

Course title: Environmental Pollution and Control				
Course code: NRE 132		No. of credits: 3	L-T-P: 42-0-0	Learning hours: 42
Pre-requisite course code and title (if any): NRE 131 Environmental Chemistry and Microbiology, NRS 137 Environmental Monitoring laboratory				
Department: Department of Natural Resources				
Course coordinator:			Course instructor: Prof V Subramanian	
Contact details:				
Course type: Elective			Course offered in: Semester 2	
Course Description The course has been designed to improve the understanding of the students about different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil. The course will also be dealing about the sources of pollution in air, soil, water, solid-waste and noise and the impacts these sources on the environment and health. In addition, the students will be given the training to develop the particular skills required in pollution related structured research.				
Course objectives				
1. To assess air pollution: sources and effects				
2. To assess sources and classification of water pollutants				
3. To assess sources of soil contamination				
Course content				
SNo	Topic	L	T	P
1.	Module1. Environmental management and pollution control strategies Environmental indicators; Pollution prevention methodologies; methods for waste minimization; types of recycling; recycling of waste material; recovery effort index; ISOTC-207 standards; environmental audits.	4		
2.	Module 2. Air pollution and control Introduction to air pollution and atmospheric diffusion (Gaussian plume modeling); General ideas in air pollution control: Alternative control measures, Improving dispersion, Building tall stacks, Intermittent control schemes, Relocation of plant, Process change, Use of downstream control device. Control of particulate Contaminants: Nature of particulate contaminants; Behavior of particles in the atmosphere; Particulate Control Methods and Devices: Wall collection devices-Gravity settlers, Centrifugal separators, Electrostatic precipitators; Dividing collection devices -surface filters, Depth filters, Scrubbers; Selection of particulate collection device. Control of Gaseous Contaminants: Gaseous control methods and devices-Absorption, Adsorption, Combustion	12		

	and Condensation. Major air pollutants in India			
3.	Methods of waste reduction such as volume and strength reduction, segregation, reuse, recycle, neutralization, equalization, proportioning. Fundamentals of urban water supply and sanitation infrastructure. Physical processes: sedimentation, coagulation and flocculation, filtration, sludge dewatering. Chemical processes: disinfection, removal of hardness, fluoride, arsenic, chromium, iron and manganese, removal of Nitrogen and Phosphorus. Biochemical processes: aerobic and anaerobic treatment methods. Low Cost Treatment Technologies: Septic tank; Imhoff tank; Oxidation ponds; Aerobic lagoons.	12		
4.	Module3: Soil and control Soil contamination by chemical pollutants: sources and fate. Remediation by plants, bioremediation by microorganisms; contamination by inorganic (including heavy metals) and organic pollutants; factors affecting uptake of contaminants, prevention and elimination of contamination; landfills. Effects of atmospheric deposition on various types of soils, cation exchange capacity (CEC) of soils	8		
5.	Module 4. Noise pollution Basics of Sound, Sound Propagation, Directionality, Reverberation, SEL, LAeq,T, L90, L10, SIL, Noise Control at source, Noise Control along the source-receiver pathway, Noise Control at Receiver, Assessing and Predicting Noise, introduction to Noise Modelling and audiometry	6		
	Total	42		
Evaluation criteria				
<ul style="list-style-type: none"> ▪ Tutorials/assignment: 20% ▪ 1 major test (end semester): 50% ▪ 2 minor tests: 20% ▪ Visits field or labs: 10% 				
Learning outcomes				
<ol style="list-style-type: none"> 1. Ability to distinguish between various methods of air pollution analysis 2. To understand air pollution sampling and measurement 3. Water quality analysis and measurement of soil contamination 				
Pedagogical approach				
Materials				
Required text				
<ol style="list-style-type: none"> 1. De A.K. (1990) <i>Environmental Chemistry</i>, Wiley Eastern Ltd. 2. Manahan S.E. (2000) <i>Fundamentals of Environmental Chemistry</i>, CRC Press. 				
Suggested readings				

1. Brady N.C. (2007) *The Nature and Properties of Soil*, Thirteenth edition, Prentice-Hall India.
2. Eckenfelder W. (1990) *Industrial Pollution Control*, McGraw Hill Int. Ed.
3. Pepper I.L., Gerba C.P. and Brusseau M.L. (2nd edition) (2006) *Environmental and Pollution Science*, Academic Press.
4. Gilbert M. (2007) *An Introduction to Environmental Engineering and Science*, Pearson Education.
5. Harrison R.M. (2001) *Pollution: Causes, Effects and Control*, Fourth Edition, Royal Society of Chemistry.
6. Nevers N.D. (2000) *Air Pollution Control Engineering*, McGraw Hill Int.
7. Perkins H.C. (1974) *Air Pollution*, McGraw Hill.
8. Stern A.C. (1980) *Air Pollution*, Vol. 1-VIII, Academic Press.

Case studies

Websites

Journals

1. Atmospheric Environment
2. Environmental Pollution
3. Environmental Management
4. Journal of Air and Water Management Association
5. Journal of the Air Pollution Control Association

Additional information (if any)

Student responsibilities

Attendance, feedback, discipline, guest faculty etc