ENS-316 WATER AND WASTEWATER TREATMENT 3(3+0)

COURSE CODE:	ENS-316		
COURSE NAME:	Water and Wastewater Treatment		
CREDIT HOURS:	Theory = 03	Practical = 0	Total = 03
CONTACT HOURS:	Theory = 48	Practical = 0	Total = 48
PREREQUISITE:	None		
MODE OF TEACHING:	3 hours of Lecture per week (100%)		

COURSE DESCRIPTION:

The course equips students with the knowledge of water quality parameters, sources of pollutants, and standard techniques for characterizing water and wastewater. It covers key treatment processes, including physical, chemical, and biological methods, disinfection, sludge management, and low-cost treatment options. With a focus on treatment efficiency, cost-effectiveness, and sustainability, the course prepares students to address real-world challenges in municipal, industrial, and environmental contexts, ensuring compliance with water quality standards and contributing to public health and environmental protection.

COURSE LEARNING OUTCOMES:

By the end of this course, students will be able to:

a) Discuss water quality parameters and characterize the wastewater generated from various sources using standard analytical techniques
b) Understand the principles and processes involved in water and wastewater treatment, including physical, chemical, and biological treatment methods
c) Explain treatment efficiency, cost-effectiveness, and environmental sustainability

TOPICS COVERED:

Theory:

Week	Topics
1-2	Introduction to the course; Sources of pollutants in water; Water quality and wastewater characteristics
2-3	Standard analytical techniques for measurements; Water quality and wastewater regulations
4-5	Water treatment: Principles of water treatment; Physical and chemical methods; Coagulation and flocculation for water treatment
6-8	Sedimentation process and types of sedimentation tanks; Flotation; Filtration process basics, Filter media selection; Slow sand filter, Rapid sand filter, Cartridge filter
9	Mid Semester Exam
10-11	Disinfection: Introduction, Various methods/ options for disinfection with details of chlorination; Wastewater treatment: Principles and stages of wastewater treatment
12-13	Wastewater treatment: Processes of wastewater treatment
14-15	Treatment processes for domestic wastewater and industrial effluent; Low-cost water treatment and sanitation techniques.
16	Sludge processing: Handling, use or disposal of sludge

17	Resource recovery from wastewater and sludge; Use of treated wastewater
18	End Semester Exam

TEXT AND MATERIAL:

Textbooks:

1. Mritunjay Chaubey (2021). Wastewater Treatment Technologies: Design Considerations, Wiley-Blackwell, United Kingdom.
2. WB (2022). Wastewater Treatment and Reuse: A Guide to Help Small Towns Select Appropriate Options, World Bank, USA.

Reference Books:

1. APHA (2022). Standard Methods for the Examination of Water and Wastewater, 24th Edition, American Public Health Association, USA.
2. Xuan-Thanh Bui, Chart Chiemchaisri, Takahiro Fujioka, Sunita Varjani (Eds.), (2018). Water and Wastewater Treatment Technologies, Springer, Germany.

ASSESSMENT SYSTEM:

Theoretical/ Instruction		
Assessment Category	**Marks Distribution (%)**	
	Without Project	**With Project**
Quiz	15	10-15
Assignment	10	5-10
MSE	25	25
Project	-	5-10
ESE	50	45-50