

# Department of Botany

## **Program: B. Sc. (Botany)**

### **Program outcomes**

1. After the completion of this course students have the option to go for higher studies i.e., M. Sc. and then do some research for the welfare of mankind.
2. This course also offers opportunities for serving in Indian Army, Indian Navy, Indian Air Force as officers.
3. Students after this course have the option to join Indian Civil Services as IAS, IFS etc.
4. Science graduates can go to serve in industries or may opt for establishing their own industrial unit.
5. After the completion of the B. Sc. (Bio) degree there are various other options available for the science students. Often, in some reputed universities or colleges in India and abroad the students are recruited directly after their completion of the course.
6. Apart from the research jobs, students can also work or get jobs in marketing, Business & Other technical fields.
7. Science graduates also recruited in the banking sector to work as customer service executives. Students can also find employment in non -governmental (private) sectors.

### **Program Specific Outcomes:**

1. After the completion of B. Sc. (Bio) students go for M. Sc.
2. Students after this course have the option to join Indian Civil Services as IAS, IFS etc.

### **Course outcomes of B. Sc. Botany**

Bachelor of Science (B. Sc.) offers theoretical as well as practical knowledge about different subject areas. These subject areas include Zoology, Chemistry, Botany and Seed technology (depending on the subjects a student opts). This program course is most beneficial for students who have a strong interest and background in science. The course is also beneficial for students who wish to pursue multi and inter-disciplinary science careers in future. Following are the various course outcomes:

## **B. Sc. I year Botany**

### **Paper-I: Bacteria, Viruses and Fungi**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the diversity among microorganisms.
2. Know the systematic, morphology and structure, Bacteria.
3. Their fine structure, nutrition, reproduction, classification and economic importance
4. Understand the Biodiversity of Fungi and know the Economic Importance of Fungi

### **Paper-II: Algae and Bryophytes**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the diversity among Algae.
2. Know the systematic, morphology and structure, of Algae.
3. Understand the life cycle pattern of Algae.
4. Understand the useful and harmful activities of Algae.
5. Understand the Biodiversity of Fungi
6. Know the Economic Importance of Fungi
7. Understand the morphological diversity of Bryophytes.
8. Understand the economic importance of the Bryophytes.

### **Paper III: Pteridophytes, Gymnosperms and Elementary Paleobotany**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the morphological diversity of Pteridophytes and Gymnosperms.
2. Understand the economic importance of the Pteridophytes and Gymnosperms.
3. Know the evolution of plants in elementary palaeobotany.
4. Know the vegetative characteristics of the plant.
5. Learn about the reproductive characteristics of the plant.
6. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.
7. Understand the various fossil genera representing different fossil groups.

## **B. Sc. II year Botany**

### **Paper I:**

#### **Angiosperms and Economic Botany**

##### **Outcomes**

On completion of the course, students are able to:

1. Know the scope and importance of the discipline.
2. Know the concept of methodology in taxonomy.
3. Learn about conservation of biodiversity, and angiosperms families viz. Papaveraceae, Cruciferae, Capparidaceae, Caryophyllaceae, Malvaceae, Rutaceae, Rosaceae, Leguminosae, Myrtaceae, Convolvulaceae, Solanaceae, Acanthaceae, Verbenaceae, Apocynaceae, Rubiaceae, Asclepiadaceae, Amaranthaceae, Lilliaceae and Musaceae
4. Discover botanical regions of India and vegetation in Balrampur, Uttar Pradesh
5. Understand the habit of the angiosperm plant body.
6. Know the vegetative characteristics of the plant
7. Learn about the reproductive characteristics of the plant.

#### **Anatomy, Embryology and Economic Botany**

##### **Outcomes**

In this section student understand the flowing important things

1. Basic idea of anatomical anomalies and ecological variations in the primary structure of stems, anomalous secondary growth.
2. Knowledge of the microsporangium, megasporangium, female gametophyte, male gametophyte, fertilization, endosperm, embryo, fertilization and seed formation; practical application of experimental embryology.
3. Understanding the distribution of mechanical tissues in plants.

### **Paper II: Ecology and Genetics**

##### **Outcomes**

On completion of the course, students are able to:

1. Know the scope of ecology environment and ecological factors and importance of the discipline.
2. Understand population and community, ecological succession, concept of climax.

3. Understand plant communities and ecological adaptations in plants.
4. Learn about conservation of biodiversity, energy flow through the ecosystem; cycling of carbon and nitrogen.
5. Understand pollution, Biological Oxygen Demand (BOD), and biological magnification and climate change.
6. Understand the cellular and subcellular structure, morphology of chromosomes, cell division, pre-Mendelian concept of heredity.
7. Learnt about the Mendelism, interaction of genes, linkage and crossing over, chromosomal aberration, polyploidy and mutations, sex-linked inheritance, determination of sex, cytoplasmic inheritance,
8. Understand the gene concept, muton, recon and cistron; chemistry of nucleus including chromosome.

