SYLLABI AND SCHEME OF EXAMINATIONS FOR MINOR COURSES FOR UNDER GRADUTE PROGRAM OFFERED 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 MINOR COURSES FOR B. Sc. (LIFE SCIENCE) OFFERED BY DEPT. OF BOTANY

Minor Courses (MIC)/ Minor (Vocational) Course MIC(VOC)	TYPE OF PROGRAM	Nomenclature of Course	Course Code	Credits Distribution			Total Credits	Workload			Total Workload	Marks				
	B.Sc. (Life Sciences) PROGRAM			L	T	P		L	T	P		Theory		Practical		Total Marks
	SEMESTER											Internal	External	Internal	External	
MIC 1 @ 4 credits	1	Fundamentals of Plant Ecology	24BOT401MI01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 2 @ 4 credits	3	Basics of Plant Genetics	24BOT403MI01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 3 @ 4 credits	4	Basics of Plants Cell Biology	25BOT404MI01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 4 (VOC) @ 4 credits	5	Horticulture	25BOTS405MV01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 5 (VOC) @ 4 credits	6	Agroforestry	26BOT406MV01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 6 (VOC) @ 4 credits	6	Plant resource Utilization & its Management	26BOT406MV01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 7 (VOC) @ 4 credits	7	Ethnobotany	24BOT201MV01	2	0	2	4	2	0	4	6	15	35	15	35	100
MIC 8 (VOC) @ 4 credits	8	Home Gardening	24BOT202MV01	2	0	2	4	2	0	4	6	15	35	15	35	100

L: Lecture; T: Tutorial; P: Practical

Note:

1. **The Syllabi and Scheme of Examinations (SOE) for Minor (Vocational) Courses for UG Semester 7 and Semester 8 will be same as applicable for Vocational Course in Post Graduate semester 1 and semester 2 respectively.**
2. **Course coding of Minor courses for Single Major Programs will be applicable for Multidisciplinary Programs/ Multidisciplinary Programs after 2nd semester irrespective of their offering in any semester.**
3. **The student who select any Minor Course (MIC) of any discipline in first semester should study the Minor courses (MIC) in the same discipline in the subsequent semesters. However, while exercising the option for choosing Minor Vocational Course MIC (VOC), the student may opt the discipline either related to the discipline of Minor Course or the discipline of Major Course or any other discipline as per his/her choice.**

SYLLABI FOR MINOR COURSES FOR
B. Sc. (LIFE SCIENCE) OFFERED BY DEPT. OF BOTANY

Semester –I (Session: 2024-25)

Name of Program	**Bachelor of Science (Life Sciences)**	**Program Code**	**UMLS4**
Paper No.	**Paper 2 (Theory)**	**Nomenclature**	**Fundamentals of Plant Ecology**
Name of the Course	**Minor Course (MIC-1)**	**Course Code**	**24BOT401MI01**
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 ecology and basic ecological concepts, inter-relation between the living world and environment and also to make students them aware about phytogeographical regions

Course Learning Outcomes (CLO):
On completion of the course, students will be able to:

CLO 1: Understand the complex interrelationship between organisms and environment

CLO 3 Evaluate community patterns and processes including ecosystem functions

CLO 4: Understand evolving strategies for sustainable natural resource management and biodiversity conservation.

CLO 4: Attain knowledge on principles of phytogeography and plant endemism, soil analysis and climate variables

Unit 1

Introduction to Ecology: Definition; scope and importance; levels of organization.
Environment: Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction

Unit 2

Adaptation: Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes).

Population ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.

Unit 3

Community ecology: Concepts; characteristics (qualitative and quantitative-analytical and synthetic); methods of analysis; ecological succession.

Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow)

Biogeochemical cycles: Carbon, nitrogen, phosphorus and hydrological cycle.

Unit 4

Phyto-geography: Phyto-geographical regions of India; vegetation types of India (forests).

Environmental pollution: Sources, types and control of air and water pollution.

Global change: Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading; Ozone layer depletion; Biomagnification

Semester –I (Session: 2024-25)

Name of Program	**Bachelor of Science (Life Sciences)**	**Program Code**	**UMLS4**
Paper No.	**Paper 2 (practical)**	**Nomenclature**	**Fundamentals of Plant Ecology**
Name of the Course	**Minor Course (MIC-1)**	**Course Code**	**24BOT401MI01**
Hours per Week	**04**	**Maximum Marks**	**50**
Credits	**02**	**Internal marks**	**15**
Time of Examinations	**03**	**External marks**	**35**
Note:			

Course Objectives:

To gain knowledge on ecology and basic ecological concepts, inter-relation between the living world and environment and also to make students them aware about phytogeographical regions

Course Learning Outcomes (CLO):

On completion of the course, students will be able to:

CLO 1: Understand the complex interrelationship between organisms and environment

CLO 3 Evaluate community patterns and processes including ecosystem functions

CLO 4: Understand evolving strategies for sustainable natural resource management and biodiversity conservation.

CLO 4: Attain knowledge on principles of phytogeography and plant endemism, soil analysis and climate variables

List of Practical:

1. Determination of pH of soil and water samples.
2. Study of physical properties of soil- soil density, water holding capacity, bulk density and electrical conductivity of different types of soils.
3. Study of community structure by quadrate / line transact method.

