Core IX **Plant Ecology & Phytogeography**

Course objectives

- To learn the interaction of biotic components with non-living components of an ecosystem.
- To introduce to various natural ecosystems and how the interaction among different biotic and abiotic factors influencing the stability and diversity of an ecosystem.
- To study the physical, biological and chemical characteristics of factors influencing population.
- To know the experimental approach to determine the physical, chemical and organic matters of soil.
- To introduce the students to the characteristics and dynamism of population ecology.

Course Outcomes:

- Have ability to understand the ecological functioning of ecosystems and would certainly help students to maintain the local ecosystems.
- Have information on species' geographical range and how the size and life history influenced by the various components of ecosystems.
- An understanding of the factors that influence patterns of abundance and distribution in populations.
- Have knowledge on the process of soil formation and approaches to study the nature of soils.
- Have skill to evaluate the dynamics of change of population characteristics.

Unit-I:

Learning Outcomes: The students learn the concept of ecology and inter-relationships between the living world and its environment.

- Introduction and Concept of ecology, Autoecology, Synecology, System ecology: Levels of organization. Inter-relationships between the living world and the environment, the components of environment, concept of hydrosphere and lithosphere and dynamism, homeostasis.
- Light, temperature, wind and fire.Variations; adaptations of plants to their variation.

Unit-II:

Learning Outcomes: The students get idea on the formation, composition and profile of soil and state of water in environment.

Soil: Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development.

Water: Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle

Unit-III:

Learning Outcomes: The students grasp about the dynamics of population ecology and plant communities.

- Biotic interactions and Population ecology: Characteristics and Dynamics.
- Plant communities: Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts.

Unit-IV:

Learning Outcome : The students know about the ecosystem process and phytogeography of India.

- Ecosystems: Structure; Processes; Trophic organization; Food chains and Food webs; Ecological pyramids.
- Functional aspects of ecosystem: Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus.
- Phytogeography: Principles; Continental drift; Theory of tolerance; Endemism; Phytogeographical division of India; Vegetation of Odisha.

Practical:

1. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)
2. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
3. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
4. Study of morphological adaptations of hydrophytes, xerophytes, halophiles (two each).
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
6. Quantitative analysis of herbaceous vegetation for frequency, density and abundance in the college campus.
7. Field visit to familiarize students with ecology of different sites.

Text Books:

- ✓ *Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.*
- ✓ *Shukla R.S. and Chandel P.S. (2016). A Text Book of Plant Ecology. S Chand Publication, New Delhi.*

Reference Books:

- ✓ *Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5thedition.*
- ✓ *Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.*
- ✓ *Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.*
- ✓ *Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.*
- ✓ *Santra, S. C. (2015) Environmental Science. New Central Book Agency (P) Ltd. Kolkata.*
- ✓ *Das M. C. and Das S. P. (2009). Fundamental of Ecology. Tata MGrow Hill, New Delhi.*
- ✓ *Shukla R.S. and Chandel P.S. (2016). A Text Book of Plant Ecology. S Chand Publication, New Delhi.*
- ✓ *Kumar H D by Modern Concept of Ecology Revised Ed. Vikas Publication.*