SYLLABI AND SCHEME OF EXAMINATIONS FOR SKILL ENHANCEMENT COURSES FOR UNDER GRADUATE PROGRAM OFFERD BY DEPARTMENT OF BOTANY

Bachelor of Science (Life Sciences) Program

(Based on Curriculum and Credit Framework for UG Programs under NEP 2020)

WITH EFFECT FROM THE SESSION 2024-25

MAHARSHI DAYANAND UNIVERSITY ROHTAK (HARYANA)

SCHEME OF EXAMINATIONS FOR SKILL ENHANCEMENT COURSES FOR UNDER GRADUATE PROGRAM FOR B. Sc. (LIFE SCIENCE) OFFERED BY DEPT. OF BOTANY

Skill Enhancement Course (SEC)	Nomenclature of Course	Course Code	Credits Distribution			Total Credits	Workload			Total Workload	Marks				Total Marks
			L	T	P		L	T	P		Theory		Practical		
											Internal	External	Internal	External	
SEMESTER 1 (2024-25)															
SEC 1 @ 3 credits	Biofertilizres & Biopesticides	24BOT401SE01	2	0	1	3	2	0	2	4	15	35	5	20	75
SEMESTER II (2024-25)															
SEC 2 @ 3 credits	Florticulture	24BOT402SE01	2	0	1	3	2	0	2	4	15	35	5	20	75
SEMESTER III (2025-26)															
SEC 3 @ 3 credits	Plants Propagation & Nursery Techniques	25BOT403SE01	2	0	1	3	2	0	2	4	15	35	5	20	75
SEMESTER VI1 (2027-28)															
SEC 4 @ 4 credits (if offered as an option)	Mushroom Culture Technology	24BOT201SE01	2	0	2	4	2	0	4	6	15	35	15	35	100
SEMESTER VII1 (2027-28)															
SEC 5 @ 4 credits (if offered as an option)	Floriculture	24BOT202SE01	2	0	2	4	2	0	4	6	15	35	15	35	100

L: Lecture; T: Tutorial; P: Practical

SYLLABI FOR SKILL ENHANCEMENT COURSE
B. Sc. (LIFE SCIENCE) OFFERD BY DEPT. BOTANY

Semester –I (Session: 2024-25)

Name of Program	**Bachelor of Science (Life Sciences)**	**Program Code**	**UMLS4**
Paper No.	**Paper 3 (Theory)**	**Nomenclature**	**Biofertilizers and Biopesticides**
Name of the Course	**Skill Enhancement Course (SEC-1)**	**Course Code**	**24BOT401SE01**
Hours per Week	**02**	**Maximum Marks**	**50**
Credits	**02**	**Internal marks**	**15**
Time of Examinations	**03**	**External marks**	**35**

Note:
Examiner will set nine (09) questions and the candidates will be required to attempt five questions in all. Question number one (01) will be compulsory containing short answer type questions covering the entire syllabus from all units. Further, examiner will set two (02) questions from each unit and the candidates will be required to attempt one question from each Unit. All questions will carry equal marks.

Course Objectives:
To gain knowledge on eco-friendly fertilizers like *Rhizobium, Azospirilium, Azotobactor,* cyanobacteria and mycorrhizae, their identification, growth multiplication and practical application of organic farming and recycling of the organic waste. Knowledge of eco-friendly biopesticides.

Course Learning Outcomes (CLO):
CLO 1: Identify different microbes used as biofertilizers and biopesticides and also to understand the advantages and disadvantages of biofertilizers and biopesticides.
CLO 2: Acquire skills on isolation, culture of microbial agents, process of production and application of biofertilizers and biopesticides.
CLO 3: Evaluate the economic and environmental impacts of using biofertilizers and biopesticides.
CLO 4: Gain knowledge about the regulations on the production and use of biofertilizers and biopesticides.

Unit 1

Introduction to Biofertilizers : Biofertilizers: Definition, scope, status, and importance; Advantages and limitations of biofertilizers compared to chemical fertilizers, Types of biofertilizers (e.g. nitrogen-fixing, phosphate-solubilizing, plant growth promoting), Structure and characteristic features of bacterial (*Azospirillum, Azotobacter, Rhizobium*), actinomycetes (*Frankia*), cyanobacterial (*Anabaena, Nostoc, Hapalosiphon*) and fungal (AM and ectomycorrhiza) biofertilizers.

Unit 2

Production and applications of biofertilizers: Production of biofertilizers: Strain selection, sterilization, growth, equipment, fermentation (solid state and liquid), mass production of carrier based and liquid bio fertilizers, Factors affecting the production of biofertilizers (i.e., temperature, pH, aeration, carbon source); quality control of biofertilizers, Application methods and dosage of biofertilizers, Effect of biofertilizers on soil fertility, plant growth, and yield.

Unit 3

Commercialization and future prospects of biofertilizers: Biofertilizers -storage, shelf life, quality control and marketing; regulatory framework and certification for biofertilizers, Application technology for seeds, seedlings, tubers, sets etc.; factors influencing the efficacy of bio fertilizers, Economic feasibility and cost-benefit analysis of using biofertilizers, Future prospects and potential of biofertilizers in sustainable agriculture and environmental protection.

Unit 4

Biopesticides and applications: Biopesticides: Definition and classification; advantages and limitations of biopesticides compared to chemical pesticides. Modes of action and mechanisms of biopesticides, Characteristics and applications of microbial pesticides – bacteria, fungi and viruses, Characteristics and applications of botanical pesticides (plant extracts and essential oils) and biochemical (pheromones and repellents), Biocontrol agents (*Trichoderma* spp., *Pseudomonas* spp. and *Bacillus* spp) and their efficacy on seed borne and soil borne plant pathogens.

Semester –II (Session: 2024-25)

Name of Program	**Bachelor of Science (Life Sciences)**	**Program Code**	**UMLS4**
Paper No.	**Paper 2 (Theory)**	**Nomenclature**	**Floriculture**
Name of the Course	**Skill Enhancement Course (SEC 2)**	**Course Code**	**24BOT402SE01**
Hours per Week	**02**	**Maximum Marks**	**50**
Credits	**02**	**Internal marks**	**15**
Time of Examinations	**03**	**External marks**	**35**

Note:
Examiner will set nine (09) questions and the candidates will be required to attempt five questions in all. Question number one (01) will be compulsory containing short answer type questions covering the entire syllabus from all units. Further, examiner will set two (02) questions from each unit and the candidates will be required to attempt one question from each Unit. All questions will carry equal marks.

Course Objectives: To have knowledge of gardening and cultivation of ornamental plants and knowledge of landscaping, soil condition.

Course Learning Outcomes (CLO): After completing this course, the learner will be able to:

CLO 1: Students will be able to understand the importance and scope of floriculture, management of nursery and gardens, methods of plant propagation.
CLO 2: Students will develop a conceptual understanding of different types of ornamental plants.
CLO 3 : Students will gain knowledge about the various types of gardens and importance of landscaping.
CLO 4: Students will learn about commercial floriculture and cultivation of important cut flowers

Unit 1

Introduction: History of gardening; Importance and scope of floriculture and landscape gardening. Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.

Unit 2

Ornamental Plants: Flowering annuals (*Petunia, Chrysanthemum*); perennials (Rose, China Rose); Divine vines (Money plant, Monstera); Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit 3

Principles of Garden Design and landscaping ideas; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden.

Unit 4

Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Lilium, Orchids).