

Suggestions/feedback are invited from all stakeholders on draft 2 of syllabus in LOCF format of compulsory course on Environmental Science at undergraduate level (AECC-I). Please send your suggestions/feedback at head@es.du.ac.in desdu2012@gmail.com on or before 30th April, 2019.

Draft 2: Environmental Science Learning Outcome Based Curriculum Framework

Introduction

Content: The Compulsory course on Environmental Science at Undergraduate level (AECC-I) aims to train students to cater to the need for ecological citizenship through developing a strong foundation on the critical linkages between ecology-society-economy.

Learning Outcome based approach to Curriculum Planning

1. Graduate Attributes in Subject

a) Disciplinary knowledge

Enable students to develop a comprehensive understanding of various facets of life forms, ecological processes and how humans have impacted them during the Anthropocene era.

b) Critical thinking

Capability to identify relevant environmental issues, analyse the various underlying causes, evaluate the practices and policies, and develop framework to make informed decisions.

c) Moral and ethical awareness/reasoning

Develop empathy for various life forms and appreciate the various ecological linkages within the web of life.

2. Programme Learning Outcome in course

The course will empower the undergraduate students by:

- i. Gaining in-depth knowledge on natural processes that sustain life and govern economy.
- ii. Predicting the consequences of human actions on the web of life, global economy and quality of human life.
- iii. Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.
- iv. Acquiring values and attitudes towards understanding complex environmental-economic-social challenges, and participating actively in solving current environmental problems and preventing the future ones.
- v. Adopting sustainability as a practice in life, society and industry.

3. Qualification Description

Graduates will evolve into ecologically informed and socially responsible citizens who are empowered to protect the natural resources while ensuring sustainable lifestyle and developmental model.

Environment Science

Revised Syllabus

Compulsory course on Environment Science at UG level (AECC I)

Course Learning Outcomes

The course will empower the undergraduate students by helping them to:

- i. Gain in-depth knowledge on natural processes that sustain life, and govern economy.
- ii. Predict the consequences of human actions on the web of life, global economy and quality of human life.
- iii. Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.
- iv. Acquire values and attitudes towards understanding complex environmental-economic-social challenges, and participating actively in solving current environmental problems and preventing the future ones.
- v. Adopt sustainability as a practice in life, society and industry.

Unit 1

Introduction to Environmental Studies

(2

lectures)

- Multidisciplinary nature of environmental studies
- Scope and importance; Concept of sustainability and sustainable development

Unit 2

Ecosystem

(8

lectures)

- Definition and concept of Ecosystem
- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem – Physical (energy flow), Biological (food chains, food web, ecological succession) and Biogeochemical (nutrient cycling) processes. Concepts of productivity, ecological pyramids and homeostasis
- Types of Ecosystem – Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries) – their importance and threats on them with relevant examples from India
- Ecosystem services (Provisioning, Regulating, Cultural and Supporting). Basics of Ecosystem restoration

Unit 3

Natural Resources

(6 lectures)

- Land resources and land use change Land degradation, soil erosion and desertification
- Forest resources and causes of deforestation; impacts of mining and dam building on environment, forests, biodiversity and tribal populations
- Water resource: Use and over exploitation of surface and ground water, floods, drought conflicts over water (international & inter-state)
- Energy resources :Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs
- Case studies: National Solar Mission, Cauvery river water conflict etc

Unit 4

Biodiversity and Conservation

(8

lectures)

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India
- India as a mega-biodiversity nation; Endemic and endangered species of India; IUCN Red list; biodiversity hotspots
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic and informational value of biodiversity with examples; sacred groves and their importance with example
- Current mass extinction crisis; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasion with emphasis to Indian biodiversity
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation; Biosphere reserves; Keystone and Flagship species; Species reintroduction and translocation
- *Case studies*: Project Tiger, Vulture breeding program etc

Unit 5

Environmental pollution

(8

lectures)

- Environmental pollution (Air, water, soil, thermal and noise): causes, effects and controls; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies: Ganga Action plan (GAP), Delhi air pollution and public health issues etc

Unit 6

Global Environmental Issues and Policies

(8 lectures)

- Climate change, Global warming, Ozone layer depletion, Acid rain and impacts on human communities and agriculture
- International agreements: Earth Summit, UNFCCC, Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)

- Sustainable Development Goals and India's National Action Plan on Climate Change
- Environment legislation in India: Wildlife Protection Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Forest (Conservation) Act 1980, Air (Prevention & Control of Pollution) Act, 1981; Environment Protection Act, 1986; Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

Unit 7

Human Communities and the Environment

(7 lectures)

- Human population growth: Impacts on environment, human health and welfare
- Resettlement and rehabilitation of project affected persons; case studies
- Disaster management: floods, earthquake, cyclones and landslides
- Environmental movements: Chipko movement, Silent valley movement, Bishnois of Rajasthan, Narmada Bachao Andolan etc
- Environment justice: National Green Tribunal and its importance
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi, Swachh Bharat Abhiyan)

Field work/ Practicals

(Equal to 5 lectures)

- Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/ Yamuna river and its floodplains *etc.* or any nearby lake or pond, explaining the theoretical aspects taught in the classroom
- Visit to any biodiversity park/ reserve forests/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, explaining the theoretical aspects taught in the classroom
- Visit to a local polluted site (Urban/Rural/Industrial/Agricultural), Wastewater treatment plants
- Study of common plants, insects, birds and basic principles of identification
- Organize a seminar/ conference/ workshop/ panel discussion on relevant topics for enhancing awareness, capacity building and critical reasoning among students

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Teaching Learning process

The teaching learning methodologies are designed to provide the undergraduate student a comprehensive understanding of the subject in a simplistic manner as well as evoking critical reasoning and analytical thinking among them. The various approaches to teaching – learning process include classroom lectures, video presentations and ICT enabled teaching tools. For enhancing practical understanding, field visits are encouraged to relevant places in Delhi like Biodiversity parks, Protected areas, Wetlands, Sewage treatment plants etc.

Assessment methods

1. Written examinations (Semester exams, Internal assessment)
2. Project work related to field visit and its report submission
3. Assignment/presentations on any contemporary environmental issue

Keywords

Ecosystem, Biodiversity, Conservation, Pollution, Natural Resources, Sustainable Development, Climate Change, Desertification, Deforestation