classification and nomenclature.	Identify various types of plants and their classification. To know about botanical garden, herbarium, flora and journals. To know about modern classification of taxonomy.
02	Taxonomical evidence from palynology, cytology and molecular data.	
03	Study about taxonomy hierarchy, botanical nomenclature and system of classification.	
04	Study about numerical taxonomy, cladistics and phylogeny of angiosperm.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Molecular Biology Class: B.Sc. (Botany) 4th Sem.

Sl. No.	Course Object	Course Outcomes
01	Study about the structure of DNA & RNA, replication, transcription & translation of DNA.	Practically know how to isolation of genetic DNA from *E. coli.* To know about preparation of difference types of cultural media.
02	To study about nucleic acid.	
03	To study about processing and modification of RNA	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Reproductive Biology Angiosperms Class: B.Sc. 5th Sem

Sl. No.	Course Objective	Course Outcome
01	Explain the process and types of pollination and fertilization in flowering plants;	Apply the knowledge gained to comprehend self-incompatibility in plants and apply methods to overcome it;
02	Describe embryo development and seed formation.	Able to explain the process of pollination, fertilization and self-incompatibility.
03	To describe flower as modified terminate shoot.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Physiology Class: B.Sc. 5th Sem

Sl. No.	Course Objective	Course Outcome
01	Discuss plant water relations, i.e. How plants acquire, utilize, and regulate the flow of water between plant and environment;	Demonstrate & understanding of the process of photosynthesis, glycolysis, citric acid cycle and electron transport.
02	Outline the mineral nutrients plants require, and how they are obtained, metabolized, transported and their role in plants;	Demonstrate an understanding of how water moves in plant at both molecular and organismal levels.
03	Explain how plant growth regulators regulate the growth and development in plants;	
04	Describe physiology of flowering, light responses and seed dormancy in plants.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Metabolism Class: B.Sc. 6th Sem

Sl. No.	Course Objective	Course Outcome
01	Describe the concepts of different types of metabolisms and their regulation in plants;	Apply the knowledge gained regarding physiological and biochemical details ofphotosynthesis and respiration, in how they are organized and regulated in plants.
02	Discuss bioenergetics in regulation of physico-chemical metabolisms in plants explain the process of signal transduction in plants.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Biotechnology Class: B.Sc. 6th Sem

Sl. No.	Course Objective	Course Outcome
01	Basic idea plant tissue culture (Composition of media, totipotency, organogenesis, explant).	Handle, store & identify cells in culture. Select and apply experimental procedure to the spectrum of fields making use of biotechnology. Describe how cell culture can be used for invitro studies and commercial application.
02	Understand different gene transfer techniques.	
03	Exploit the recombinant DNA technology for development of transgenic plants.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Biofertilizer Class: B.Sc. SEC-1

Sl. No.	Course Objective	Course Outcome
01	To study different types of fertilizers using biological organisms;	To know the process of isolation, mass multiplication etc.
02	Study various types of mycorrhizal association, taxonomy, occurrence and distribution.	Apply the knowledge gained in utilization of biofertilizers in organic farming.
03	Study on organic farming, process and application.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Mushroom Culture Class: B.Sc. SEC-2

Sl. No.	Course Objective	Course Outcome
01	Describe nutritional and medicinal values of edible mushrooms and their cultivation strategies;	Apply the knowledge gained in storage and food preparation.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Biostatistics Class: B.Sc. DSE-1

Sl. No.	Course Objective	Course Outcome
01	Biostatistics are the development and application of statistical methods to a wide range of topic in biology.	Recognize the definition of statistics, its subject and relation with the other science.
		Collect data relating to variable which will be examine and calculate descriptive statistics from these data.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Breeding Class: B.Sc. DSE-2

Sl. No.	Course Objective	Course Outcome
01	Get an overview of the hybridization technique;	Learn the importance of plant breeding.
02	Explain inbreeding depression and heterosis;	Able to know the method of crop improvement.
03	Understand the role of biotechnology in crop improvement;	Brief idea about inbreeding depression and heterocyst and its application.
04	Analyse statistical data and understand the nature of inheritance.	Role of mutation, biotechnology in crop improvement.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Industrial and environmental microbiology Class: B.Sc. DSE-3

