

Course Plan

School	Engineering
Department	Energy
Course Code	EN535
Course Name	Energy Environment Interaction
L T P CH Credit	3 0 0 3 3
Instructor	Debendra Chandra Baruah (baruahdeben@gmail.com)

Abstract

Adequate supply of Energy and provision of a benign environment are essential for human development. Interaction with environment is natural during harnessing of energy and subsequent conversion and consumption. Several issues of concerning environment are linked with energy. Pollution and global warming are two key challenges associated with *Energy – Environment* interaction. This course is designed to give an idea about the mechanisms of energy-environment interaction besides highlighting energy developmental linkages and sustainability issues.

Objective

- (a) To give an understanding on energy extraction, conversion, uses and their impact on environment
- (b) To generate understanding on energy and environment related issues
- (c) To create an understanding on the Energy-Development-Sustainability linkages

Prerequisites of the course

Understanding on various energy conversion processes

Lecture Plan

Tentative Lecture	Topic (s)
1-4	Basic Concept of Energy: photosynthesis, biomass, evolution of modern energy system, Understanding of traditional energy, non-commercial energy, modern energy, units conversion, understanding on energy demand and supply
5-8	Ecological principles of nature, concept of ecosystems, different types of ecosystems, ecosystem theories; energy flow in the ecosystems; biodiversity
9-12	Environmental effects of energy extraction, conversion and uses with some case examples
13-16	Sources of pollution with case examples related with energy system; Primary and secondary pollutants originated from energy system; Consequence of pollution caused by energy system: Air, water, soil, thermal, noise pollution;
17-20	Pollution control measures; Environmental laws on pollution control, Environmental Impact assessment of Energy projects – case study examples
21-24	Global warming and Climate change: Green House Gas emissions, Emission intensity, impacts, mitigation strategies – case examples
25-28	Sustainability, Externalities, Future energy systems, Clean energy technologies, United Nations Framework Convention on Climate Change (UNFCCC): Case study examples
29-32	Sustainable development, International initiatives (Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), Prototype Carbon Fund (PCF) and India's Climate Change Initiatives
33-36	Energy poverty and Human Development Indices, Understanding the link between economic growth and energy consumption – case examples
37-40	Revision and presentation of Assignment

Evaluation Plan

Evaluation Plan			
Test	Marks	Time	Schedule (tentative)
Test I (Objectives)	25	45 Minutes	08-14 th Feb
Mid term	40	1 hour	8 th - 11 th April
Test III (Assignment and Presentation)	25	2 weeks	20 th April
End Semester Examination	60	2 hours	21 st -27 th May
Total	150		

Pedagogy

Teaching-learning methods to be used

- Lecture and Discussion
- Case studies
- Assignments and Presentations
- Problem Solving

Learning outcomes

- Ability to analyze energy-environment-economy nexus at different stages of human development
- Ability to assess the impacts of energy on environment
- Ability to understand global concern of sustainable development on the backdrop of energy-environmental interaction

Suggested Reading Materials

Text Books

- [1] Goldemberg J. (Ed) (2008); Interactions: Energy and Environment, Eolss Publishers
- [2] Saxena A. B. (2011); A Textbook of Energy, Environment, Ecology and Society, New Age International

Reference Books

- [1] Wilson R. and Jones W. J. (1974); Energy, Ecology, and the Environment, Elsevier
- [2] Fowler J. M. (1984); Energy and the Environment, Second Edition, McGraw Hill
- [3] Kaushika N. D. and Kaushik K. (2004); Energy, Ecology and Environment: A Technological Approach, Capital Publishing
- [4] Research papers and Reports from standard sources