**City University of Hong Kong**
**Course Syllabus**

**offered by School of Energy and Environment**
**with effect from Semester B 2022 /23**

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**Part I Course Overview**

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|---|---|
| **Course Title:** | Air Pollution and Atmospheric Chemistry |
| **Course Code**: | SEE8211 |
| **Course Duration:** | One semester |
| **Credit Units**: | 3 |
| **Level**: | R8 |
| **Medium of Instruction:** | English |
| **Medium of Assessment:** | English |
| **Prerequisites**: *(Course Code and Title)* | Nil |
| **Precursors**: *(Course Code and Title)* | Nil |
| **Equivalent Courses**: *(Course Code and Title)* | SEE5201 Air Pollution and Atmospheric Chemistry |
| **Exclusive Courses**: *(Course Code and Title)* | Nil |

## Part II Course Details

### 1. 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 and climate 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.

### 2. Course Intended Learning Outcomes (CILOs)

| No. | CILOs | Weighting (if applicable) | Discovery-enriched curriculum related learning outcomes (please tick where appropriate) | | |
|---|---|---|---|---|---|
| | | | *A1* | *A2* | *A3* |
| 1. | Describe the compositions and structure of the atmosphere and their relationships with air quality and climate. | 25% | ✓ | | |
| 2. | Demonstrate an understanding of atmospheric chemistry. | 50% | | ✓ | |
| 3. | Demonstrate critical thinking skills in current challenges of air pollution and global climate change. | 25% | ✓ | ✓ | ✓ |
| | | 100% | | | |

*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 self-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.*

### 3. Teaching and Learning Activities (TLAs)

| TLA | Brief Description | CILO No. | | | Hours/week (if applicable) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| Lectures | Explain key concepts of atmospheric chemistry | ✓ | ✓ | ✓ | |
| Tutorials | Solidify students' and understandings with practical examples, real cases, class assignments and discussions. | ✓ | ✓ | ✓ | |
| Presentation | Express students' own opinions on air quality and climate change issues | | | ✓ | |

## 4. Assessment Tasks/Activities (ATs)

*(ATs are designed to assess how well the students achieve the CILOs.)*

| Assessment Tasks/Activities | CILO No. | | | | | | Weighting* | Remarks |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | | | | |
| Continuous Assessment: _100_% | | | | | | | | |
| Assignments | ✓ | ✓ | ✓ | | | | 40% | |
| Midterm | ✓ | ✓ | | | | | 35% | |
| Term paper and presentation | ✓ | ✓ | ✓ | | | | 25% | |
| Examination: ____% (duration: , if applicable) | | | | | | | | |
| | | | | | | | 100% | |

## 5. Assessment Rubrics

Applicable to students admitted in Semester A 2022/23 and thereafter

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B) | Marginal (B-, C+, C) | Failure (F) |
|---|---|---|---|---|---|
| 1. Assignments | Ability to solve problems related to lecture material | Excellent analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Good analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Acceptable analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Poor analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate |
| 2. Mid-term | Ability to explain concepts, analyse and solve problems related to air pollution | Excellent understanding of concepts and ability to analyze and solve problems related to air pollution | Good understanding of concepts and ability to analyze and solve problems related to air pollution | Acceptable understanding of concepts and ability to analyze and solve problems related to air pollution | Failure to demonstrate understanding of concepts and ability to analyze and solve problems related to air pollution |
| 3. Term paper and presentation | Ability to propose and present an air pollution- or climate-related project | Excellent project design, writing, and presentation | Good project design, writing, and presentation | Be able to design, describe, and present the project | Failure to design, describe, or present the project |

Applicable to students admitted before Semester A 2022/23

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D) | Failure (F) |
|---|---|---|---|---|---|---|
| 1. Assignments | Ability to solve problems related to lecture material | Excellent analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Good analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Moderate analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Acceptable analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate | Poor analysis and problem solving skills to demonstrate in-depth understanding of atmospheric chemistry and its relationship to air pollution and climate |
| 2. Mid-term | Ability to explain concepts, analyse and solve problems related to air pollution | Excellent understanding of concepts and ability to analyze and solve problems related to air pollution | Good understanding of concepts and ability to analyze and solve problems related to air pollution | Moderate understanding of concepts and ability to analyze and solve problems related to air pollution | Acceptable understanding of concepts and ability to analyze and solve problems related to air pollution | Failure to demonstrate understanding of concepts and ability to analyze and solve problems related to air pollution |
| 3. Term paper and presentation | Ability to propose and present an air pollution- or climate-related project | Excellent project design, writing, and presentation | Good project design, writing, and presentation | Moderate project design, writing, and presentation | Be able to design, describe, and present the project | Failure to design, describe, or present the project |

**Part III Other Information** (more details can be provided separately in the teaching plan)

## 1. Keyword Syllabus

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

## 2. Reading List

### 2.1 Compulsory Readings

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

### 2.2 Additional Readings

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