

**COURSE CODE:** ENE-423  
**COURSE NAME:** Air and Noise Pollution Control  
**CREDIT HOURS:** Theory = 3 Practical = 0 Total = 3  
**CONTACT HOURS:** Theory = 48 Practical = 0 Total = 48  
**PREREQUISITE:** Introduction to Air and Noise Pollution  
**MODE OF TEACHING:** Three hours of lecture per week

**COURSE DESCRIPTION:**

This course is designed to familiarize the students of environmental Engineering with the atmosphere and the prevalent pollutants in it. The course is divided into three parts mainly. In the first part, students are introduced to the major air pollutants, their sources and effects, basic concepts of the air pollution, sampling and measuring techniques, the meteorological processes that govern the dispersion and transfer of pollutants and basic models used in the ambient air quality determination. The second part covers air pollution control techniques in which students learn about the design aspects of the major air pollution control equipment. The third and last part of the course covers noise pollution, its impact and mitigation techniques.

The course also includes practical sessions in which the students get hands-on experience with the major air pollutants measuring instruments.

**COURSE OBJECTIVES:**

The main objective of this course is to provide a comprehensive package of the concepts related to design of the technology used for the control of gaseous and particulate air pollution as well as management and control of noise pollution.

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the PLOs:

- |                                    |                          |                                   |                                     |
|------------------------------------|--------------------------|-----------------------------------|-------------------------------------|
| 1 Engineering Knowledge:           | <input type="checkbox"/> | 7 Environment and Sustainability: | <input checked="" type="checkbox"/> |
| 2 Problem Analysis:                | <input type="checkbox"/> | 8 Ethics:                         | <input type="checkbox"/>            |
| 3 Design/Development of Solutions: | <input type="checkbox"/> | 9 Individual and Teamwork:        | <input type="checkbox"/>            |
| 4 Investigation:                   | <input type="checkbox"/> | 10 Communication:                 | <input type="checkbox"/>            |
| 5 Modern Tool Usage:               | <input type="checkbox"/> | 11 Project Management:            | <input type="checkbox"/>            |

6 The Engineer and Society:

12 Lifelong Learning:

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will demonstrate competency by being able to:

Sr. No.	CLO	Domain	Taxonomy Level	PLO
1	<b>EXPLAIN</b> the basics of policy and technical aspects of air and noise pollution control	Cognitive	2	6
2	<b>ANALYSE</b> the operation, design, and maintenance of various stationary and mobile air pollution control technologies	Cognitive	4	2

**PRACTICAL APPLICATIONS:**

Most of the Pakistan’s bigger cities are currently included in the lists of the cities having the most polluted atmospheres in the world. Despite this fact, the country lacks the basic infrastructure to monitor and manage its air quality. This course will enable the students to understand the importance of air quality and equip them with the basic knowledge of managing the air quality in an efficient way.

**TOPICS COVERED:**

Week	Topic Covered	Reading Assignment/ Homework	CLO #
1	<b>Air Pollution Regulations:</b> US Clean Air Act (CAA) 1990, Pakistan Environmental Protection Act (PEPA) 1997, Environmental Standards, US-EPA, WHO, and Pak-NEQS	Chapter 1	1
2	<b>Measurement Fundamentals:</b> Gas flowrates and Temperature/Pressure Conditions, Ideal Gas Laws	Chapter 1	1
3	<b>Fundamentals of Combustion Systems and their link with Pollutants:</b> Boilers, Furnaces, Internal Combustion Engines, Gas Turbines	Chapter 1 Quiz 1	1
4	<b>Stationary Source Control (PM):</b> Particle Collection Mechanisms, Fluid–Particle Dynamics, Particle Sizing and Measurement Methods	Chapter 2 Assignment 1	2
5	<b>Stationary Source Control (PM):</b> Particle Size Distribution, Collection Efficiency	Chapter 2 Quiz 2	2

6	<b>Stationary Source Control (PM):</b> Gravity Settling Chambers (Operations, Design and Maintenance)	Chapter 2 Assignment 2	2
7	<b>Stationary Source Control (PM):</b> Cyclones (Types, Operations, Design and Maintenance)	Chapter 2	2
8	<b>Stationary Source Control (PM):</b> Electrostatic Precipitators (Operations, Design and Maintenance)	Chapter 2 Quiz 3	2
9	<b>Mid Semester Exam</b>		
10	<b>Stationary Source Control (PM):</b> Scrubbers and Baghouse (Types, Operations, Design and Maintenance)	Chapter 2 Assignment 3	2
11	<b>Stationary Source Control (Gases):</b> Adsorbers (Types, Operations, Design and Maintenance)	Chapter 3	2
12	<b>Stationary Source Control (Gases):</b> Incinerators (Types, Operations, Design and Maintenance)	Chapter 3 Quiz 5	2
13	<b>Stationary Source Control (Gases):</b> Absorbers (Types, Operations, Design and Maintenance)	Chapter 3 Assignment 4	2
14-15	<b>Mobile Source Control (Gasoline Vehicles):</b> Three-way catalytic Converter (Operations, Design and Maintenance)	Chapter 4	2
16	<b>Mobile Source Control (Diesel Vehicles):</b> Selective catalytic Converter (Operations, Design and Maintenance)	Chapter 5 Quiz 6	2
17	<b>Noise Pollution Control</b> (Types, Operation, Design and Maintenance)	Chapter 6	2
18	<b>End Semester Exam</b>		

**Practical:**

Not Applicable.

**TEXT AND MATERIAL:**

**Textbook (s)**

- 1- Energy and Environment, Willey, 2nd Ed. 2005
- 2- Lecture Notes

**References Material:** (Books available in soft)

- 1- Turner, Wayne C., and Steve Doty. *Energy management handbook*. The Fairmont Press, Inc., 2007.

2- Moss, Keith J. Energy management in Buildings. Taylor & Francis, 2006.

**ASSESSMENT SYSTEM:**

<b>Theoretical/Instruction</b>	<b>100%</b>
<b>Assignments</b>	<b>10%</b>
<b>Quizzes</b>	<b>15%</b>
<b>Mid Semester Exam</b>	<b>25%</b>
<b>End Semester Exam</b>	<b>50%</b>
<b>Practical Work</b>	<b>0%</b>
<b>Lab Attendance</b>	<b>0%</b>
<b>Lab Report</b>	<b>0%</b>
<b>Lab Quiz</b>	<b>0%</b>
<b>Lab Rubrics</b>	<b>0%</b>