### **Paper III: Physiology and Biochemistry of Plants**

#### **Outcomes**

1. Learn and understand about mineral nutrition in plants.
2. Understand the growth and developmental processes in plants.
3. Know about Photosynthesis and Respiration in plants.
4. Understand the process of translocation of solutes in plants
5. Know about the growth in plants and its importance.
6. Understand the properties of Monosaccharides, Oligosaccharides and Polysaccharides.
7. They will learn about the Significance of Carbohydrates.
8. Understand the Properties of saturated fatty acids, and unsaturated fatty acids.
9. Understand lipid metabolism in plants.
10. Understand the Beta Oxidation, Gluconeogenesis and its role in mobilization of fatty acids during germination.
11. They will learn about the Significance of lipids.
12. They will be able to understand Brief outline of biosynthesis of amino acid.
13. Understand the protein - structure and classification and protein biosynthesis in prokaryotes and eukaryotes.
14. They will learn about the nucleic acid metabolism.

## **B. Sc. III year Botany**

### **Paper I: Microbiology and Plant Pathology**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the history, scope of microbiology and types of microorganisms on earth.
3. learnt the methods of isolation and culturing of microorganisms; micrometry
4. Basic idea of nutrition of microorganisms: Chemoautotrophism, Photoautotrophism, Saprotrophism and Paratrophism.
5. Elementary idea of microbiology of soil, water and air.
6. Understand the application of microbiology in Dairying, Bakery, Brewing, and Medicine.
7. Learnt the general principle of plant pathology with special reference to symptoms of plant diseases; modes of infection, disease resistance; methods of control of plant disease.
8. Students are also aware and learn about the symptoms, Disease cycle and control of the following plant diseases: Linseed rust, Late blight of potato, tikka disease of groundnut, yellow vein mosaic, bacterial blight of rice, little leaf of brinjal, wilt of chick pea.

### **Paper II: Experimental Embryology, Morphogenesis and Elementary Biostatistics**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the *in-vitro* culture technique: general principle, nutritional and hormonal requirement of excise plant parts; sterilization; inoculation; maintenance of cultures, preparation of Murashige and Skoog medium for *In-vitro* culture.
2. Learn the elementary idea of control of fertilization and induced parthenocarpy.
3. Learn basic idea of application of experimental embryology with special reference to anther and embryo culture.
4. Learn general technique of protoplast culture, Somatic hybridization, cell culture for metabolite production.

5. Understand the characteristic features and measurement of plant growth and Elementary idea of morphogenetic phenomenon: polarity, correlation symmetry; differentiation, totipotency of plant cell.
6. Understand the photomorphogenesis, role of light as a morphogenetic factor.
7. Learn the application of Biostatistics in Biology.
8. Ability to calculate the, measures of central tendency-Mean, Median and Mode.
9. Learn also the measures of dispersal-Standard Deviation and Standard Error.

### **Paper III: Soil Science, Environmental Pollution and Conservation**

#### **Outcomes**

On completion of the course, students are able to:

1. Learnt about soil forming rocks and mineral
2. Understand Weathering of parent rocks, major process of soil formation and different types of soil degradation; soil conservation, reclamation of soil problems.
3. Understand the basic knowledge of earth environment, biosphere, atmosphere pollution CO<sub>2</sub> and ecosystem, ozone depletion, water pollution, BOD, eutrophication, pesticide pollution, radioactive pollution, problem of soil wastes, Monitoring and control of pollution, recycle of wastes and technological fix.
4. Understand about the bioethics and conservations: ecology vs. economy; natural resources; major Indian biomes, conservation of renewable resources, causes of extinction, endangered Indian flora; natural reserves and germplasm bank.

### **Paper IV: Molecular Genetics and Biotechnology**

#### **Outcomes**

On completion of the course, students are able to:

1. Understand the definition origin, history and scope of Molecular Genetics and Biotechnology
2. Learn the nucleic acids as genetic material, structure and replication of nucleic acids, different forms of DNA and RNA.
3. Understand the genetic code and its properties; initiation and termination codon.
4. Learn the gene expression; brief idea of mechanism of transcription and translation.
5. General idea of operon model, *Lac* operon in prokaryotes and chemical method of gene synthesis.

6. Understand the restriction enzymes; vectors viz. plasmid, cosmid and bacteriophage. Gene cloning; recombinant DNA technology

7. Student also learn about the application of Biotechnology with special reference to

(a) Synthesis of Hormone

(b) Monoclonal antibodies

(c) Solving dispute parentage (DNA-fingerprinting)

(d) Transgenic plants