

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B. Tech. in Civil Engineering
Course Code:	3CL501CC24
Course Title:	Environmental Engineering
Course Type:	Core
Year of Introduction:	2024-25

L	T	Practical Component				C
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Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. choose the sources of water and estimate water demand for water distribution system (BL5)
2. examine the quality of water and design unit processes of water treatment (BL4)
3. analyse various design parameters of wastewater & sewage treatment systems (BL4)
4. summarize the concepts of solid waste management, air and noise pollution. (BL2)

Unit	Contents	Teaching hours (Total 45)
Unit-I	Water Supply System sources of water, water supply systems: need and components; water demand, population forecasting methods.	05
Unit-II	Water Treatment water quality parameters and standards, basic unit operations and unit processes, design of treatment units, aeration and types of aerators, sedimentation, coagulation and flocculation, filtration, disinfection. Water softening, removal of iron and manganese, fluoridation/defluorination.	10
Unit-III	Sewerage System physical, chemical and biological characteristics of domestic wastewater, wastewater flow, sewerage system and sewer design, storm drainage. Effluent discharge standards, self-purification of natural stream.	08
Unit-IV	Wastewater Treatment preliminary, primary and secondary treatment units, aerobic and anaerobic processes, sludge treatment and disposal, oxidation ditch, other treatment concepts.	12

Unit-V **Solid Waste Management and Air & Noise Pollution**

10

Solid waste management: classification of solid wastes, concept of integrated solid waste management, disposal systems. Air Pollution: composition and properties of air, quantification and monitoring of air pollutants, air quality standards, health effects, dispersion stacks, control measures for air pollution. Noise pollution: sources, impact, measurement and control of noise pollution, permissible limit for noise.

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/
References:

- Peavy H.S., Rowe, D., & Tchobanoglous, G. *Environmental Engineering*, McGraw Hill.
- Garg, S. K., *Water Supply Engineering–Environmental Engineering (Vol. I)*. Khanna Publishers.
- Garg, S. K., *Sewage Disposal and Air Pollution Engineering–Environmental Engineering (Vol. II)*. Khanna Publishers.
- Birdie, G. S., & Birdie, J. S. *Water Supply and Sanitary Engineering*, Dhanpat Rai Publishing.
- Tchobanoglous, G., & Kreith, F. *Handbook of Solid Waste Management*, McGraw Hill.
- *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India.
- Rao, M. N., & Rao, H. V. N. *Air pollution*, Tata McGraw Hill
- Metcalf & Eddy, Tchobanoglous, G., Burton, F. & Stensel, H. D. *Wastewater Engineering Treatment and Reuse*, Tata McGraw Hill.

Laboratory Work: Laboratory work will be based on the above syllabus with minimum 11 experiments to be incorporated.



Suggested List of Experiments (not restricted to the following):
(Only for Information)

Sr. No.	Name of Experiment/Exercise	Hours
1.	Introduction to standards, collection and preservation of samples	02
2.	Determination of pH and electric conductivity	02
3.	Determination of acidity and alkalinity	02
4.	Determination of residual chlorine & chlorides	02
5.	Determination of hardness	02
6.	Determination of total, dissolved, suspended and settleable solids	04
7.	Determination of optimum dosage of coagulant (Jar Test)	02
8.	Determination of bio-chemical oxygen demand	04
9.	Determination of chemical oxygen demand	04
10.	Measurement of particulate contaminants SPM & RPM	04
11.	Determination of noise level	02