

## Department of Botany

Course Outcome, Program Outcome and Program Specific Outcome, 2023-20024

### 4yr Honours + Research (NEP 2020)

#### Program Outcome

**Students taking admission to the program of B. Sc. are expected to get equipped to following:**

**PO1:** They gain the ability to explain the basic scientific principles and methods.

**PO2: 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.

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

**PO4. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

**PO5.** Grow ability to handle the unexpected situation by critically analyzing the problems.

**PO6. Problem Solving and Analytical Skills:** Developing the skill to understand and solve problems of relevance to society to meet the specified needs using the knowledge of statistical analysis, comprehensive skills and attitudes acquired from humanities/ sciences/mathematics/social sciences.

#### Program Specific Outcome

##### **B.Sc. Botany 4yr Honours + Research (NEP 2020)**

After completion of the 4 Years B.Sc Botany + Research (NEP 2020) program, a student will attain the following developments.

**PSO 1:** Understand the principles behind the identification, nomenclature, and classification of various plant groups according to their morphology, anatomy, etc.

**PSO 2:** Building capacity to understand how evolution has led to the origin of various plant groups with increased complexity in organization and metabolism.

**PSO 3:** Gaining knowledge about the various economic applications of plants and will develop newer ideas for diverse applications in this direction.

**PSO 4:** They will have in-depth ideas about the anatomy and embryology of plants and will attain practical skills in carrying out such analysis themselves.

**PSO 5:** Developing the clear concept about the evolutionary lineage of different plant groups through palaeobotanical study.

**PSO 6:** Awareness will be developed that how various plants have been used by humans for medicinal purposes and develop a keen interest in this direction.

**PSO 7:** Developing clear concepts about viruses and bacteria including their organization, behavior multiplication, and implication upon plant and animal health.

**PSO 8:** Understanding the principles behind life processes, biomolecules, and heredity.

**PSO 9:** Developing concepts about the physiology of plants.

**PSO 10:** Developing the knowledge of application of various statistical analytic techniques and will be able to collect, evaluate, and meaningfully interpret biological data.

**PSO 11:** They will develop ideas about plant geography and ecology and will be able to estimate biodiversity loss and develop conservation strategies.

**PSO 12:** Students will learn techniques of plant breeding, plant propagation, genetic engineering, etc, and apply them accordingly.

**PSO 13:** Students will become aware of various research methodologies currently practiced.

**PSO 14:** Developing the ideas about bioinformatics & instrumentation and their application in plant sciences in particular and biological sciences in general.

## **Course Outcome**

### **BOT-H-CC1-1-Th- PLANT DIVERSITY**

At the end of this course the students will develop the following concepts.

## **Introduction to plant kingdom**

**CO 1:** Have an idea of possible events that lead to the origin of cellular life forms in general and plant cells in particular.

**CO 2:** Understand the economic importance of plants as sources of food, fuel etc.

**CO 3:** Learn to appreciate the enormously important role played by plants in the conservation and maintenance of balance of our ecosystem.

## **Algae**

**CO 1:** General characters and Classification (Fritsch), ranges of vegetative and reproductive structure of different classes.

**CO 2:** Ideas about the economical uses of Algae in environment, agriculture, biotechnology and industry

## **Fungi**

**CO 1:** Have the idea of general characters and Classification (Ainsworth),.

**CO 2 :** Understand asexual and sexual Reproduction, economic importance of fungi with special reference to food, medicine and agriculture.

**CO 3 :** Understand the brief ideas of Mycorrhiza, Lichen and their importance in respect to Environment.

**CO 4:** Develop the knowledge of Life cycles of Saprolegnia (Mastigomycota), Mucor (Zygomycota), Neurospora (Ascomycota), Puccinia (Basidiomycota), and Penicillium (Deuteromycota).

## **Bryophytes**

**O 1:** Understand the economic importance of Bryophyta

**CO 2:** Know the classification, occurrence, structure & reproduction of Bryophyta,

**CO 3 :** Get the ideas about the environmental impact of Bryophytes.

## **Pteridophytes**

**CO 1:** Know the classification of pteridophytes

**CO 2:** Develop knowledge about the salient features of major Divisions of pteridophytes.

**CO 3:** Understand the economic importance of pteridophytes.

## **Gymnosperms**

**CO 1:** Know the classification of gymnosperms

**CO 2:** Develop knowledge about the salient features of major Divisions of gymnosperms.

**CO 3:** Understand the economic importance of gymnosperms

### **Angiosperms**

**CO 1:** Get the detail ideas about leaf, stem and root

**CO 2:** Develop knowledge about the different floral parts with their aestivation and placentation.

**CO 3:** Develop the basic ideas of fruits and seeds types with overall plant morphology

## **BOT-H-CC1-1-P- PLANT DIVERSITY**

At the end of this course the students will develop the following skills.

**CO1:** Dissect, study and draw the parts of different types of flowers.

**CO2:** Identify different types of ovules, fruits and inflorescences.

**CO3:** Identify different types of algae, fungi, bryophytes, pteridophytes and gymnosperms by observing their reproductive and structural features.

