

Proposed
NEP 2020 Based Syllabus
For
Four Year Undergraduate Programme



Department of Environmental Biology and Wildlife Sciences

Panbazar, Guwahati- 781001, Assam, India

2023

Introduction

The term 'Environment' can be viewed from different perspectives, encompassing our physical, social, cultural, economic or political environment. Man is shaped by his environment, while the environment in turn is affected by the actions of man. The once harmonious nature of human-environment relationship has gradually changed over time. At present times, tremendous anthropogenic pressures have deteriorated the quality of the environment and depleted natural resources beyond sustainable levels. A series of important environmental conferences including the Stockholm Conference (1972) and the Earth Summit (1992) were instrumental in raising environmental awareness among the masses, leading to the present day global environmental movement. People are now much concerned about environmental issues like pollution, climate change, natural disasters, biodiversity loss, deforestation, land degradation, population growth, resource depletion etc., which have adversely affected human societies, economies and livelihoods around the world. Scientific understanding of environmental problems can help in designing effective strategies for minimizing adverse impacts and also contribute towards awareness creation. Thus, Environmental Studies as a multidisciplinary subject has become an important part of academic curricula across the world.

The undergraduate syllabus for Environmental Studies is designed with the aim of disseminating scientific knowledge and creating awareness on contemporary environmental issues of global, national or regional nature. It is adopted from the syllabus recommended by UGC for undergraduate Environmental Studies.

Programme Specific Outcomes/Programme Learning Outcomes (PSOs/PLOs) in Environmental Studies

PSO 1 Ability to comprehend environmental issues from a scientific standpoint and acquaint oneself with the causes, effects and control measures of the problem

PSO 2 Understand the importance of environmental education, awareness and sustainable development

PSO 3 Ability to understand the working of natural systems and analyze the impact of human actions on the environment

PSO 4 Gain knowledge on legislations or policies related to environment, wildlife and development

PSO 5 Gather knowledge on modern tools and techniques for environmental analysis

PSO 6 Gain knowledge on utility of modern tools and techniques for environmental and wildlife management

Course Level Learning Outcome Matrix

PSOs	VAC	MDE
PSO 1 Ability to comprehend environmental issues from a scientific standpoint and acquaint oneself with the causes, effects and control measures of the problem	X	
PSO 2 Understand the importance of environmental education, awareness and sustainable development	X	
PSO 3 Ability to understand the working of natural systems and analyze the impact of human actions on the environment	X	X
PSO 4 Gain knowledge on legislations or policies related to environment, wildlife and development	X	
PSO 5 Gather knowledge on modern tools and techniques for environmental analysis		X
PSO 6 Gain knowledge on utility of modern tools and techniques for environmental and wildlife management		X

Course Objectives

1. Critical analysis of human-environment-development relationships in terms of environmental ethics and sustainable development
2. Disseminate scientific knowledge on environmental issues, their causes, effects and control measures
3. Understand natural resources and the importance of their conservation and management
4. Acquire a detailed understanding of innovative modern technologies for addressing environmental issues

Graduate Attributes

1. Ability to critically analyze environmental problems and suggest logical remedies
2. Ability to utilize the wide scope of environmental studies across multiple disciplines
3. Ability to take measures for spreading awareness on environmental issues
4. Ability to develop skills to work in the field of environmental management and nature conservation

Course Structure (Undergraduate)

Semester	Course detail	Paper title	Credit (L+T+P)
I	VAC (Value Added Course)	Environmental Studies	2 (1+1+0)
II	MDE (Multidisciplinary Elective)	Tools and techniques in Wildlife and Environmental Sciences	3 (2+1+0)

Total Credit=5

SEMESTER-I
VALUE ADDED COURSE (VAC)
ENVIRONMENTAL STUDIES
CREDIT: 2 (1+1+0)

Course Outcomes

CO1 Appreciation of the environment and its various components

CO2 Appreciate attributes of natural resource use and its sustainability

CO3 Knowledge on environmental pollution, its types and control measures

CO4 Comprehension of human-environment interaction, and different types of natural hazards

Course contents:

Unit 1: Introduction to Environmental Studies (4 lectures)

Environmental Science: definition and scope ; Segments of Environment: atmosphere, hydrosphere, lithosphere, biosphere; Concept of sustainability and sustainable development

Unit 2: Ecosystems, Biodiversity and Natural Resources (10 lectures)

