

DEPARTMENT OF BOTANY
VALUE ADDED COURSE

Semester	Course Code	Course Title	Hours
III	22UBOVAC1	ENTREPRENEURIAL SKILLS IN BOTANY	30

Course outcomes

At the end of the course students will be able to

- CO.1 Understand the azolla cultivation techniques.
- CO.2 Practice the organic farming methods.
- CO.3 Learn the bonsai nursery techniques for entrepreneurship development
- CO.4 Gain knowledge production of mushroom for commercialization
- CO.5 Apply the knowledge on medicinal plants and develop the herbal based products.

- Unit – I** **6 Hours**
Azolla cultivation – Selection of Species cultivation pit preparation, Inoculation , Multiplication and harvesting techniques.
- Unit – II** **6 Hours**
Organic farming – types, best practices for preparation of organic materials.
- Unit – III** **6 Hours**
Bonsai nursery – Selection of plants, Methods used in bonsai, Caring, potting, repotting and maintenance practices.
- Unit – IV** **6 Hours**
Mushroom cultivation: Edible mushroom spawn selection, spawn preparation, mushroom bed preparation, seeding and harvesting techniques.
- Unit – V** **6 Hours**
Domestic herbal products preparation – Activated charcoal, *Aloe vera*, papaya soap , Honey and neem soap preparation. Herbal face wash gel, herbal syrup and eucalyptus oil preparation.

Books for Reference

1. Farming Systems and Sustainable Agriculture, V.Praveen Rao ,R.Veeraraghavaiah,S. Hemalatha and B.Joseph <http://jnkvv.org/PDF/0504202013425134200822.pdf>
2. Motsara MR, Bhattacharyya P and Srivastava S, Biofertilizers, 1995, Fertilizer Development and Consultation Organization, Bhanot Corner, India.

Semester	Course Code	Course Title	Hours
V	22UBOVAC2	SOILLESS CULTIVATION OF PLANTS	30

Course outcomes

At the end of the course students will be able to

- CO.1 To appraise the soilless cultivation as emerging alternative practice
- CO.2 To classify the systems adapted for soilless cultivation
- CO.3 To characterize various inert media used in soilless cultivation
- CO.4 Analyse factors for successful formulation and maintainance of nutrient media.
- CO.5 Adapt soilless cultivation as solution for space constrains for growing population.

Unit I: Nutrient media

6 Hours

Nutrient media – pH, dissolved Oxygen, Total dissolved solids and Electrical conductivity – nutrient availability – effect of ascorbic acid as metabolite additive – Specific adsorption of phosphorous and zinc – physical properties of inter media.

Unit II: Hydroponic systems

6 Hours

Classification of hydroponic systems – **Solution culture:** NFT (Nutrient flow technique), DFT (Deep flow technique) and EFT (Ebb and flow technique) – **Solid media systems:** Hanging bag, Grow bag, Trench or trough and Pot techniques – **Aeroponics:** Root mist and fog feed techniques.

Unit III: Inert media

6 Hours

Basic characters of inert media – Types of inter media: Rockwool, Vermiculite, Hydroton clay balls, Oasis, Coco coir, Perlite, Grow stones, Sand, Polyurethane foam, Rice hulls, Floral foams and Water crystals. Cost and reusability of inert media

Unit IV: Introduction to soilless cultivation

6 Hours

Introduction – Historical facets and scope of soilless cultivation – Soilless production in agriculture – Recent scenarios – Introduction to leading industries – SquareRoots®, USA and Entwurf Hydroponics®, India. Components of hydroponics (nutrients and inert media)

Unit V: Skills for entrepreneurship

6 Hours

Formula for seed germination (viability, proper sowing method, appropriate potting mix, right temperature or season for germination, containers for seed germination, incubation in dark). Chemical property of nutrient media (tracking of EC and pH, sowing to harvest feeding guide) – Controlled Environment Agriculture (CEA) and its benefits. Harvesting, packing, storage and marketing of produce.

Reference Books:

1. Benton Jose Jr, J, 2014. Complete Guide for growing plants hydroponically. CRC press, Taylor and Francis Group, London.
2. Raviv, M., Leith, J.H., 2008. Soilless culture: Theory and practice. Elsevier publications.

Semester	Course Code	Course Title	Hours
III	22PBOVAC1	BIOETHICS AND BIOSAFETY FOR BOTANICAL RESEARCH	30

Course Outcomes

- CO.1 To gain awareness about ethical principles applied to the environment.
- CO.2 To get insights on the ethical principles in research and successful transfer of their scientific input in publications.
- CO.3 To follow and implement appropriate procedure in biosafety labs.
- CO.4 To acquire knowledge on ethical principles in health care related research
- CO.5 To applied the knowledge on the Good Laboratory Practices (GLP) and preventive measures from chemical hazardous.

Unit I:

6 Hours

Environmental Ethics: Importance of environmental ethics, Ethical Guidelines to Work with Earth, Ecofeminism, Feminizing Nature, Dualism, Degrees of Androcentrism, Ecolabelling and ecomarks

Unit II:

6 Hours

Research Ethics: Objectives in research ethics, Research misconducts, Responsible Conduct of Research in the Health Sciences, Authorship and Publication, Responsibilities of author, General Responsibilities of Authors, Originality; Good Record-keeping and Maintenance of Data,

Plagiarism: Types of plagiarism , Problems of self-plagiarism and duplicate publication, Types of duplicate publications, Impact factors, Scopus, Web of Science and UGC Care Journals.

UnitIII:

6 Hours

Biosafety – Introduction: Conventions and Protocol on Biosafety, Importance of Biosafety issues, Biological hazards Risk Type , Restriction of Access Biosafety Levels– 1-4, Biological Waste Regulations, Safety equipment personal and for laboratory.

Unit IV:

6 Hours

Biosafety and Health Care: Risk Group - classification of microorganisms, Essential biosafety equipment, Personal Protective Equipment (PPE) kit, Sterilization and Disinfection Procedures Solid and Liquid Bio-hazardous Waste, Treatment and Disposal, Protection of radiation exposure

Unit V:

6 Hours

Biosafety –Chemical Laboratories: General Laboratory Safety Procedures, maintenance of Equipment's, **Lab Safety:** Fire safety , First Aid Kits and Spill Kits. Laboratory Emergencies- Common Laboratory Injuries & Accidents, , Medical Consultation and Medical Examinations.

Training& Records–Good Laboratory Practices (GLP) and Training, General storage of chemicals, labelling. Employee Monitoring and chemical stock record Keeping and Chemical Waste disposal.

Books for Reference

1. Deshmukh P, 2020. Principles of Good Laboratory Practice. Adhyyan Books Pvt Ltd., NewDelhi, India.
2. Sathees MK, 2013, Bioethics and Biosafety. IK International Publishing House Pvt Ltd.,New Delhi India.