NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Department of Chemical Engineering

COURSE OUTLINE						
Course Title	**ENVIRONMENTAL ENGINEERING**					
Course Code	**CLOE10**	**No. of Credits**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**
Department	**Chemical Engineering**	**Faculty**	**Dr. M. Arivazhagan**			
Pre-requisites Course Code	---					
Course Coordinator(s) (if, applicable)	---					
Other Course Teacher(s)/Tutor(s) E-mail	---	**Telephone No.**	**0431-2503111**			
Course Type	**Elective course**					

COURSE OVERVIEW

Knowledge of environmental issues and controlling strategies is essential for Chemical Engineers as production and process industries cause high impact pollution to the environment. The aim of this course is to provide students with an understanding of classification of environmental pollutants, their treatment/ controlling methods and Environmental Impact Assessment (EIA).

COURSE OBJECTIVES

i) To impart the basic concepts of environmental engineering
ii) To understand the problems of pollution and its treatment methodology.
iii) To understand the control methodologies of pollutants and uses Environmental Impact Assessment (EIA)

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
1. Learn about the sources and effects of pollutants to the environment	PO1, PO3, PO5, PO6, PO7, PO9, PO10, PO11
2. Explain the various treatment technologies for wastewater, air effluents, solid waste, noise pollution released from Process industries	PO1, PO2, PO3, PO4, PO7, PO8, PO9, PO10, PO11, PO12
3. Understand the development and applications of various unit operation to control the toxic elements	PO1, PO2, PO3, PO4, PO5, PO9, PO10, PO11, PO12
4. Understand the Limitation and Importance of Environmental Impact Assessment (EIA)	PO1, PO2, PO3, PO4, PO6, PO8, PO9, PO10, PO11

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1	Week 1 (2 contact hours)	Environment, Environmental quality and degradation, Industrial scenario in India.	Lecture C&T/ PPT
2	Week 2 (3 contact hours)	Sources and classification of Air Pollutants, Air quality standards – Meteorology and Air Pollution: Atmospheric stability and inversions - mixing height - plume rise estimation	
3	Week 3 (3 contact hours)	Effluent dispersion theories effects of air pollution on the environment, on materials, on human health, on animals. Measurements of air pollution, Equipments for control of air pollution.	
4	Week 4 (3 contact hours)	Sources and types of industrial wastewater – Nature and Origin of Pollutants - Industrial wastewater and environmental impacts. Regulatory requirements for treatment of industrial wastewater.	
5	Week 5 (3 contact hours)	Industrial Wastewater Treatment methods: Equalization - Neutralization – Oil separation – Flotation – Precipitation, Aerobic and anaerobic biological treatment, Chemical oxidation – Ozonation	
6	Week 6 (3 contact hours)	Carbon adsorption - Photo catalysis, Ion Exchange – Membrane Technologies .	
7	Week 7 (1 hour cycle test)	**Assessment - 1** Written test	--
	(2 contact hours)	Solid Waste Management: Type of waste collection systems, analysis of collection system – alternative techniques for collection system.	Lecture C&T/ PPT
8	Week 8 (2 contact hours)	Separation and Processing and Transformation of Solid Waste: unit operations used for separation and processing	
9	Week 9 (3 contact hours)	Landfills: Site selection, design and operation, drainage and leachate collection systems – e waste - sources, collection, treatment and reuse management.	Lecture C&T/ PPT
10	Week 10 (2 contact hours)	Hazardous waste treatment technologies	
11	Week 11 (3 contact hours)	Sources of noise pollution. Noise pollution standards and measurements	
12	Week 12 (2 contact hours)	Controlling methods of noise pollution. Effects on human being.	
	(1 hour cycle test)	**Assessment - 2** Written test	--

13	Week 13 (3 contact hours)	Historical development of Environmental Impact Assessment (EIA). EIA in Project Cycle. Legal and Regulatory aspects in India. Types and limitations of EIA	Lecture C&T/ PPT
14	Week 14 (3 contact hours)	Cross sectoral issues and terms of reference in EIA – Public Participation in EIA. EIA process- screening – scoping - setting – analysis – mitigation, Software packages for EIA – Expert systems in EIA.	
15	Week 15 (2 contact hours)	Prediction tools for EIA – Mathematical modeling for impact prediction	
	(1 hour cycle test)	**Compensation Assessment (CPA)** Written test	--
16	Week 16 Date decided by class committee/ Dean office	**End Semester Examination** Written test	--

C & T : Chalk and Talk and PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment - 1 Written test	Week 7	60 Minutes	20
2	Assessment - 2 Written test	Week 12	60 Minutes	20
3	Project based Assignment	During the regular class hours – Details will be informed later		10
4	Compensation Assessment (CPA) Written test	Week 15	60 Minutes	20
5	End Semester Examination	Week 16 or 17	180 Minutes	50

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. M.N. Rao et al, "Air Pollution" Tata McGraw Hill, 1989.
2. Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse, Tata McGraw Hill, New Delhi, 2003.
3. George Techobanoglous et al, "Integrated Solid Waste Management", McGraw-Hill, Publication, 1993.
4. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York, 1996
5. C. S. Rao, "Environmental Pollution Control Engineering", New Age International Pvt. Ltd., 2003.
6. Richard W. Boubel et al "Fundamentals of Air pollution", Academic Press, New York,1994.
7. Lecture materials by the course faculty

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

- 75% attendance is mandatory. Any student, who fails to maintain 75% and having above 50% attendance need to appear for the compensation assessment (CPA) and score minimum 30% marks in the CPA for attending the end semester examination. Students who maintained less than 50% will redo the course.
- Those who indulge in malpractice such as copying, plagiarism shall have to redo the course.
- Those who are absent for any of the assessment tests (S. No. 1 or 2) on genuine grounds shall be given an opportunity only once for the retest with the prior permission of the concerned faculty member. The retest shall be conducted before the end semester exam and the portions will be up to Cycle Test II.
- The minimum marks for passing this course and grading pattern will adhere to the regulations of the Institute.
- Those who fail in the course can appear for the supplementary exam. The total marks will be 100.
- Any misbehavior, indiscipline in the classroom/ exam hall will be dealt with seriously. In the worst case, the departmental disciplinary committee is empowered to debar the student from the course.

ADDITIONAL COURSE INFORMATION

- Queries may be emailed to the Course Coordinator directly at ariva@nitt.edu
- The Course Coordinator can be contacted in person for clarifications on a mutually convenient time.

FOR SENATE'S CONSIDERATION

Course Faculty M.A (Dr. M ARIVAZHAGAN) **CC-Chairperson** S. Saravanan **HOD**