

F.Y.B.Sc. Botany



**MAHARASHTRA EDUCATION SOCIETY
ABASHEB GARWARE COLLEGE
(NEP - Autonomous)**

(AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY)

**Three Year B.Sc. Degree Program in Botany
(Faculty of Science and Technology)**

Syllabi under NEP - Autonomy F.Y.B.Sc. (Botany)

**Choice Based Credit System Syllabus
To be implemented from Academic Year 2023-2024**

Title of the Course: B.Sc. (Botany)**Preamble**

The syllabus includes basic as well as advanced concepts in the plant sciences from first year to the third year shall inspire the students for pursuing higher studies in Botany and for becoming an entrepreneur and also enable students to get employed in the Botany subject based industries.

Program Outcome

1. To ensure that students can get latest level of knowledge of plant science.
2. To make the students aware of the curriculum for a botany degree that consists of lecture-based courses, laboratory work and outdoor / field activities.
3. To provide the groundwork for prospective botanists to pursue a graduate level education or find an entry-level career.
4. To highlight the potential of studies in plant sciences to become a capitalist.

Eligibility: XII standard pass with Biology Structure of the Course: F.Y.B.Sc. (CBCS) BOTANY under NEP

Year	Semester	Course Type	Course Code	Course Title	Remark	Credit	No. of Lectures /Practical to be conducted
4.5	I	MAJOR	BOT-111-TH	Basics Of Plant Science	Theory	2	30
		MAJOR	BOT-112-PR	Practicals based on BOT-111-TH	Practical	2	12 P
	II	MAJOR	BOT-161-TH	Commercial Plant Science	Theory	2	30
		MAJOR	BOT153MJ	Practicals based on BOT-161- TH	Practical	2	12 P

F.Y.B.Sc. (NEP) BOTANY SYLLABUS (2024-2025) – Three subjects structure**BOT-111-TH BASICS OF PLANT SCIENCE****Credit: 02****SEMESTER-I****Lectures: 30****Chapter No. 1: Introduction to Plant Groups**

(4 Lectures)

General characters and uses of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, and Angiosperms.

Chapter No. 2: Ecological Plant Groups

(4 Lectures)

Ecological grouping of the plants about their significance of adaptive external and internal features:
a) Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes with examples.

Chapter No. 3: Botanical Plant Description

(4 Lectures)

Description of plant in botanical terms.

Chapter No. 4: Horticultural Practices:

(6 Lectures)

Importance and scope of horticulture, Types of pots and containers, Potting mixture and potting media (soil, sand, peat, Sphagnum moss, vermiculite), Soil types, Soil preparation, Irrigation methods, Hydroponics.

Propagation methods: Cuttings- Stem, Layering- Air layering, Budding: T- budding & Patch budding, Grafting- Approach grafting, Garden tools and implements - Pruning shears, secateurs, spade, trowel, garden rake, hand rake, sprinklers/sprayers, shovel, and lawn mower.

Chapter No. 5: Polyhouse Technology

(6 Lectures)

Introduction and components of polyhouse cultivation, polyhouse technology- its basics, planning, and types, environment control mechanisms in Greenhouse. Media, bed preparation and soil sterilization, Different Cladding Materials, nursery bed preparation and seedling raising, Mulching in protected cultivation, Irrigation and drainage in polyhouse. Nutrient Management in polyhouse, Integrated disease and insect pest management under polyhouse. Cultivation of exotic fruits, vegetables, and flowers under polyhouse.

Chapter No. 6: Basics of Plant Functioning

(6 Lectures)

photosynthesis, mineral nutrition, respiration, transportation, and plant development and growth. Osmosis, Plasmolysis, Diffusion, Water Absorption, Imbibition.

**BOT-112-PR Practical Paper based on BOT-111-TH
(SEMESTER-I)**

Credit: 02

Sr. No.	Title	No. of Practical
1.	Study of plant groups: Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, and Angiosperms.	02
2.	Study of ecological adaptations in Hydrophytes and Mesophytes.	01
3.	Study of ecological adaptations in Xerophytes and Halophytes.	01
4.	Description of flowering plant in Botanical terms.	02
5.	Study of horticultural practices- Stem cutting, Air Layering, Approach grafting, Budding: T-budding & patch budding.	02
6.	Study of Garden implements and their uses.	01
7.	Study of different types of pots & potting media, Potting, and repotting.	01
8.	Study of physiological processes in plants-Osmosis, Plasmolysis, Imbibition, Water absorption, and Diffusion.	02
9.	A visit to a Polyhouse.	--
Total Practicals		12

**F.Y.B.Sc. BOTANY SYLLABUS (2024-2025)
BOT-161 –TH COMMERCIAL PLANT SCIENCE**

Credit: 02

SEMESTER-II

Lectures: 30

Chapter No. 1 Fermentation Technology

(3 Lectures)

Introduction to Fermentation technology History, Scope, and Development of Fermentation technology, Production of alcohol, Wine; Organic acid – Citric acid

Chapter No. 2: Cosmeceuticals

(5 Lectures)

Process for development of cosmetics, different bases used in cosmetics, basic theory of cream, oils and Gels, raw materials used in cosmetics, Formulation of cosmetic products using herbs- Amla hair oil, Heena hair oil, Aloe vera Gel, Cucumber gel, Liquorice, Neem and Turmeric Cream, Importance of Quality control in cosmetic preparation and guidelines.

