SKILL ENHANCEMENT COURSES

SYLLABUS FOR THE

SUBJECT: BOTANY

for the award of the Degree in

BACHELOR OF ARTS/ BACHELOR OF SCIENCE/HONOURS

(Offered under 4-year UG Degree Programme)

(Credit Based Grading System)
under NEP 2020

Batch: 2025–29

GURU NANAK DEV UNIVERSITY AMRITSAR

SCHEME

SKILL ENHANCEMENT COURSES

BOTANY

SEC-I

Sr. No.	Course Code	Course Title	L	T	P	Total Credits	Max. Marks
1.		MEDICINAL BOTANY (THEORY)	2	0	0	2	50
2.		MEDICINAL BOTANY LAB (PRACTICAL)	0	0	1	1	25

SEC-II

Sr. No.	Course Code	Course Title	L	T	P	Total Credits	Max. Marks
1.		GARDENING TECHNIQUES (THEORY)	2	0	0	2	50
2.		GARDENING TECHNIQUES LAB (PRACTICAL)	0	0	1	1	25

SEC-III

Sr. No.	Course Code	Course Title	L	T	P	Total credits	Max. Marks
1.		GENERAL MICROBIOLOGY (THEORY)	2	0	0	2	50
2.		GENERAL MICROBIOLOGY LAB (PRACTICAL)	0	0	1	1	25

SKILL ENHANCEMENT COURSES
BOTANY
(SEC-I)
MEDICINAL BOTANY
(THEORY)

Time: 3 Hrs. **L-T-P**
Credits: 2-0-0
Max. Marks: 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. **History, Scope and Importance of Medicinal Plants:** Indigenous Medicinal Sciences; Definition and Scope; *Ayurveda*: History, origin, *panchamahabhutas*, *saptadhatu* and *tridosha* concepts, *Rasayana*, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: *Umoor-e- tabiya*, tumors treatments/ therapy, polyherbal formulations.

SECTION-B

2. **Conservation of endangered and endemic medicinal plants**: Definition; Endemic and Endangered medicinal plants, Red list criteria; *In situ* conservation: Biosphere reserves, sacred groves, National Parks; *Ex situ* conservation: Botanical Gardens, Gene Banks.

SECTION-C

3. **Propagation of Medicinal Plants**: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

SECTION-D

4. **Ethnobotany and Folk medicines:** Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany, folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, blood pressure and skin diseases.

Suggested Readings :
1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2. Dhaduk, H. L, 2016, Medicinal Plants: Cultivation and Uses. India: DAYA Publishing House.

SKILL ENHANCEMENT COURSES

BOTANY

(SEC-I)

MEDICINAL BOTANY LAB

(PRACTICAL)

Time: 2 Hrs. **L-T-P**

Credits : 0-0-1

Max. Marks :25

Suggested Laboratory Exercises

1. To visit the nurseries for the study of medicinal and aromatic plants.
2. To visit Botanical Garden and Herbal Garden for the identification of Medicinal Plants.
3. To study harvesting, drying, grading, storage, processing techniques for medicinal and aromatic plants.
4. Collection and Identification of locally used ethnobotanicals.
5. To extract essential oils from aromatic plants by hydrodistillation method.
6. To study major ethnomedicinal plants and practices followed in India.
7. Qualitative analysis of secondary metabolites from plant sample.

SKILL ENHANCEMENT COURSES
BOTANY
(SEC-II)
GARDENING TECHNIQUES
(THEORY)

Time: 3 Hrs. **L-T-P**
Credits : 2-0-0
Max. Marks: 50

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. **Nursery:** Definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.
2. **Seed:** Structure and types, Seed dormancy; causes and methods of breaking dormancy, Seed storage: Seed banks, factors affecting seed viability, genetic erosion, Seed production technology, seed testing and certification.

SECTION-B

3. **Vegetative propagation:** Air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings, Hardening of plants, green house, mist chamber, shed root, shade house and glass house.

SECTION-C

4. **Gardening:** Definition, objectives and scope, different types of gardening - landscape and home gardening, parks and its components, plant materials and design, computer applications in landscaping, Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

SECTION-D

5. **Sowing/raising of seeds and seedlings:** Transplanting of seedlings, Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots; Storage and marketing procedures.

