Marwadi University
Marwadi Chandarana Group

Bachelor of Technology

Civil Engineering

Environmental Pollution

01CI1507

Objective of the Course:

- To understand the concept of environmental pollution, its types, effects, and mitigation strategies.

Credit Earned: 03

Prerequisite: Basics of Environmental Studies

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Understand essential attributes of environmental pollution types
2. Know about environmental resources and their pollution aspects
3. Analyze the sampling and analysis strategies for the water, air, and soil samples
4. Apply remediation techniques for various environmental pollution

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr No.	Topic	Hours
1	**Introduction**	6
	Introduction to Environmental pollution: Introduction and basic concepts of environment, the structure of the environment, air, soil, water interactions, Interface between Environment and Development, Pollution and Environmental Ethics, pollution types (Water, Air, Noise, Land, Municipal Solid Waste), Pollution prevention strategies and processes, Sustainable Development Goals (SDGs).	
2	**Water Pollution**	10
	Definition and sources of water pollution, Environmental, health, and economic impacts of water pollution, **Water quality standards, and regulatory** Overview of regulatory agencies and their roles in enforcing compliance, Fundamentals of water quality monitoring, Techniques for determining water quality. **Overview of**	

	available technologies and their application in water pollution control, Case studies. **Conservation and Management of Water Resources**: Groundwater Pollution and its control measures, Rainwater Harvesting and Artificial Recharge.	
3	**Air and Noise Pollution**	**10**
	Air Pollution: Introduction and Impacts of air pollution on human health, vegetation, animals, building materials, structures, atmosphere, soil and water bodies, Sources, and classification, Air Quality Monitoring, Air Quality Index (AQI), Global and regional environmental issues of air pollution: Ozone depletion, Climate change, Global warming, Acid rain. **Indoor air pollution:** sources, types, and health impacts. Air pollution emission standards, National and international policies, acts, rules, and regulations. **Noise Pollution** Basics of acoustics- propagation of indoor and outdoor sound-noise profiling effects of noise – measurement, index, and mitigation methods-health effects of noise. **Noise regulations and guidelines**, Overview of regulatory agencies and their roles in enforcing compliance. Overview of available technologies and their application in noise control, Case studies.	
4	**Municipal Solid Waste (MSW)Treatment and Disposal**	**10**
	Introduction to Solid Waste Management, Municipal Solid Waste Characteristics and Quantities, MSW Rules 2016, NITI Aayog, Swachh Bharat Mission and Smart Cities Program**,** Municipal Solid Waste Collection, Transportation, Segregation and Processing, factors influencing a waste generation and health hazards, Waste minimization, waste hierarchy, and waste audit, Recycling of solid wastes, Disposal of Municipal Solid Waste: Landfill, Current Issues in Solid Waste Management. **E-waste:** Introduction, E-waste characteristics; E-waste generation, collection, transport, recycling, and disposal methods; E-Waste Management Rules 2016 and Management Challenges. **Plastic waste:** Introduction, Plastic Waste – Sources, Production, Global and Indian Context; Plastic Waste Management Practices – Plastic management-recycling, energy production & other applications. Plastic Waste Management Rules, 2022 **Construction and Demolition (C&D) Waste Management** – Introduction & Overview C&D Waste – Regulation, Beneficial Reuse of C&D Waste Materials. Construction and Demolition Waste Management Rules 2016	
5	**Climate Change and Environmental Pollution**	**6**
	Introduction to Climate change and its effect on the environment, Climate Change Impacts agriculture, biodiversity, water resources (intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms), and Current examples of emerging environmental pollutants and their potential impacts.	
	Total	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	25%	25%	20%	10%	05%

Instructional Method and Pedagogy:

1. Presence in all academic sessions is mandatory, carrying 5% marks of the total internal evaluation.
2. Prerequisites of the course and its pattern shall be discussed at the commencement of the course.
3. The course delivery method will depend upon the requirement of content and the need of students. The teacher, in addition to the conventional teaching method by a whiteboard, may also use any of the tools such as collaborative learning, demonstration, role play, Quiz, brainstorming, MOOCs, Active Learning Assignments, etc.
4. The internal evaluation will be done based on continuous evaluation of students in the classroom.
5. At the end of each unit/topic, the students will be given an assignment based on the course content, carrying a minimum of 5% weightage for timely completion. And submission of the assigned work.

Students will use supplementary resources such as online videos, NPTEL videos, and e-courses (Swayam).

Recommended Study Material

1. C.S. Rao, (2021) Environmental Pollution Control Engineering, NEW AGE International Publishers.
2. Goel, P. K. Water pollution: causes, effects, and control. New age international, 2006.
3. Wang, Lawrence K., Norman C. Pereira, and Yung-Tse Hung, eds. Advanced air and noise pollution control. Totowa, NJ: Humana Press, 2005.
4. Peirce, J. J., Vesilind, P. A., & Weiner, R. (1998). Environmental pollution and control, Butterworth-Heinemann.
5. Sustainable Development Goal Interactions through a climate lens: a global analysis (2023), Publisher: Stockholm Environment Institute (SEI)
6. Municipal Solid Waste Management Manual Part I: An Overview, Central Public Health and Environmental Engineering Organisation (CPHEEO), 2016
7. Municipal Solid Waste Management Manual Part II: The Manual, Central Public Health and Environmental Engineering Organization (CPHEEO), 2016
8. Climate Change 2022: Mitigation of Climate Change, IPCC.