FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF

CIVIL ENGINEERING

Marwadi University Marwadi Chandarana Group NAAC A+

Air Pollution and Control

01CI0713

Objective of the Course:

- To identify and explain the causes and effects of air pollution.
- To evaluate air quality through pollution inventory and modeling techniques.
- To analyze the policy, health, and social aspects of air pollution.
- To assess contemporary technological innovations for air quality improvement.

Credit Earned: 04

Prerequisite: Basics of Environmental Studies and Environmental pollution.

Student's learning outcomes:

After successful completion of the course, students will be able to,

1. Explain the different sources of air pollution and their associated health and environmental effects.
2. Analyze air quality data using pollution inventory and modeling techniques.
3. Evaluate the social, health, and policy implications of air pollution.
4. Assess the effectiveness and potential of contemporary technological innovations designed to improve air quality.

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	01	00	04	50	30	20	25	25	150

Detailed Syllabus

Sr. No	Topic name	Hours
1	**Air Pollution**	**06**
	1.1 Introduction to Air Pollution and Impacts of air pollution on human health, vegetation, animals.	03
	1.2 Impacts of air pollution on building materials, structures, and atmosphere, soil, and water bodies.	03

2	**Sources, Classification, and Formation/ Transformation of Air Pollutants: Meteorology and Atmospheric Stability**	**10**
	2.1 Sources and Classification of Air Pollutants, Atmospheric Formation and Fate of Air Pollutants, Meteorological Parameters & Air Pollution, Atmospheric Stability and Lapse Rates	03
	2.2 Atmospheric Stability and Plume Behavior, Boundary Layer, Mixing Height, Stack Height, and Plume rise	02
	2.3 Status of Air Quality Monitoring in India, Air Quality Index (AQI)	02
	2.4 Introduction to Air Quality Modelling, Gaussian Dispersion Model for Point Source, Gaussian Dispersion Model for Line and Area Source	03
3	**Emissions Inventory and Air Pollution Emission Standards**	**12**
	3.1 Transport Emission Inventory, Emission Inventory for Industrial sector	03
	3.2 Emission Inventory for Agriculture sector, Emission Inventory for Residential and Commercial sectors	03
	3.3 Application of Remote Sensing/Satellite-Based Data in Air Quality Management, Source Apportionment	03
	3.4 Air Quality Standards, Air Pollution Legislations and Regulations, National Policies for Managing the Ambient Air Quality (AAQ)	03
4	**Indoor Air Pollution**	**08**
	4.1 Indoor Air Quality: An Introduction, Sources and Types of Indoor Air Pollutants	02
	4.2 Health Impacts Due to Indoor Air Pollution, Assessment of exposure to Indoor Air Pollution	03
	4.3 Indoor Air Quality Modelling, Technologies to Mitigate Indoor Air Pollution	03
5	**Air Pollution Control Devices, Equipment, and Their Design**	**06**
	5.1 Introduction to Air Pollution Control	02
	5.2 Settling chamber, Inertial separator, Cyclonic separator, Fabric Filters, Electrostatic Precipitators, Scrubbers, or wet collector	02
	5.3 Adsorption, Absorption, Biofiltration, Oxidation, Condensation	02
	TOTAL	**42**

List of Tutorials

Sr. No	Topic name	Hours
1	Determination of Concentration of Pollutants using Gaussian Dispersion Model.	2
2	Case Study Based on Emission Inventory.	2
3	Case Study Based on Assessment and Evaluation of IAQ.	2
4	Examples on Particulate Emission Control Devices, Gaseous Emission Control Devices.	2

5	Sampling and analysis of PM10 & PM2.5 in Ambient Air.	2
6	Sampling and analysis of SO2 and NO2 in Ambient Air.	2
7	Stack Emission Monitoring using Isokinetic Sampling.	2
	Total	**14**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as 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
5%	10%	30%	30%	15%	10%

Instructional Method and Pedagogy:

1. Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2. Lectures shall be conducted in the classroom using various teaching aids.
3. Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4. At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.
5. The tutorials are planned in such a way that they cover the practical aspects of the course contents. These tutorials shall bring clarity of the theoretical concepts which the students have studied during the academic sessions.

Recommended Study Material

1. Wark, K., Warner, C.F., and Davis, W.T., "Air Pollution: Its Origin and Control", Addison-Wesley Longman. 1998.
2. Boubel, R.W., Fox, D.L., Turner, D.B., Stern, A.C., "Fundamentals of Air Pollution", Academic Press. 2005.
3. Seinfeld, J.H., Pandis, S.N.,"Atmospheric Chemistry and Physics", John Wiley. 2006.
4. Lodge, J.P. (Ed.), "Methods of Air Sampling and Analysis", CRC Press. 1988.
5. Gurjar, B.R., Molina, L., Ojha, C.S.P. (Eds.), "Air Pollution: Health and Environmental Impacts", CRC Press. 2010.

Web Links

1. https://onlinecourses.nptel.ac.in/noc22_ce22/preview
2. https://archive.nptel.ac.in/courses/105/104/105104099/