Chapter No. 3: Adulteration in Plant products

(6 Lectures)

Common Foods subjected to Adulteration - Adulteration – Definition – Types; Poisonous Substances, Foreign matter, cheap substitutes, Spoiled Parts. Adulteration through Food Additives – Intentional and incidental. General Impact on Human Health.

Common adulterated foods- Atta, Edible oils, Cereals, Condiments (whole and ground), Pulses, Coffee, Tea, Confectionary, Besan, Spices and Curry powder.

Chapter No. 4 Mushroom Cultivation Technology

(6 Lectures)

Cultivation of mushroom- types of raw material – preparation and sterilization; Mushroom bed preparation – maintenance of mushroom shed; harvesting method and preservation of mushrooms.

Cultivation of mushrooms – Oyster mushroom, Button mushroom.

Nutrient values of mushroom – protein, carbohydrate, fat, fibre, vitamins, and amino acids contents; Medicinal and economic value of mushroom.

Chapter No. 5 Biopesticides and Biofertilizers

(4 Lectures)

History and concept of Biopesticides, importance, scope, and potential of biopesticide. Definitions, concepts, and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales.

Introduction, Scope, and Importance of Biofertilizers, General account of the microbes used as Biofertilizers, Bacterial, Algal, and Fungal biofertilizers: VAM, *Nostoc*, *Rhizobium*, Microbial biopesticides- *Trichoderma*, *Bacillus thuringiensis*, Compost-FYM, and Green manure – *Glyricidia*, *Crotolaria*, *Leucaena*.

Biocompost making methods, types, and method of vermicomposting – field Application.

Chapter No. 6 Processing of Horticultural Crops

(6 Lectures)

Principles and methods of preservation by heat pasteurization, canning, bottling.

Methods of preparation of juices, squashes, syrups, cordials, fermented beverages, Jam, jelly, and marmalade.

Preservation by sugar and chemicals, candies, and crystallized fruits.

preservation with salt and vinegar, pickling, chutneys and sauces, tomato and mushrooms, and freezing preservation.

Spoilage in processed foods, quality control of processed products, Govt. policy on import and export of processed fruits. Food laws.

F.Y.B.Sc. BOTANY SYLLABUS (2024-2025)**BOT- 162-PR****Practical Paper based on BOT-161 –TH (SEMESTER-II)****Credit: 02**

Sr. No.	Title	No. of Practical
1.	Production & estimation of Citric acid.	02
2.	Production of Wine.	01
3.	Preparation of Cosmeceutical products: Amla hair oil, Heena hair oil, Aloe vera Gel, Cucumber gel, Neem, and Turmeric Cream.	02
4.	Detection of adulterations in Plant products.	01
5.	Cultivation & harvesting of Oyster and button Mushrooms.	02
6.	Study of Biopesticides- Bacterial & fungal, Biofertilizers –VAM, <i>Nostoc</i> , <i>Rhizobium</i> .	01
7.	Study of Compost-FYM, Green Manures- <i>Glyricidia</i> , <i>Crotolaria</i> , <i>Leucaena</i> and Vermicompost.	01
8.	Preparation of squash, syrups, cordials, jam, jelly, marmalade and sauce.	02
9.	Visit to a Mushroom cultivating Laboratory.	--
Total Practicals		12

OE- 101- BOT FLOWER ARRANGEMENTS SEM I (1 CREDIT THEORY)

1. Floral Designs – Introduction, definition, Significance Of Flowers, Flowers On Special Occasions, Types of Flower Arrangements for Occasions 3L
 Flowers And their Characteristics – Flowers of different seasons (such as spring, summer, autumn and winter), flowers for different occasions (like wedding, anniversary, funeral and sympathy), flowers and occasions, flowers for all seasons
2. Basic Elements of Art in Flower Arrangement – Line, form or shape, Texture, colour, general guidelines 3L
3. Basic Principles of Art in Flower Arrangement – Design principles such as Design, symmetry, focal point, proportion and scale, harmony, rhythm 3L
4. Conditioning cut flowers and foliage – picking and collecting flowers, conditioning methods, specific care of flowers and treatments before, during and after arrangements 3L
5. Basic Shapes of Flower Arrangements – Equilateral triangle, conical, fan like, circular, crescent, verticle, miniature, horizontal, Hogarth curve Arrangements 3L

