

ENS-223 Applied Ecology 3(2+1)

COURSE CODE:	ENS-223		
COURSE NAME:	Applied Ecology		
CREDIT HOURS:	Theory = 2	Practical = 01	Total = 03
CONTACT HOURS:	Theory = 32	Practical = 48	Total = 80
PREREQUISITE:	None		
MODE OF TEACHING:	2 hours of Lecture and 3 hours of Lab per week (67% + 33%)		

COURSE DESCRIPTION:

This course will make the students aware of the concepts of applied ecology and understand some major environmental issues such as global climate change, sustainable agriculture, conservation of resources in ecological perspectives, their management and ecological restoration.

COURSE LEARNING OUTCOMES:

By the end of this course, students will be able to:

- a) Apply ecological principles to address real-world environmental challenges and problems.
- b) Identify and explain conservation and ecological issues in environment.
- c) Evaluate the effectiveness of applied ecological interventions in restoring ecosystem health and resilience.

TOPICS COVERED:

Theory:

Week	Topics
1	Background and scope of applied ecology
2	Applications of ecological knowledge in solving different environmental issues
3	Energy and carbon balance
4	Carbon emission and global climate change
5	Effect of increased carbon dioxide concentration on agriculture
6	Human impact on Nitrogen cycle
7	Water as an ecological resource
8	Water and distribution of species
9	Mid Semester Exam
10	Farming practices under limited water supply
11	Agroecology: ecology of food production, Sustainable agricultural practices
12	Forest ecology: conservation and management of forests and rangelands in Pakistan
13	Industrial ecology: impact of industrial pollution on ecosystems
14	Pollutant transfer in plant and animals, phyto-remediation
15	Urban ecology: urban ecological footprint, urban environmental degradation, green cities.
16	Ecological modeling in defining ecosystem problems
17	Ecological restoration: concepts and techniques
18	End Semester Exam

Practical:

No.	Practical/ Topics
1	Introduction to Field Sampling and Ecological Tools
2	Species Count and Biodiversity Index (Plants); Tree height and canopy cover measurement
3	Plant Collection, Preservation & Herbarium Preparation
4	Chlorophyll Content and Photosynthetic Efficiency
5	Insect Biodiversity Assessment
6	Energy Content of Organic Matter (Bomb Calorimeter or Alternate Method)
7	Water Quality and Aquatic Ecology Basics
8	Soil Properties and Carbon Content
9	Assessment of Urban Ecology Components
10	Ecological Footprint Calculation

TEXT AND MATERIAL:

1. Erin McKenney. 2023. Applied Ecology. NC State Pressbooks, Raleigh, NC. (Open source book available online: <https://doi.org/10.52750/147069>)
2. Ecological Restoration: Principles, Values, and Structure of an Emerging Profession. Clewell, A.F. Latest edition. Island Press.
3. Urban Ecology: Patterns, Processes, and Applications. Jari Niemela, Jurgen H. Breuste, Glenn Guntenspergen, Nancy E. McIntyre, Thomas Elmqvist, Philip James. Latest edition. Oxford University Press.
4. Ecology of Industrial Pollution. Ed. Lesley C. Batty and Kevin B. Hallberg. Latest edition. Cambridge University Press.
5. Applied Ecology and Environmental Management. Newman. E.I. Latest edition. Blackwell Scientific Publications, Oxford.

ASSESSMENT SYSTEM:

Theoretical/ Instruction		
Assessment Category	Marks Distribution (%)	
	Without Project	With Project
Quiz	15	10-15
Assignment	10	5-10
MSE	25	25
Project	-	5-10
ESE	50	45-50
Lab (if Applicable)		
Assessment Category	Marks Distribution (%)	
Lab Work/ Psychomotor Assessment/ Lab Reports	50–70	
Lab Project/ Open-ended Lab Project/ Assignment/Quiz	10–20	
Final Assessment/ Mid Semester Assessment (Written, viva, hands-on experimentation, group task)	20–30	