Sl. No.	Course Objective	Course Outcome
01	Apply the basics of microbiology to build a foundation for studies in microbiology and use of microbes in industry to manufactures food or products in large quantities;	Brief idea about water pollution and role of microbes in sewage and domestic water treatment system.
02	Introduce microbial processes of environmental and geochemical significance;	To know micro-organisms for industrial application, methods of immobilization and its application.
03	Utilise microorganisms as tools in environmental remediation.	Explain mycorrhiza biological fixation and isolation of root modulating bacteria.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Analytical techniques in plant science Class: B.Sc. DSE-4

Sl. No.	Course Objective	Course Outcome
01	Describe various imaging related techniques;	Brief idea of the working principle of microscope & different types of microscopes (light, fluorescence, confocal microscope).
02	Give an overview of the principle of Spectrophotometry and its application in biological research;	To knowledge the use of radio isotopes, spectrophotometry and chromatography in biological research.
03	Characterize proteins and nucleic acids;	To separate nitrogenous bases by paper chromatography and sugars by thin layer chromatography.
04	Analyse statistical data and perform chi-square test for goodness of fit.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Biodiversity (Microbes, Algae, Fungi And Archegoniate) Class: B.Sc. GE-1

Sl. No.	Course Objective	Course Outcome
01	Describe general characteristics of viruses, bacteria, algae, fungi and archegoniate with special reference to their classification,	Describe cellular, biochemical and aspects of microorganisms and recognize the similarities and differences between microbial groups.
02	Morphology, reproduction and ecology; Explain their role in environment, human welfare and in industrial applications;	Draw light circle and economic importance of gymnosperm.
03	Apply this knowledge in understanding the evolutionary significance of these organisms.	Applied the medicinal and economical knowledge of algae, bryophyte and pteridophyte.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Ecology and Taxonomy Class: B.Sc. GE-2

Sl. No.	Course Objective	Course Outcome
01	Explain the concept of ecology and the influence of different environmental, climatic and physiographic and edaphic factors on plant life;	Learn ecosystem and characteristics.
02	Describe the importance of biodiversity and relevance of conservation;	Learn applied ecology.
03	Discuss the essentials of plant taxonomy, explain taxonomic hierarchy and explain the classification system of Bentham and Hooker; Engler and Prantl classification.	To know the basic concept of ecological factors.
04	Explain the concepts of numerical taxonomy and cladistics.	The brief idea about herbarium and its merit in taxonomy. Taxonomical evidences from palynology, cytology and phytochemistry and molecular data.
		Types of classification (artificial, natural and phylogenetic) – Bentham and Hooker classification and Engler and Prantl classification.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Economic Botany and Biotechnology Class: B.Sc. GE-3

Sl. No.	Course Objective	Course Outcome
01	Study origin, distribution, botanical description brief idea about cultivation and economic uses of pulses, cereals, and fibre yielding plant.	Learn the importance of plant identification.
02	Study botanical description, processing and uses beverages (tea & coffee).	Study the molecular techniques of PCR, blotting technique, DNA fingerprinting.
03	Basic idea about plant tissue culture, micropropagation, embryogenesis.	Brief knowledge about basic concept of biotechnology and its uses in biology.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Physiology and Plant Metabolism Class: B.Sc. GE-4

Sl. No.	Course Objective	Course Outcome
01	Define hormones and explain its general role as a signal transducer. List the well documented roles of each of the major hormone groups in plant development and responses to plant environment.	Demonstrate and understanding of the biochemical process of photosynthesis, glycolysis and electro transport.
02	Explain the mechanism by inorganic ions are absorbed by the root and transported throughout the plant.	Demonstrate and understanding of how water moves in plant at both molecular and organismal levels.
03	Identify the ionic forms in which essential macro elements are tropically available to the soil.	
04	Explain the system of photosynthesis respiration, nitrogen fixation which is used in plant growth.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Biodiversity (Microbes, Algae, Fungi And Archegoniate) Class: B.Sc. DSC-1