OE- 101- BOT: FLOWER ARRANGEMENTS PRACTICALS SEM I (1 CREDIT)

1. Study of various materials used in flower arrangements. (1 practs)
2. Study of different types of flowers and other plant materials used in flower arrangements.
3. Study and observation of various flower arrangements. (1 practs)
4. Performing various flower arrangements such as veni, gajara, garland, bouquets etc. (2 practs)

OE-151- BOT: DOMESTIC MEDICOBOTANY SEM II

THEORY (1 CREDIT)

1. **Basic Principle** 5 L
 What is science of Ayurveda?
 Concept of household / local medication – Definition, knowledge of crude medicines
 Need for household / local medication
 Ayurvedic composition, Ayurvedic components
 Basic / raw preparation of medicines at home level
 Definition of terms – Health, ailment, History of Ayurvedic home remedies, Scope of Ayurvedic home remedies, concept of “Aajjibaicha Batwa”
 Definition of swasthya, Deha (Body), Prevention and maintenance of health through diet
 Dinacharya (Daily regime), Rutucharya (Seasonal conduct)
 Basic considerations for maintenance and management of household nutrition and medicines
 Basic requirements needed for preparation of crude medicines at household level like mortar and pastle, sahan, grater etc. (platform for making paste)
2. Various plants and their products used in kitchen and their medicinal Importance 10 L

- A) Plants used as Spices, oils, pulses, vegetables etc. and their medicinal uses and preparations (5 each)
- B) Kitchen garden and medicinal plants like tulsi, adulsa, mentha, durva etc. and their medicinal uses and preparations (5 each)
- C) Other important pharmaceutical aids which must be maintained in the house like honey, organic jaggary, baking soda, mineral salt, Arachis oil, Starch, Kaolin, Pectin, Olive oil, Bees wax, gum Acacia, Guar gum, Gelatin.etc.

OE-151-BOT : DOMESTIC MEDICOBOTANY PRACTICALS (1CREDIT) SEM II

1. Ayurvedic concept of preparation of household medicines such as lep (creamy preparation), kadha, kashay, churna, chatan etc. 2P
2. Propagation and nursery techniques, planting and after care, cultural practices of different medicinal plants in kitchen garden. 2P
3. Various Ayurvedic traditional preparations from plants, their produces and products 5P
4. Study of source / part used , preparation and identification, Therapeutic and pharmaceutical uses of plants as follows - 6P
 - a) Laxatives: Aloe, Castor oil, Ispaghula, Senna.
 - b) Cardiotonics – Arjuna.
 - c) Carminatives and GI regulators –Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.
 - d) Astringents – Catechu.
 - e) Vitamins – Amla, lemon.
 - f) Enzymes – Papaya
 - g) Fibres for surgical dressings - Cotton, Silkcotton

Study of following medicines with reference to above properties – Turmeric, cinnamon, liquorice, ambehalad, chandan, neem, tulsi, vekhand, bibba, sagargota, nirgudi, gavaticaha, hing, raktachandan, manjishtha, eucalyptus oil, clove oil, kadipatta, durva, bel, babhul, murudsheng, adulsa, pandhri jaswand, shepa etc.

SEC-101 BOT: LANDSCAPE DESIGNING (SEM I) (1T + 1P)

1. Landscape Design Theory

Elements of landscape design

Basic design and rough planning-bubble diagram

Types of Gardens –History and Principles-formal,informal,kitchen,terrace, vertical-english, japanese, Mughal,

Hardscape and softscape

Irrigation- To equip Students with the fundamentals of residential and light commercial landscape irrigation system design course content

- Landscape Irrigation
- Types of Irrigation
- Landscape Irrigation design
- Irrigation Application and Maintenance
- Trouble shooting
- Assessment – Irrigation design and

Theory of lighting

2. Landscape Design Drawing Construction Practices

To equip Students with the skills and knowledge necessary to design specify and build a wall; to design and lay various types of paving; and construct or install a water feature. Each of these courses will include a practical

Concrete work and Bricklaying course content:

- Types of wall,fencing
- The structure of a wall,gates
- Material and Tools
- Footings, Foundations, Piers, Expansion Joints
- Building a wall

Paving/curbs/coping:

- Types and Design
- Preparation
- Laying
- Constructing
- Product Details

Water Features -

- Types of Water Features-pools, fountains, streams,etc
- Sealing and Finishing
- Proportionate Sizes and Specifications
- Pumps, Piping and Filtration Systems
- Using Correct Plant Material

Construction of pools, ponds, waterfalls, streams etc.