4. Determination of density, abundance and frequency of species by quadrate method.
5. Morphological and anatomical features of hydrophytes, xerophytes, halophytes and parasites in relation to their habitats.
6. To prepare a report on air, water and soil Pollution (any one) in your locality. Identify the source and types of pollutants and give control measures.
7. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency of soil samples by field testing kits.
8. Determination of soil organic matter rapid titration method.
9. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
10. Field visit to familiarize students with different biomes, ecosystems and vegetation.

Pattern of examination

1. Analysis of given soil and water samples. (pH, minerals, organic matter, dissolved oxygen) (4+4=8)

2. Determination of density, abundance and frequency of species by Quadrate/ Line transect method. (Data may be provided from lab at the time of practical) ((5)

3. Comment on the given ecological specimen (Hydrophte, Xerophyte, Halophyte/ Parasite). (6)

4. Project report on land/ air/ water pollution or biome, ecosystem and vegetation. (8)

5. Note book (4)

6. Viva-voce (4)

References/ Suggested Readings:

1. Odum, E.P. 1983: Basic Ecology, Saunders, Philadelphia.
2. Kormondy, E.J. 1996: Concepts of Ecology, Prantice-Hall of India Pvt. Ltd., New Delhi.
3. Mackenzie, A. et al. 1999: Instant Notes in Ecology, Viva Books Pvt. Ltd., New Delhi.
4. Sharma, P.D. 2015. Ecology and Environment. Meerut, India: Rastogi Publications. 12th edition.
5. Singh, J.S., Singh, S.P., Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. New Delhi, India: S. Chand.

Semester –III (Session: 2024-25)

Name of Program	Bachelor of Science (Life Sciences)	Program Code	UMLS4
Paper No.	Paper 2 (Theory)	Nomenclature	Basics of Plant Genetics
Name of the Course	Minor Course (MIC-1)	Course Code	24BOT403MI01
Hours per Week	04	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 provide knowledge about the study of chromosomes, genes and their inheritance.

Course Learning Outcomes (CLO):
On completion of the course, students will be able to:

CLO1. Students will gain and understanding of the Mendelian genetics.

CLO2. Students will acquire comprehensive knowledge about extra chromosomal inheritance and gene mapping.

CLO3. Students will acquire knowledge about chromosomal aberrations and sex determination in plants.

CLO4. Students will develop an understanding of types of mutations and role of transposons.

CLO5. Students will acquire the knowledge of population and evolutionary genetics.

UNIT-I

Mendelian genetics and its extension: Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; pedigree analysis; Incomplete dominance and co-dominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance.

UNIT-II

Extrachromosomal Inheritance: Chloroplast mutation: Variegation in Four-o'-clock plant; Mitochondrial mutations in yeast; Maternal effects-shell coiling in snail; Infective heredity-Kappa particles in Paramecium.

Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, Numericals based on gene mapping; Sex Linkage.

UNIT-III

Chromosomal aberrations: Structural and Numerical - deletions, duplications, translocations, Position effect, inversions, aneuploidy, polyploidy. Sex chromosomes and Sex determination in Plants.

Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: ClB method. Role of Transposons in mutation.

UNIT-III

Fine structure of gene: Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Population and Evolutionary Genetics: Allele frequencies, Genotype frequencies, Hardy- Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.

Semester –III (Session: 2024-25)

Name of Program	**Bachelor of Science (Life Sciences)**	**Program Code**	**UMLS4**
Paper No.	**Paper 2 (Practicals)**	**Nomenclature**	**Basics of Plant Genetics**
Name of the Course	**Minor Course (MIC-1)**	**Course Code**	**24BOT403MI01**
Hours per Week	**04**	**Maximum Marks**	**50**
Credits	**02**	**Internal marks**	**15**
Time of Examinations	**03**	**External marks**	**35**

Note:

Course Objectives: To provide knowledge about the study of chromosomes, genes and their inheritance.

Course Learning Outcomes (CLO):

On completion of the course, students will be able to:

CLO1. Students will gain and understanding of the Mendelian genetics.

CLO2. Students will acquire comprehensive knowledge about extra chromosomal inheritance and gene mapping.

CLO3. Students will acquire knowledge about chromosomal aberrations and sex determination in plants.

CLO4. Students will develop an understanding of types of mutations and role of transposons.

CLO5. Students will acquire the knowledge of population and evolutionary genetics.

List of Practical:

1. Meiosis through temporary squash preparation.
2. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square.
3. Chromosome mapping using point test cross data.
4. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
6. Blood Typing: ABO groups & Rh factor.
7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.

8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.
9. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe.

Pattern of Examination:

1. Numerical regarding Genetics (Polygenic inheritance / Gene mapping) as per syllabus. (8)

2. Identify and write brief note on given spots A, B and C (Permanent slide/Photograph) (6)

3. Preparation of Idiogram from a given karyotype photograph provided by examiner (3)

4. Identify and comment on spots related to genetic disorders (any 2) (4)

5. One numerical related to Hardy- Weinberg Law (2)

6. Project Report (4)

7. Practical records (4)

8. Viva-voce (4)

References/ Suggested readings:

1. Gupta, P.K. (2009). Genetics. Rastogi Publications, Meerut (India)
2. Snustad, D.P. and Simmons, M.J. (2010). Principls of Genetics. John Wiley & Sons Inc., India. 5th edition.
3. Klug, W.S., Cummings, M.R., pSpencer, C.A. (2009). Concepts of Genetics.
4. Benjamin Cummings, U.S.A. 9th edition.,
5. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A 10th edition.