Ecosystem structure and function; Energy flow in ecosystem; Food chain and food webs; Ecological succession; Types of ecosystem; Levels of biodiversity; Biogeographic zones of India; Biodiversity hotspots; Threats to biodiversity; Conservation of biodiversity; Ecosystem and biodiversity services; Natural resources: types, issues and management

Unit 3: Environmental Pollution and Climate Change (10 lectures)

Environmental pollution: types, causes, effects and control measures; Climate change: causes, impacts, and control measures; Ozone layer depletion; Waste management practices: types, generation, collection, segregation, treatment and disposal

Unit 4: Human Communities and Environmental Policies (8 lectures)

Environmental migration: displacement, resettlement and rehabilitation, environmental refugee; Environmental movements in India; Natural disasters: types and management; Environmental ethics; Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International Conventions on Environment; Kyoto Protocol; Montreal Protocol

Recommended Textbooks and References:

1. Carson, R (2002) *Silent Spring*. Houghton Mifflin Harcourt
2. Gadgil, M., & Guha, R. (1993) *This Fissured Land: An Ecological History of India*. Univ. of California Press
3. Gleeson, B. and Low, N. (eds.) (1999) *Global Ethics and Environment*, London, Routledge
4. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) *Principles of Conservation Biology*. Sunderland: Sinauer Associates
5. McNeill, John R. (2000) *Something New Under the Sun: An Environmental History of the Twentieth Century*
6. Odum, E.P., Odum, H.T. & Andrews, J. (1971) *Fundamentals of Ecology*. Philadelphia: Saunders
7. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. (2011) *Environmental and Pollution Science*. Academic Press
8. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. (2012) *Environment*. 8th edition. John Wiley & Sons
9. Rosencranz, A., Divan, S., & Noble, M. L. (2001) *Environmental law and policy in India*. Tripathi 1992
10. Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi
11. World Commission on Environment and Development (1987) *Our Common Future*. Oxford University Press

SEMESTER-II
MULTIDISCIPLINARY ELECTIVE (MDE)
TOOLS AND TECHNIQUES IN WILDLIFE AND ENVIRONMENTAL SCIENCES
CREDIT: 3(2+1+0)

Course Outcomes:

CO1 Familiarity with wildlife study techniques

CO2 Understanding of RS-GIS and its application in Environmental Science

CO3 To understand the principle and applications of instruments used in environmental analysis

CO4 Enhance collaborative learning and communication skills through teamwork, group discussions and home assignments

Course contents:

Unit 1: Wildlife Tools and techniques (16 lectures)

Census and sampling techniques of wildlife populations; Behavioural observation techniques; Vegetation sampling techniques; Wildlife photography; Basic principles and use of compass, binoculars, Global Positioning System, camera traps, optical densiometer, range finder in wildlife study

Unit 2: Remote Sensing and GIS (16 lectures)

Remote Sensing- basic principles and concepts, Concept of resolution and its types; Satellites and data products (Landsat and IRS); Applications of remote sensing; GIS- basic principles and components, Data formats-raster and vector, overlay analysis.

Unit 3: Environmental Instrumentation (16 lectures)

Principles and practices of: Flame photometer, UV-Visible spectrophotometer, Gas Chromatograph (GC), Electron Microscopy, High Performance Liquid Chromatography (HPLC), Atomic Absorption Spectrophotometer (AAS), Inductively Coupled Plasma Atomic Emission Spectroscopy

Recommended Textbooks and References:

1. Bruaude S and Low BS (eds) (2010). *An Introduction to Methods and Models in Ecology, Evolution and Conservation Biology*. Princeton University Press.

2. Handerson PA (2003). *Practical Methods in Ecology*. Blackwell Publishing Southwood TRE and Henderson PA (2000). *Ecological Methods (3rd Edition)*. Blackwell Science.
3. Skoog DA, Holler FJ, Crouch SR (2006). *Principles of Instrumental Analysis*, 6th Edition, Thomson.
4. Gilbert M (2008). *Introduction to Environmental Engineering and Science*, Pearson Education.
5. Jensen JR (2013). *Remote Sensing of the Environment-An earth resource perspective (2nd ed.)*. Pearson Education, India.
6. Chipman JW, Kiefer RW and Lillesand TM (2011). *Remote sensing and Image interpretation*. Wiley.