2. Botany

Plant classification

Plant Morphology-habit, inflorescence,flower,leaf with examples wrt LD

Plant Growth Cycle

Plant Nutrition

Herbarium techniques

Collection and identification of specimen-digital herbarium

Geographical distribution of plants

Photoperiodism

Indoor and outdoor plants

*Phytogeography-distribution/selection of plant based on climatic condition

* Study of Trees, Shrubs,herbs, lawn, Climbers and Ground covers

Cultivation of Roses, palms, cacti,succulents, ferns,

3. Gardening-Materials And Methods

Garden Calendar

Gardening Tools, equipments, machinery, and upkipping

Plants used in our Gardens-Nursery plants in Gardening

Fertilizers-compost, manures,organic, chemicals

Soil cultivation Technique-types of soils and plants growth

Potting,repotting, soil beds, garden soil mixtures

Manure, Vermiculture

Specialized Technique in Gardening-

Indoor and Basket Gardening

Bonsai, bottle garden, Pteriarium, Dish garden,

Hanging, Moss stick, Kitchen garden, Terrace Garden,

Vertical garden,

Green House Techniques and plants

Plant Training and pruning

Topiary

*preparation of lawn and maintenance .

*Commercial products used in Gardening-cocopeat,compost, vermicompost, chemical and organic fertilizers, pesticides, growth regulators

Water, light, organic litter management, and maintenance calender

4. Horticulture-Material And Methods

To equip Students with the Skills and Knowledge to Propagate Plants Course Content
Method of Regeneration –Natural and Artificial propagation-cutting, budding, Layering, Grafting

- Sexual Propagation
- Collecting and Harvesting
- Pre-germination Preparation
- Sowing in Containers
- Sowing In - Situ
- Vegetative Propagation
- Cuttings (Vegetative, Stem, Leaf and Root)
- Specialized Stems and Bulbs
- Tissue Culture
- Dividing
- Offshoots / Runners
- Layering
- Transplanting
- Grafting and Budding

5. Practical Training

- Site Visits-Gardens, construction sites, Nursery
- Market Survey-Materials
- Projects-site development, drawing
- Practicals - Botany, gardening practices, CAD, construction drawings.

6. Computer Courses Related To Landscaping

Computer aided design (CAD): To equip Students with the Skills and Knowledge necessary to produce course content :

- Presentation plan
- Hard Landscaping and paving plan
- Tree and planting Plan
- Sleeve Plan
- Irrigation Plan
- Lighting plan
- Final Costing
- Assessment – Produce a master and associated Plans on CAD

SEC-151-BOT: HOME & TERRACE GARDENING SEM II**(THEORY+ PRACTICALS) (2 CREDIT T + P)**

Topic
गार्डन्स प्रकार – औपचारिक/अनौपचारिक गार्डन्स, बगीचा, उद्यान, वाटीका परसबाग, मांडणी/रचना – Types of Gardens –Formal/Informal gardens, Home garden, layout/designs
What is a plant?; शोभिवंत झाडांचे वर्गीकरण Classification of garden plants
बागेसाठी माती – प्रकार, निवड, संपन्नता – Soil – types, selection, enrichment for garden
सेंद्रीय आणि रासायनिक खते – Manures & Fertilizers
सामान्य कीड, रोग आणि नियंत्रण – Common Pest, Diseases of garden & Control Measures
भाजीपाला लागवड भाग 1 – Vegetables – I – Introduction, Types of vegetables, Leaf and Fruit
भाजीपाला लागवड भाग 2 –Vegetables – II – Leaf and Fruit, Special crops
Practicals — Demonstration Garden Tools, equipment, Pots, preparation of beds, composting & vermiculture plant
वेळापत्रक आणि हंगामी कामे - Time schedules and Seasonal work अभिवृद्धी पद्धती (विशेष तंत्र, शाकीय आणि बिया पासून)– Propagation Methods (Vegetative means, Special techniques & seeds); जैविक खते - Vermiculture Demonstration
शोभिवंत झाडांची लागवड भाग - Floriculture – Indoor & Outdoor
गुलाब लागवड Floriculture – Roses
पुष्परचना – इकेबाना - Ikebana and floral arrangements
भेट - High-Tech Floriculture – Agriculture College, Pune
प्रात्यक्षिके – अभिवृद्धी – Demonstration and Practical : Grafting
फळबाग – Pomoculture
हिरवळ - Lawns, Hedges and Hanging plants; Book display
बोन्साय - Bonsai with Demonstration
बाटलीतील बगीचा- Bottle Garden with demonstration
Medicinal Plants; Cacti-Succulents
यक्षपुष्पे Orchids; Aesthetic Garden