Program	BS Environmental Sciences	Course Code	ENSC-108	Credit hours	03
Course Title	FUNDAMENTALS OF ECOLOGY				

COURSE INTRODUCTION

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.

LEARNING OUTCOMES

By the end of this course the students will learn:

1. Understand the Basic concepts of Ecology, basic ecological principles
2. Learn climate and biomes of the world and interactions of Plants and environment
3. Explain the dynamics of population and community ecology
4. Describe restorations of ecosystems and challenges

CONTENTS

Unit-I: 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-II: 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

Unit-III: 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-IV: 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- V: Interactions among plants and other organisms

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

Unit-VI: 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 and Wetland management

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- 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:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

TEXT BOOKS AND READING MATERIAL

1. Singh, V. (2024). *Textbook of environment and ecology* (pp. 217-224). Singapore: Springer.
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 Pres.
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. Michael Begon, Robert W. Howarth, Colin R. Townsend. (2014). *Essentials of Ecology, 4th Edition* Willey.
7. Rana, S. V. S. (2013). *Essentials of ecology and environmental science*. PHI Learning Pvt. Ltd..

Further Reading: As suggested by the Instructor.