

**ENSC-309:**

**FUNDAMENTALS OF ECOLOGY**

**(3-0 Credit hrs)**

**PRE-REQUISITES:** ENSC-303

### **LEARNING OUTCOMES**

- Understanding the Basic concepts of Ecology
- Understanding basic ecological principles
- Studying climate and biomes of the world
- Understanding the dynamics of population ecology
- Understanding dynamics of community ecology
- Understanding interactions of Plants and environment
- Understanding restorations of ecosystems and challenges

### **CONTENTS**

The current course is designed to introduce the fundamentals of ecology and ecological principles to the participants. The course shall encompass the thorough study of climate and world major terrestrial and aquatic biomes including coral reefs and coastline mangroves. The dynamics of population and community ecology will be the core this course. Understanding population, communities, survival of species, life tables, food chain, food web, competition, predation, parasitism etc. will be focused in population and community ecology. Interactions of plants with other organism will also taught. Finally, concepts of restoration of ecosystems and modern challenges of restoration shall also be encompassed in this course.

#### **Unit-1: Introduction to Ecology and Ecological principles**

- 1.1. A brief history of life on Earth
- 1.2. Definition and types of ecology
- 1.3. Abiotic and biotic parts of the ecosystem and their interactions
- 1.4. Concept of flow of energy and recycling of nutrients
- 1.5. Ecological processes such as pollination, erosion, succession, desertification
- 1.6. Autecology and synecology

#### **Unit-2: Climate and Biomes**

- 2.1. Understanding climatic patterns of the world
- 2.2. Major terrestrial biomes Major aquatic biomes
- 2.3. Coral reefs, estuaries and coastline ecosystems including mangroves
- 2.4. Wetlands, RAMSAR convention and wetland ecology

#### **Unit-3: Population Ecology**

- 3.1. Explaining species and populations
- 3.2. Concept of subpopulation, meta populations and satellite population
- 3.3. Intraspecific and interspecific interactions
- 3.4. Population demography, growth, survivorship curve, decline, threats
- 3.5. Speciation, evolution, dispersal, natural and artificial selection

#### **Unit-4: Community and Ecosystem Ecology**

- 4.1. Understanding interactions among populations
- 4.2. Concept of food chain, food web, food pyramid, feeding guilds
- 4.3. Predation, competition, mutualism, parasitism
- 4.4. Concept of home range and territories
- 4.5. Role of Keystone species and resources in maintaining ecosystems

**Unit- 5: Interactions between plants and other organisms**

- 5.1. Mycorrhiza, Nitrogen fixation
- 5.2. Pathogens and endophytes
- 5.3. Parasites, saprophytes and Carnivorous plants

**Unit-6: Restoration ecology**

- 1.1. Introduction to restoration ecology
- 1.2. Difference between afforestation and reforestation
- 1.3. Types and intensity of disturbances in natural ecosystems
- 1.4. Restoration challenges for major ecosystems
- 1.5. Wetland management

**TEACHING – LEARNING STRATEGIES**

- Lectures based examinations
- Presentation/seminars
- Class discussion
- Quizzes

**ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR**

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- Class participation,
- attendance,
- meeting deadlines of assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

**ASSESSMENT AND EXAMINATIONS:**

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, deadlines of assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.

3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.
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### RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Malcolm L. Hunter, Jr., and James P. Gibbs. (2007). *Fundamentals and Biodiversity and Conservation*. Blackwell Publishing Ltd
2. Keddy, P. A. (2017). *Plant ecology*. Cambridge University Press.
3. Rubenstein, D. I., & Wrangham, R. W. (2016). *Ecological aspects of social evolution*. Princeton University Press.
4. Holl, K. (2016). *Foundations of restoration ecology*. Island Press.
5. *Applied population and community ecology: the case of feral pigs in Australia*. John Wiley & Sons.
6. Agarwal, S. K. (2008). *Fundamentals of ecology*. APH Publishing.
7. Beeby, A., & Brennan, A. M. (2008). *First ecology: ecological principles and environmental issues*. Oxford University Press.