Suggested Readings

1. Lancaster, S. P., Mukherjee, D. and Bose, T. K. (1984). *Gardening in India*. Oxford & IBH Publishing, New Delhi.
2. Sadhu, M. K. (1989). *Plant Propagation*. Wiley Eastern Limited, Bangalore, Madras.
3. Kumar, N. (2020). *Introduction to Horticulture*. OXFORD & IBH PUBL, India.
4. Bird, C. (2014).*The Fundamentals of Horticulture: Theory and Practice*. Cambridge University Press, United Kingdom.
5. Agrawal, P.K. (1993). *Hand Book of Seed Technology*. Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick, J. (1986). *Horticultural science*.W. H. Freeman, New York.

SKILL ENHANCEMENT COURSES

BOTANY

(SEC-II)

GARDENING TECHNIQUES LAB

(PRACTICAL)

Time: 2 Hrs. **L-T-P**

Credits : 0-0-1

Max. Marks :25

Suggested Laboratory Exercises

1. Visit to a vegetable garden to study its features and to know about various agronomic practices.
2. Preparation of land for crop cultivation and sowing of crop seeds.
3. Preparation of nursery beds for raising the healthy seedlings of different crops.
4. Visit to a local nursery and acquaintance with the nursery management practices.
5. Identification of seedling of different crops- leafy, legumes, root, bulb etc. in the nursery.
6. To study the irrigation practices in the cultivation of various crops.
7. To study the effect of water logging on various crop and method of drainage in protected agriculture.
8. Identification of various chemical fertilizer and organic manure used in nursery and gardening practices.
9. Calculation of optimum fertilizer dose (N, P, K) for various crops.
10. Identification of symptoms caused by nutrient deficiency in plants.
11. Identification of common weeds in vegetable gardening.

SKILL ENHANCEMENT COURSES
BOTANY
(SEC-III)
GENERAL MICROBIOLOGY
(THEORY)

Time: 3 Hrs. **L-T-P**
Credits : 2-0-0
Max. Marks: 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

Methods in Microbiology: Basic principles of microscopy, micrometry, staining, sterlization methods; culture media, pure culture methods. Classification of bacteria (Bergey's system), characteristics of each group, nutrition of bacteria, nature of virulence, toxins and extracellular enzymes of pathogenetic bacteria, conjugaton, transformation and transduction.

SECTION-B

Plant viruses: Nomenclature and classification, transmission of plant viruses with control measures, Viroids and origin of viruses, morphology and nature of virus particles, infection and replication with reference to TMV and bacteriophage, viral disease with special reference to encephalitis, hepatitis, AIDS, rabies, foot and mouth disease.

SECTION-C

Environmental Microbiology: Sewage (waste water) treatment, Ecological impact of raw sewage on receiving water, public health impact of raw sewage discharge. Primary, Secondary and tertiary waste water treatments. Total coliform bacteria analysis, fecal coliform bacteria analysis in drinking water. Bioremediation: Biodegradative organisms, advantages of bioremediations, problem associated with bioremediation, methodology of bioremediation. Aeromicrobiology.

SECTION-D

Industrial Microbiology: The Microbe: Primary and secondary metabolites, major industrial products: foods, flavouring agents and food supplement, vitamins and beverages; organic acids; enzymes and microbial transformation; inhibitors; genetically engineered microorganisms – Human insulin and human growth hormones and vaccines.

Books Recommended

1. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
2. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.
3. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.
4. Webster, J. (1980). Introduction to Fungi, 2nd Ed., Cambridge University Press, Cambridege, London.
5. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.

SKILL ENHANCEMENT COURSES

BOTANY

(SEC-III)

GENERAL MICROBIOLOGY LAB

(PRACTICAL)

Time: 2 Hrs. **L-T-P**

Credits : 0-0-1

Max. Marks: 25

Suggested Laboratory Exercises

1. To study different types of microscopes and their working (SEM, TEM etc.).
2. Preparation of temporary mount of *Lactobacillus* from curd.
3. Study of electromicrographs of different microorganisms.
4. Preparation of buffers and culture media.
5. Gram staining of bacteria.
6. Culture techniques: spreading, streaking and pouring.