Bot-317 & 318 SYNECOLOGY & ECOSYSTEMS (Theory & Lab) Credit Hours 3(2+1)

THEORY:

Introduction of the Course:

This course introduces the general concepts of the Ecological Hierarchy, Population Ecology, Community Ecology and Population Ecology.

Course Objectives:

The course is designed:

1. To understand the nature of environmental influences on individual organisms, their populations, and communities, and ultimately at the level of the biosphere.
2. To provide an adequate knowledge about basic concepts of Community and Population Ecology and to distinguish between biotic assemblages and communities.
3. To give an insight about ecosystems and emergent properties associated with ecosystems.

Contents:

1. **Ecological Hierarchy;** Hierarchical concept starting in the individual. Concepts of species; various species concept.
2. **Population Ecology:** Plant population structure; Plant population dynamics; Density dependent & density independent growth models; Life tables & Plant demography; Seed dispersal, seed dormancy, seed bank, Recruitment & Resource allocation
3. **Community Ecology:** Community concepts and attributes; Analytic & synthetic characteristics; Plant community structure; Plant community dynamics; Types of changes, succession, its types and climax concept. Community relationships; Local vegetation; Vegetation of Pakistan; Major Biomes of the world. Methods of sampling of communities, recent trends.
4. **Ecosystem Ecology:** Concept, components, structure & function; Trophic levels and energy flow; Food chains & food webs; Biogeochemical cycles; types; Hydrologic cycle, C, N and P cycles.

Practicals:

1. Reconnaissance survey of different local communities.
2. Study of various community attributes like Floristic Composition, Vitality, Periodicity, Association, Population density, Frequency of occurrence, Cover etc.
3. Detailed sampling of local vegetation including gradient, ordination and classification.
4. Use of Ecological Softwares.
5. Study of local aquatic and terrestrial ecosystems.

Teaching-learning Strategies

1. Lectures
2. Field tours to contaminated sites and industrial areas
3. Group Discussion
4. Laboratory work
5. Seminar/ Workshop

Learning Outcome:

1. Students are expected to get familiarized with the knowledge of the interdependence between people and nature that is vital for food production, maintaining clean air and water, and sustaining biodiversity in a changing climate.
2. They will be able to learn about human impacts on ecosystems and how humans have tried to rehabilitate ecosystems.
3. They will be able to learn basic and applied aspects of plant ecology.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Begon, M. Howarth R. W., 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. Schulze, E. D., Beck, E. K. and Müller-Hohenstein (2005). *Ecology. S*pringer. 207 pp.
5. Smith, T. M. and Smith R. L. (2006). *Elements of Ecology.* Pearson Canada. 645 pp.

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