

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 the concept of behavioral ecology
- 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. Studying behavioral aspects of plants and animals shall be the central theme of this course. 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. Definition and types of ecology
- 1.2. Abiotic and biotic parts of the ecosystem and their interactions
- 1.3. Concept of flow of energy and recycling of nutrients
- 1.4. Ecological processes such as pollination, erosion, succession, desertification
- 1.5. 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

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: Behavioral Ecology

- 1.1. Difference between plants and animals' behavior
- 1.2. Social grouping in animals
- 1.3. Feeding, roosting, nesting perching, foraging behavior
- 1.4. Mimicry, camouflage and deceptive behavior against prey
- 1.5. Reproductive, breeding and territorial behavior and parental care
- 1.6. Communication and signals

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

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.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Keddy, P. A. (2017). *Plant ecology*. Cambridge University Press.
2. Rubenstein, D. I., & Wrangham, R. W. (2016). *Ecological aspects of social evolution*. Princeton University Press.
3. Holl, K. (2016). *Foundations of restoration ecology*. Island Press.
4. Davies, N. B., Krebs, J. R., & West, S. A. (2012). *An introduction to behavioural ecology*. John Wiley & Sons.
5. Hone, J. (2012). *Applied population and community ecology: the case of feral pigs in Australia*. John Wiley & Sons.
6. Bell, W. J. (2012). *Searching behaviour: the behavioural ecology of finding resources*. Springer Science & Business Media.
7. Krebs, J. R., & Davies, N. B. (Eds.). (2009). *Behavioural ecology: an evolutionary approach*. John Wiley & Sons.
8. Agarwal, S. K. (2008). *Fundamentals of ecology*. APH Publishing.
9. Beeby, A., & Brennan, A. M. (2008). *First ecology: ecological principles and environmental issues*. Oxford University Press.

PRE-REQUISITES: ENSC-303**LEARNING OUTCOMES**

- Understanding fundamentals of ecology
- Understanding ecological principles
- Measuring plants and animals' diversity
- Understanding various ecological processes such as, pollination, competition, predation, parasitism in the field
- Underpinning threats to species, population communities and ecosystem
- Understanding behavior of different organisms
- Studying any model ecosystem, measuring its plants and animal diversity, its temporal deterioration
- Evaluating the measures and challenges for restorations of ecosystems

CONTENTS

The practical course is designed to emphasize the measuring plants and animals' diversity in any ecosystem, evaluating major threats and assess future consequences. Further, evaluating measures needed for restoration of various ecosystems are key for this practical course. Understating various behavior such as breeding, nesting, roosting, perching, feeding, foraging and escaping from prey behavior will also be studied in this practical course. Finally, the practical will also intend to visit different model ecosystems for species conservation. Lastly, some model habitats will be studied to see the human impacts on natural ecosystems and species and possible restoration measures.

Unit-1: Fundamentals of ecosystems

- 1.1. Understanding interaction between living and non-living parts of ecosystem
- 1.2. Understanding various processes in ecosystem
- 1.3. Evaluating values of different ecosystem

Unit-2: Plants and Ecosystems

- 2.1. Measuring plants diversity
- 2.2. Use diversity indices and models for plants
- 2.3. Evaluating role of plant species in ecosystem
- 2.4. Studying behavior of different plant species

Unit-3: Animal and Ecosystem

- 3.1. Measuring animal diversity
- 3.2. Use diversity indices and models for animals
- 3.3. Evaluation of role of animal species
- 3.4. Studying behavior of different animal species

Unit- 4: Evaluation of threats to Ecosystems

- 4.1. Studying model aquatic and terrestrial ecosystems and evaluating its threats
- 4.2. Evaluating threats to some model ecosystems
- 4.3. Evaluation of natural and anthropogenic threats

Unit- 5: Ecosystem restoration

- 5.1. Investigating disturbances in model ecosystem
- 5.2. Evaluating extent of disturbance and spatial and temporal damage
- 5.3. Measures to restore models' ecosystems
- 5.4. Evaluation of challenges in restoration of ecosystems

TEACHING – LEARNING STRATEGIES

- Lectures and practical performance-based examinations
- Demonstrations,
- Field based learning
- 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, practical performance
- meeting deadlines of assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

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RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Keddy, P. A. (2017). *Plant ecology*. Cambridge University Press.
2. Slingsby, D., & Cook, C. (2016). *Practical ecology*. Macmillan International Higher Education.
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.
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