ENVR/CIVL 4470 Air Quality Control and Management
(3 credits)

Fall 2023

1. GENERAL INFORMATION

Instructor:	Prof. Zhe WANG
Email:	z.wang@ust.hk
Date and Time:	Mon Wed 9:00AM - 10:20AM
Room:	Rm 2503, Lift 25-26

2. COURSE DESCRIPTION

Historical and health impact studies related to air pollution. Atmospheric stability and its impact on the transport and dispersion of pollutants. Sources of major air pollutants. Comparison of urban, industrial and transport related air pollution issues, using Hong Kong and Pearl River Delta as examples. Control of stationary and mobile emission sources. Air quality management - framework, policy tools and comparison of different approaches.

3. COURSE OBJECTIVES

This course is designed to provide solid foundation of the science, engineering, and basic issues associated air pollution control and air quality management, aiming to: (1) identify and describe the main sources of emissions that lead to urban air pollution; (2) compare and contrast the most common methods for effectively preventing or controlling emissions of air pollution; (3) understand the key issues in connecting science to policy formulation; (4) discuss and evaluate options and strategies for management of air quality; (5) discuss and identify opportunities in addressing air pollution problem with smart city technologies.

4. TENTATIVE COURSE SCHEDULE

Week	Topics	Briefly outline what this topic will cover
1	Nature of Atmospheric Pollution	• History and health impact of Air Pollution • Major air pollutants in the atmosphere
2	Fundamentals knowledge of Air Pollution	• Physical and Chemicals • Concentration Units • Unit conversion
3	Air Quality Management strategies	• Air quality management framework • Different management philosophies • Air quality standards • Air quality index
4	Air Quality monitoring and measurement techniques	• Monitoring principles • Measurement techniques
5.	Air Pollution Emission	• Energy Use and Combustion • Emission Sources of Air Pollutants • Emission Inventory and Emission Factors
6.	Air Pollution Meteorology	• Structure and stability of the atmosphere • Mixing, dispersion and transport of air pollutants
7.	Air Quality Models	• Box models • Gaussian models • 3-D gridded models • Receptor models
8.	Air Pollution Control Strategies	• General considerations in air pollution control
9.	Air Pollution Control Technology (1)	• Nature of particulate pollutants • Behavior of particles in the atmosphere • Control of particulates

10.	Air Pollution Control Technology (2)	• Control of Sulfur Oxides
11	Air Pollution Control Technology (3)	• Photochemical air pollution • Control of NOx and VOCs
12	Indoor Air Pollution and Exposure	• Indoor air quality • Exposure assessment
13	New advances and opportunities	• Crisis and challenges in modern cities • Emerging advances in technologies • New directions in air quality management • Air Quality and Global Climate

5. REFERENCES/READING MATERIALS

Primary Reference:

1. Noel De Nevers (2000) - Air Pollution Control Engineering. McGraw-Hill International Editions
2. NRC 2012 Exposure Science in the 21st Century: A Vision and Strategy

Secondary Reference:

3. Mark Z. Jacobson (2002) - Atmospheric Pollution, History, Science and Regulation. Cambridge University Press.
4. World Health Organization (https://www.who.int/)
5. Hong Kong Environmental Protection Department (http://www.epd.gov.hk)
6. EPA 1992 Guidelines for Exposure Assessment Excerpts

6. Assessment

Homework **25%**

In-class discussion and activity **5%**

Group Project **10%**

Mid-term (open book) **20%**

Final Exam (open book) **40%**