DISCIPLINE SPECIFIC CORE COURSE – 11: Ecology and Conservation

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Ecology and Conservation **DSC – 11**	**4**	**2**	**0**	**2**	Class XII pass with Biology/ Biotechnology	**Nil**

Learning Objectives:

- To introduce the students with environmental factors affecting the plants, the basic principles of ecology and phytogeography.
- To make them understand community patterns and processes, and ecosystem functioning.

Learning Outcomes:

At the end of this course, students will be able to understand:

- the interrelationship between organisms and environment.
- methods to study vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography.
- evolving strategies for sustainable natural resource management and biodiversity conservation.

Unit 1: Introduction **01 hour**

Basic concepts, Interrelationships between the living world and the environment

Unit 2: Soil **05 hours**

Origin & Formation; physical, chemical and organic components; soil profile; forms of water in soil

Unit 3: Water **02 hours**

Importance; States of water in the environment; Atmospheric moisture; Water table

Unit 4: Abiotic interactions **03 hours**

Abiotic factors and plant adaptations, variations in light, temperature & wind conditions.

Unit 5: Biotic interactions **02 hours**

Definition; types of positive and negative biotic interactions

Unit 6: Population ecology **02 hours**

Characteristics of populations; population growth models and introduction to population regulation (density-dependent and independent); ecotypes; metapopulation (history, concept and applications to conservation)

Unit 7: Plant Communities **04 hours**

Community characters (General account of analytical and synthetic characters); Ecotone; Succession: processes, types (Lithosere, Hydrosere, Xerosere, Psammosere)

Unit 8: Ecosystems **04 hours**

Types, components, trophic organisation; food chain & food webs, ecological pyramids. models of energy flow; production and productivity; a brief outline of biogeochemical cycles (Carbon and Nitrogen)

Unit 9: Phytogeography **04 hours**

Principles; Continental drift; Theory of tolerance; Endemism; Phytogeographical division of India

Unit 10: Conservation **03 hours**

In-situ, ex-situ; gene banks, institutions - National & International; sacred groves, on-farm conservation.

Practicals **60 hours**

1. Principle and operation of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH and detection of carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from atleast two soil samples by rapid field tests.
3. Determination of pH & dissolved oxygen from polluted and unpolluted water samples.
4. Determination of soil organic carbon and organic matter of different soil samples by Walkley & Black rapid titration method.
5. Study of ecological adaptations of hydrophytes and xerophytes (four each).
6. Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobanche*), Epiphytes, Predation (Insectivorous plants).
7. Determination of minimal quadrat size and number for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
8. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law.

9. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.
10. Species distribution pattern based on A/F ratio (regular, random, clumped).
11. Field visit to familiarize students with ecology/conservation of different sites.

Suggested Readings:

1. Daubenmire, R.F. (1975). Plant and Environment.London: J. Wiley and Sons Inc.
2. Kormondy, E.J. (1996). Concepts of Ecology. New Delhi, India: PHI Learning Pvt. Ltd. 4th edition.
3. Odum, E.P. (2005). Fundamentals of Ecology. New Delhi, India: Cengage Learning India Pvt. Ltd., 5th edition.
4. Sharma, P.D. (2010). Ecology and Environment. Meerut, India: Rastogi Publications. 8th edition.
5. Singh, J.S., Singh, S.P., Gupta, S.R. (2014). Ecology, Environmental Science and Conservation. New Delhi, India: S. Chand.

Additional Resources:

1. Ambasht, R.S. and Ambasht, N.K. (2008). A text book of Plant Ecology, CBS Publishers & Distributors PVT. LTD.
2. Majumdar, R and Kashyap, R (2019). Practical Manual of Ecology and Environmental Science, New Delhi, India: Prestige Publishers
3. Singh, J.S., Singh, S.P., Gupta, S. R. (2006). Ecology, Environment and Resource Conservation. New Delhi, India: Anamaya Publications.
4. Wilkinson, D.M. (2007). Fundamental Processes in Ecology. USA: An Earth Systems Approach. Oxford University Press.
5. Hanski, I.A., & Gilpin, M.E. (1997). Metapopulation biology: Ecology, genetics, and evolution. Academic Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.