

Objective: The objective of the course is to provide skills and an improved understanding of how firms and organizations work with sustainability issues such as environmental and natural resource management and sustainability issues.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to:

- Compare the different roles of, and relations between, firms, governmental agencies, not-for-profit organizations and other actors in relation to issues concerning environmental and natural resource management and sustainability.
- Describe the motivating factors and processes for integrating environmental and natural resource management and sustainability issues with the strategies, operations management and global surveillance of organizations.
- Compare results from own studies with results from other natural science and social science studies.
- Conduct a project and firmly establish the study in a theoretical basis within environmental management and sustainable development

Pre-requisite of course:

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term work (TW)	
3	2	0	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	Concepts of Environmental Impact Assessment Environment; Environmental Impacts; Environmental Impact Analysis; Environmental Impact Assessment and Environmental Impact Statement; EIA- As an Integral Part of The Planning Process	5
2	Detailed Contents of EIA Introduction; Project Description; Description of The Environment; Anticipated Environmental Impacts and Mitigation Measures; Analysis of Alternatives; Environmental Monitoring Programme; Additional studies; Project Benefits; Environmental Cost Benefit Analysis; EMP; Summary.	8



Chemical Engineering

3	Environmental Monitoring: Purpose of monitoring, Scales of observation, Environmental characteristics, Representative units, Sampling Location, Types of environmental monitoring, Sampling plan.	5
4	Water and Air Quality Monitoring: Sampling techniques, Preservation of water sample, Physical Properties of water & its monitoring: Temperature, Conductivity, Turbidity etc., Chemical Properties of water & its monitoring 1. Electrometric method: pH 2. Colorimetric method 3. Spectroscopy method, Standardization & calibration of monitoring instruments. Type of Air Quality monitoring - Ambient Air Quality monitoring, Source Air Quality monitoring, Ambient Air Quality Monitoring, Selection of monitoring sites, Sampling time, Frequency & mode of sampling, Source Air Quality Monitoring – Type of Monitoring procedure.	10
5	Physical, Chemical and Microbial contaminants Physical contaminants – Naturally occurring particulates, Human made particulates, Mechanisms and control of particulate, Chemical contaminant: - Type of contaminants, Sources of Contaminants, contaminant transport and fate, Microbial contaminants: - Environmentally transmitted pathogens, concept of indicator organisms, sample processing and storage	8
Total Hours		36

References:

1. Environmental Impact Assessment; Jan 2012 by R.R. Barthwal
2. “Natural Hazards and Disaster Management: Vulnerability and Mitigation” by R B Singh
3. Practical Guide to Environmental Management by Frank Friedman

Suggested Theory distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
30%	30%	15%	15%	10%	-



List of Experiments/Activities:

1. Case studies on Environmental Impact Assessment
2. Case studies on Industrial and Hazardous Waste Audit
3. Determination of pH, Hardness, Acidity and Basicity in water sample
4. Determination of Dissolved Oxygen and BOD for water sample
5. Determination of TS, TDS, TSS in water sample
6. Determination of air pollutants concentration in ambient air.
7. Indoor Air Pollution – Sources and Control
8. Municipal Solid Waste – Source and Control
9. Case studies on waste minimization and management in various industries.
10. Determination of Chemical Oxygen Demand for water sample
11. Importance of Risk assessment in Chemical industries.
12. Storm Water Management
13. Environmental Tour to Audit labs.
14. Future Treatment Technologies in the field of Air, Water and solid waste

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Design Based Problems (DP)/ Open Ended project (OEP):

In the beginning of the session, subject faculty will allot an OEP / DP to the students. Students will be free to choose a topic of their choice which will be relevant to the syllabus and they will either prepare a working model/ report / presentation / poster on their topic.

Online Web Resources:

1. <https://www.open.edu/openlearn/nature-environment/environmental-management-and-organisations>