

# SEE3203: AIR POLLUTION

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## Effective Term

Semester B 2025/26

## Part I Course Overview

### Course Title

Air Pollution

### Subject Code

SEE - School of Energy and Environment

### Course Number

3203

### Academic Unit

School of Energy and Environment (E2)

### College/School

School of Energy and Environment (E2)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

SEE2002 Chemical Sciences for Energy and Environmental Engineers;  
SEE2003 Introduction to Energy and Environmental Data Analysis; and  
SEE3101 Engineering Thermofluids II

### Precursors

BCH2004 OR CHEM2004 Principles of Analytical Chemistry

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims to develop a fundamental appreciation and understanding of current air pollution and global warming problems. Students are expected to be present a balanced perspective on air pollution science by covering: sources and sinks of pollutants, their chemical and physical transformations within the atmosphere, the mathematical modelling of pollution dispersion.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Explain the scale and process of current air pollution and global warming problems	25	x		x
2 Relate physical and chemical principles to the process of air pollution	30		x	x
3 Apply mathematical and/or computational models to solve air pollution formation, transport and dispersion problems	20		x	x
4 Demonstrate critical thinking skills in global environmental change and societal adaption strategies	25	x	x	x

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Key topics related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems, will be discussed during lectures. Students will form small groups (2 – 3) during lectures to work with their peers to organize their understandings and relate the presented lecture material to those taught in previous lectures and other courses.	1, 2, 3, 4	
2	Group project	Group project requires students to form a small group of 2 – 3, and identify, analyze, and discuss their findings on an air pollution-related issue in the form of a group report and presentation.	2, 3, 4	

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1 Group Project Students will participate in groups to consolidate their learnings to identify, analyze, and discuss their findings on an air pollution-related issue in the form of a group report and presentation.	1, 2, 3, 4	35	-	Yes

2	Assignments Students will complete the assignments to demonstrate their ability to explain and apply their knowledge in key concepts as outlined in Lectures.	2, 3, 4	5	-	Yes
3	Mid-term There will be 1 midterm exam for instructor to assess students' learning progress on the concepts as outlined in Lectures.	1, 2, 3, 4	20	-	No

**Continuous Assessment (%)**

60

**Examination (%)**

40

**Examination Duration (Hours)**

2

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

Examination duration: 2 hrs Percentage of continuous assessment, examination, etc.: 60% by continuous assessment; 40% by exam To pass a course, a student must do ALL of the following: 1) obtain at least 30% of the total marks allocated towards continuous assessment (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable); 2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and 3) meet the criteria listed in the section on Assessment Rubrics.

**Assessment Rubrics (AR)****Assessment Task**

1. Term Project

**Criterion**

Capacity for self-directed learning to investigate air pollution issues and their impacts on human health and/or well-being

**Excellent (A+, A, A-)**

Demonstrate excellent self-directed learning capacity to investigate air pollution issues and their impacts on human health and/or well-being

**Good (B+, B, B-)**

Demonstrate good self-directed learning capacity to investigate air pollution issues and their impacts on human health and/or well-being

**Fair (C+, C, C-)**

Demonstrate moderate self-directed learning capacity investigate air pollution issues and their impacts on human health and/or well-being

**Marginal (D)**

Demonstrate basic self-directed learning capacity to investigate air pollution issues and their impacts on human health and/or well-being

**Failure (F)**

Demonstrate poor self-directed learning capacity to investigate air pollution issues and their impacts on human health and/or well-being

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**Assessment Task**

2. Assignment

**Criterion**

Ability to explain in detail and with accuracy and apply their knowledge in key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Excellent (A+, A, A-)**

Excellent analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Good (B+, B, B-)**

Good analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Fair (C+, C, C-)**

Moderate analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Marginal (D)**

Basic analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Failure (F)**

Poor analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

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**Assessment Task**

## 3. Mid-term

**Criterion**

Ability to explain in detail and with accuracy and apply their knowledge in key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Excellent (A+, A, A-)**

Excellent analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Good (B+, B, B-)**

Good analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Fair (C+, C, C-)**

Moderate analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Marginal (D)**

Basic analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Failure (F)**

Poor analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Assessment Task**

## 4. Examination

**Criterion**

Ability to explain in detail and with accuracy and apply their knowledge in key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Excellent (A+, A, A-)**

Excellent analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

**Good (B+, B, B-)**

Good analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

#### **Fair (C+, C, C-)**

Moderate analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

#### **Marginal (D)**

Basic analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

#### **Failure (F)**

Poor analysis and problem-solving skills in demonstrating their understanding of key concepts related to the scale and process of current air pollution and global warming problems, including the physical and chemical principles to the process of air pollution, mathematical and/or computational models to solve air pollution formation, transport, and dispersion problems

## **Part III Other Information**

### **Keyword Syllabus**

- The unpolluted atmosphere  
Composition, pressure and temperature distributions, general circulations, solar irradiance and heat balance, the greenhouse effect, meteorology, geochemical cycles
- Air pollutants  
Primary and secondary pollutants, natural and man-made sources, dynamics and properties of aerosols, air quality standards, Hong Kong's air pollution index, chemical and physical processes impacting air pollution, scavenging mechanisms, risks and effects
- Air pollution modelling  
Physical models, plume transport and dispersion analysis, mass balance
- Measurement and monitoring  
Air sampling systems, monitoring networks, air pollutant instrumentation
- Air pollution control  
Regulatory and engineering control, emission standards, Hong Kong's air quality objectives, control devices and technologies

### **Reading List**

#### **Compulsory Readings**

Title	
1	Nil

#### **Additional Readings**

Title	
1	John H. Seinfeld and Spyros N. Pandis: Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 2nd Edition, Wiley-interscience, N Y, 2006

2	Richard Segar Scorer: Meteorology of air pollution: implications for the environment and its future. New York: E. Horwood, 1990
3	Daniel Vallero, Fundamentals of Air Pollution, Academic Press, 5th Edition, 2014
4	Daniel Jacob, Introduction to Atmospheric Chemistry, Princeton University Press, 1st Edition, 1999