

# SEE8211: AIR POLLUTION AND ATMOSPHERIC CHEMISTRY

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Air Pollution and Atmospheric Chemistry

### Subject Code

SEE - School of Energy and Environment

### Course Number

8211

### Academic Unit

School of Energy and Environment (E2)

### College/School

School of Energy and Environment (E2)

### Course Duration

One Semester

### Credit Units

3

### Level

R8 - Research Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

SEE5201 Air Pollution and Atmospheric Chemistry

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims to provide a working knowledge of air quality issues. It will emphasize on a multidisciplinary approach to investigating the emission sources, atmospheric chemistry and removal processes, meteorological phenomena and their impact on pollution at local to global scales. Regional and global issues such as acid rain, ozone depletion and air quality connections to climate change will also be discussed.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Describe the compositions and structure of the atmosphere and their relationships with air pollution and global atmospheric change	25	x		
2	Demonstrate an understanding of atmospheric chemistry	50		x	
3	Demonstrate critical thinking skills in current challenges of air pollution and global atmospheric change	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	Lectures	Explain key concepts of atmospheric chemistry	1, 2, 3
2	Tutorials	Solidify students' and understandings with practical examples, real cases, class assignments and discussions.	1, 2, 3
3	Presentation	Express students' own opinions on air quality and climate change issues	3

### Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?	
1	Assignments	1, 2, 3	40	Summative Assessment	No
2	Midterm	1, 2	35	-	No

3	Term paper and presentation	1, 2, 3	25	-	Yes
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**Continuous Assessment (%)**

100

**Examination (%)**

0

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

30

**Additional Information for ATs**

To pass a course, a student must do ALL of the following:

- a. obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
  - b. 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**

Assignments (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Ability to solve problems related to lecture material

**Excellent**

(A+, A, A-) Excellent analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate

**Good**

(B+, B, B-) Good analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate

**Fair**

(C+, C, C-) Moderate analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate

**Marginal**

(D) Acceptable analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate

**Failure**

(F) Poor analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate

**Assessment Task**

Midterm (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Ability to explain key concepts and solve problems related to air pollution

**Excellent**

(A+, A, A-) Excellent understanding of concepts and ability to analyze and solve problems related to air pollution

**Good**

(B+, B, B-) Good understanding of concepts and ability to analyze and solve problems related to air pollution

**Fair**

(C+, C, C-) Moderate understanding of concepts and ability to analyze and solve problems related to air pollution

**Marginal**

(D) Acceptable understanding of concepts and ability to analyze and solve problems related to air pollution

**Failure**

(F) Failure to demonstrate understanding of concepts and ability to analyze and solve problems related to air pollution

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**Assessment Task**

Term paper and presentation (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Ability to propose and present an air pollution- or climate-related project

**Excellent**

(A+, A, A-) Excellent project design, writing, and presentation

**Good**

(B+, B, B-) Good project design, writing, and presentation

**Fair**

(C+, C, C-) Moderate project design, writing, and presentation

**Marginal**

(D) Be able to design, describe, and present the project

**Failure**

(F) Failure to design, describe, or present the project

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**Assessment Task**

Assignments (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

Ability to analyse and solve problems related to lecture material

**Excellent**

(A+, A, A-) Excellent analysis and problem solving skills to demonstrate in-depth understanding of air pollution chemistry

**Good**

(B+, B) Good analysis and problem solving skills to demonstrate good understanding of air pollution chemistry

**Marginal**

(B-, C+, C) Marginally acceptable analysis and problem solving skills to demonstrate limit understanding of air pollution chemistry

### **Failure**

(F) Poor analysis and problem solving skills to demonstrate understanding of air pollution chemistry

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### **Assessment Task**

Midterm (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

### **Criterion**

Ability to explain key concepts and solve problems related to air pollution

### **Excellent**

(A+, A, A-) Excellent understanding of concepts and ability to analyse real-world problems related to air quality

### **Good**

(B+, B) Excellent understanding of concepts and ability to analyse real-world problems related to air quality

### **Marginal**

(B-, C+, C) Marginally acceptable understanding of concepts and ability to analyse real-world problems related to air quality

### **Failure**

(F) Failure to demonstrate understanding of concepts and ability to analyse real-world problems related to air quality

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### **Assessment Task**

Term paper and presentation (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

### **Criterion**

Ability to propose and present an air pollution-related project

### **Excellent**

(A+, A, A-) Excellent project design, literature review, and writing in the term paper. Excellent, clear, and confident performance in the presentation.

### **Good**

(B+, B) Good project design, literature review, and writing in the term paper. Good and clear performance in the presentation.

### **Marginal**

(B-, C+, C) Marginally acceptable performance in project design, literature review, paper writing, and presentation.

### **Failure**

(F) Failure to design the project and present it clearly.

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## **Part III Other Information**

### **Keyword Syllabus**

- Chemistry concepts
- Air pollution regulations and health effects
- Atmospheric composition, meteorology, pressure, and transport
- Biogeochemical cycles

- Radiation, greenhouse effects, and climate forcing
- Stratospheric chemistry and pole ozone hole
- Tropospheric chemistry, ozone smog, and urban air quality
- Aerosols, clouds aqueous phase chemistry, and acid rain
- Air Pollution control and indoor air quality

### Reading List

#### Compulsory Readings

Title	
1	Daniel Jacob, Introduction to Atmospheric Chemistry, Princeton University Press, 1999.

#### Additional Readings

Title	
1	John H. Seinfeld and Spyros N. Pandis: Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 3rd Edition, Wiley, 2016.