**CO4:** Gain first-hand experience of studying and photographing different types of inflorescence, flowers and fruits during field study.

## **BOT-H-SEC-1-TH MUSHROOM CULTIVATION TECHNOLOGY**

**CO 1:** have an idea about introduction, history of Mushroom cultivation, current overview of mushroom production in the world. nutritional and medicinal value of edible mushrooms; poisonous mushrooms, types of edible mushrooms available in India.

**CO2:** They will gain the ideas of infrastructure of mushroom farm, different instruments and methods of sterilizations.

**CO3.** Students will gain in-depth knowledge about the cultivation technology: infrastructure: substrates, composting technology, bed preparation, production and maintenance of pure culture.

**CO4:** They will gain the ideas of different kinds of Mushroom like Oyster, paddy-straw, milky mushroom, white button and special reference to medicinal mushroom.

**CO5:** Students will get the ideas about Mushroom diseases and management strategies, Post harvest technology and different food preparations.

**CO6:** Students will gain knowledge about food preparation: type of foods prepared from mushroom. Research centres- National level and regional level. Cost benefit ratio-marketing in India and abroad. Export value.

## **BOT-H-SEC-1-P MUSHROOM CULTIVATION TECHNOLOGY**

**CO 1:** Students will gain the practical ideas of Media preparation, sub culturing techniques, spawn production.

**CO 2:** Students will be able to develop the knowledge of cultivation techniques of Pleurotus and Calocybe.

**CO 3:** Students will gain the knowledge to identify the common mushrooms.

## **Semester-2**

### **DSE/Core (BOT-H-CC2-2-TH)**

#### **PLANT SYSTEMATICS (THEORY)**

**CO 1:** Understanding about the conception of biosystematics in detail including basic knowledge of taxonomy.

**CO 2:** Identifying different groups of plants. Understand the plant Morphology & basic Taxonomy like Rules of Nomenclature, Author citation, ICN Rules, publication rules.

**CO 3:** Understand the phylogeny of Angiosperms – a general account of the origin of Angiosperms.

**CO 4:** Understand the general range of variations in the group of Angiosperms.

**CO 5:** Learn the wide activities in Angiosperms & trends in classification.

**CO6:** Learn about the characters of important families of Dicot and monocot of Angiosperms.

**CO 7:** Know the floral variations in Angiospermic families, their phylogeny & Evolution. Understand various rules, principles & recommendations of plant nomenclature produces.

**CO 8:** Details ideas and supportive evidence from phytochemistry, cytology, Anatomy, palynology and molecular Biology

### **DSE/CORE (BOT-H-CC2-2-P)**

#### **PLANT SYSTEMATICS (PRACTICAL)**

**CO 1:** Students gain hands on training in plant work out, description, preparation of floral formula and floral diagram, identification up to genus with the help of suitable literature of wild plants and systematic position according to Bentham & Hooker's system of classification.

**CO 2:** Students get the opportunity and knowledge of field study in Botanical garden and Herbarium study. They gain the knowledge of floral documentation.

**CO 3:** Students will learn the procedures of writing Field Note Book with field notes on the plants of the area of excursion.

### **BOT-H-SEC-2 TH BIOFERTILIZER & BIOPESTICIDES**

**CO 1:** Students will learn the general account about the microbes used as biofertilizers- Rhizobium- isolation, identification, mass multiplication, carrier based inoculants, actinorrhizal symbiosis.

**CO 2:** will learn in details about Azospirillum: isolation and mass multiplication- carrier based inoculants, associative effect of different microorganisms.

**CO 3:** will learn in details about Azotobacter: classification, characteristics- crop response to Azotobacter inoculants, maintenance and mass multiplication.

**CO 4:** will learn in details about Cyanobacteria (Blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation. Factors affecting growth, blue green algae and *Azolla* in rice cultivation.

**CO 5:** Students will learn in details about Mycorrhizal association, types of mycorrhizal association, phosphorus nutrition, growth and yield- colonisation of VAM – isolation and inoculum production of VAM and its influence on growth and yield of crop plants.

**CO 6:** will learn about Plant Growth Promoting Rhizobacteria (PGPR) and their mode of action.

**CO 7:** Students will get the ideas about bio pesticides, their prospects and limitations. They will learn about Trichoderma, their isolation, mass production, quality control and field applications.

**CO 8:** Students will learn about Pseudomonas – their mode of action, utility in agriculture.

**CO 9:** Students get the opportunity to learn about bioinsecticides, Nematophagous fungi, they will learn about the bacteria as bio insecticides, and the viruses as bio insecticides – their characterization, mass production as also field application.

### **BOT-H-SEC-2 P BIOFERTILIZER & BIOPESTICIDES**

**CO 1:** Students will gain the practical knowledge about media preparation, isolation from the soil of Azotobacter, Trichoderma.

**CO 2:** will learn the process of isolation and identification of phosphate-solubilizing fungi.

**CO 3:** will develop the knowledge of evaluation of in vitro antagonistic activity of Trichoderma species in the dual culture system.