

THEORY:**Introduction of the Course:**

The course is organized to provide information about main concept of ecology and its major divisions. It focuses on study of different environmental factors and environmental complex. Macroclimatic and microclimatic factors, dynamic and complex nature of organisms and environment are also discussed.

Course Objectives:

The course is designed:

1. To give an insight to understand the nature of environmental influences on individual organisms, their populations, and communities.
2. To prepare graduates to study and resolve the ecological consequences of environmental problems.

Course Detail:

1. **Introduction and concept of Autecology.** The seven major autecological factors and their detail. Adaptations in plants in response to autecological factors.
2. **The Soil Factor:** Definition and importance of soil: Concept of texture and structure; Physical and chemical properties of soil; Soil formation and parent materials; Soil porosity; Organic and inorganic components; Living inhabitants of soil; Water-logging and salinity of soil; causes and reclamation methods; Soil Erosion.
3. **The Water Factor:** Importance of water to plants; Forms of atmospheric moisture; Forms of precipitation and their ecological effects. Soil water relationships; Soil moisture constants; Role of water in plant diversity; Plant water relationships.
4. **Light and Temperature Factors:** Introduction; Comparison of tropical, temperate and polar regions; Temporal and spatial variations in light and temperature; Role of light and temperature in plant distribution and diversity; Responses and adaptations of plants to light and temperature; Differences in Heliophytes and Sciophytes; Ecological response of plants to warm, chilling and freezing temperatures. Hardening; Ecophysiological responses in plants: Photoperiodism; Thermoperiodism; Cardinal temperatures; Light compensation point; Dormancy; Stratification; Vernalization.
5. **The Wind Factor:** Formation of wind; Influences of wind on plants; Cushion plants; Shelterbelts.
6. **The Fire Factor:** Kinds of fire; Plant adaptations related to fire. Indirect effects fire; Modification of habitat after crown fire; Fire climax; Practical value of vegetation burning.
7. **The Biotic Factor:** Biotic influences; Grazing and Browsing by animals; Impacts of herbivorous animals on vegetation, pollination and dissemination.

Practicals:

1. Determination of soil texture, water stable aggregates and soil organic matter.
2. Soil moisture constants: Determination of soil water holding capacity.
3. Determination of infiltration, permeability and capillary rise of water in soil.
4. Determination of physico-chemical properties of soil and water.
5. Measurement of humidity, light and temperature under various ecological conditions.
6. Study of adaptations in Hydrophytes, Xerophytes and Cacti.
7. Study of Heliophytes and Sciophytes
8. Study of impact of wind on plants- Cushion plants

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Lab work
4. Seminars/ Workshop
5. Assignments

Learning Outcome:

1. Students will be able to describe and debate various global and regional environmental concerns that affect various forms of life.
2. They will be able to determine impact of human activities on the life forms and the environment.
3. The students will acquire knowledge about the hazardous effects of different environmental pollutants and relative measures for their control/prevention.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Classroom discussion
4. Quizzes and Tests
5. Self-assessments

Recommended Readings:

1. Begon, M., Howarth, R. W. and Townsend C. R. (2014). *Essentials of Ecology*. 4th Edition .Wiley. 480 pp
2. Chapman, J. L. and Reiss, M.J. (1999). *Ecology: Principles & Applications*. Cambridge University Press. London. 330 pp.
3. Hussain, F. (1989). *Field and Laboratory Manual of Plant Ecology*. National Academy of Higher Education, Islamabad.
4. Lambers, H., Chapin III, F. S. and Pons, T. L. (2008). *Physiological Plant Ecology*. Second Edition. Springer. 545 pp.
5. Schulze, E. D., Beck, E. and Müller-Hohenstein, K. (2005). *Ecology*. Springer. 207 pp.
6. Smith, T. M. and Smith, R. L. (2006). *Elements of Ecology*. Pearson Canada. 645 pp.