Sl. No.	Course Objective	Sl. No.	Course Outcome
01	Describe general characteristics of viruses, bacteria, algae, fungi and archegoniate with special reference to their classification,	**01**	Describe cellular, biochemical and aspects of microorganisms and recognize the similarities and differences between microbial groups.
02	Morphology, reproduction and ecology; Explain their role in environment, human welfare and in industrial applications;	**02**	Draw light circle and economic importance of gymnosperm.
03	Apply this knowledge in understanding the evolutionary significance of these organisms.	**03**	Applied the medicinal and economical knowledge of algae, bryophyte and pteridophyte.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Ecology and Taxonomy Class: B.Sc. DSC-2

Sl. No.	Course Objective	Sl. No.	Course Outcome
01	Explain the concept of ecology and the influence of different environmental, climatic and physiographic and edaphic factors on plant life;	**01**	Learn ecosystem and characteristics.
02	Describe the importance of biodiversity and relevance of conservation;	**02**	Learn applied ecology.
03	Discuss the essentials of plant taxonomy, explain taxonomic hierarchy and explain the classification system of Bentham and Hooker; Engler and Prantl classification.	**03**	To know the basic concept of ecological factors.
04	Explain the concepts of numerical taxonomy and cladistics.	**04**	The brief idea about herbarium and its merit in taxonomy. Taxonomical evidences from palynology, cytology and phytochemistry and molecular data.
		05	Types of classification (artificial, natural and phylogenetic) – Bentham and Hooker classification and Engler and Prantl classification.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Physiology and Plant Metabolism Class: B.Sc. DSC-4

Sl. No.	Course Objective	Sl. No.	Course Outcome
01	Define hormones and explain its general role as a signal transducer. List the well documented roles of each of the major hormone groups in plant development and responses to plant environment.	**01**	Demonstrate and understanding of the biochemical process of photosynthesis, glycolysis and electro transport.
02	Explain the mechanism by inorganic ions are absorbed by the root and transported throughout the plant.	**02**	Demonstrate and understanding of how water moves in plant at both molecular and organismal levels.
03	Identify the ionic forms in which essential macro elements are tropically available to the soil.		
04	Explain the system of photosynthesis respiration, nitrogen fixation which is used in plant growth.		

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Plant Anatomy and Embryology Class: B.Sc. DSC-3

Sl. No.	Course Objective	Course Outcome
01	Apply plant anatomical features for correct identification;	Students who successfully complete these courses will be able to draw diagram and explain the major structures within the root, shoot, leaves, flowers, seeds and seedlings of representative monocot and dicot angiosperm plants.
02	Apply the knowledge gained in taxonomical studies and evolutionary biology and ontogeny studies;	
03	Analyse and comprehend wood structure.	
04	Explain the developmental patterns of both vegetative and reproductive organs of plants;	
05	Apply knowledge about embryological characters in explaining plant reproductive biology.	

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Economic Botany and Biotechnology Class: B.Sc. DSC-5

Sl. No.	Course Objective	Sl. No.	Course Outcome
01	Study origin, distribution, botanical description brief idea about cultivation and economic uses of pulses, cereals, and fibre yielding plant.	**01**	Learn the importance of plant identification.
02	Study botanical description, processing and uses beverages (tea & coffee).	**02**	Study the molecular techniques of PCR, blotting technique, DNA fingerprinting.
03	Basic idea about plant tissue culture, micropropagation, embryogenesis.	**03**	Brief knowledge about basic concept of biotechnology and its uses in biology.

DEPARTMENT OF BOTANY

Course Objective & Outcomes

Subject: Genetics and Plant Breeding Class: B.Sc. DSC-6

Sl. No.	Course Objective	Sl. No.	Course Outcome
01	Basic idea about laws of inheritance, modified Mendelian ratios, multiple allelism, pleotropism.	**01**	Apply quantitative problem-solving skill to genetics problems and issues. Describe the chromosome theory.
02	Difference between cytoplasmic inheritance and chromosome theory of inheritance.	**02**	molecular genetics and quantitative and evolutionary genetics.
03	Get an overview of the hybridization technique;	**03**	Able to know the method of crop improvement.
04	Explain inbreeding depression and heterosis;	**04**	Role of mutation, biotechnology in crop improvement.