

# Environmental Engineering - Web course



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## Chemical Engineering

**Coordinators:**

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### COURSE OUTLINE

This course is very important for Chemical Engineers considering the expectation of the Industries for pollution control in their premises so as to comply with newer and tougher laws and acts that are being enforced in India and globally.

This course introduces the principles and methods to control air, water and soil pollution to the undergraduate students of chemical engineering.

The topics cover sources of water, air and land pollution; legislation and standards; Recycle and reuse of waste, energy recovery and waste utilization.

Air pollution and its measurement, design of pollution abatement systems for particulate matter and gaseous constituents.

Design of waste-water and industrial effluent treatment; Hazardous waste treatment and disposal; Solid-waste disposal and recovery of useful products.

The course will be presented in logical manner with a number of numerical problems and case studies so that the students may properly understand the subject and apply the knowledge after their graduation in industry and higher studies.

### COURSE DETAIL

S.No	Topics	No. of Hours
1	<b>Introduction:</b> Environment and environmental pollution from chemical process industries, characterization of emission and effluents, environmental Laws and rules, standards	7

	for ambient air, noise emission and effluents.	
2	<p><b>Pollution Prevention:</b></p> <p>Process modification, alternative raw material, recovery of by co-product from industrial emission effluents, recycle and reuse of waste, energy recovery and waste utilization.</p> <p>Material and energy balance for pollution minimization. Water use minimization, Fugitive emission/effluents and leakages and their control-housekeeping and maintenance.</p>	8
3	<p><b>Air Pollution Control:</b></p> <p>Particulate emission control by mechanical separation and electrostatic precipitation, wet gas scrubbing, gaseous emission control by absorption and adsorption, Design of cyclones, ESP, fabric filters and absorbers.</p>	8
4	<p><b>Water Pollution Control:</b></p> <p>Physical treatment, pre-treatment, solids removal by setting and sedimentation, filtration centrifugation, coagulation and flocculation.</p>	6
5	<p><b>Biological Treatment:</b></p> <p>Anaerobic and aerobic treatment biochemical kinetics, trickling filter, activated sludge and lagoons, aeration systems, sludge separation and drying.</p>	6
6	<p><b>Solids Disposal:</b></p> <p>Solids waste disposal - composting, landfill, briquetting / gasification and incineration.</p>	5
	<b>Total</b>	40

## References:

1. "Pollution Control Acts, Rules, Notifications issued there under" CPCB, Ministry of Env. and Forest, G.O.I., 3rd Ed. 2006.
2. Vallero D; "Fundamentals of Air Pollution", 4 th Ed; Academic Press.
3. Eckenfelder W.W; "Industrial Water Pollution Control", 2 Ed; McGraw Hill.
4. Kreith F. and Tchobanoglous G., "Handbook of Solid Waste Management", 2 Ed; Mc Graw Hill.
5. Pichtel J; "Waste Management Practices: Municipal, Hazardous and Industrial", CRC.
6. Tchobanoglous G., Burton F. L. and Stensel H.D., "Waste Water Engineering: Treatment and Reuse", 4th Ed; Tata McGraw Hill.