City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2020/21

Part I Course Overview

Course Title:	Air Pollution
Course Code:	SEE3203
Course Duration:	1 semester
Credit Units:	3 credits
Level:	B3
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	SEE2003 Introduction to Energy and Environmental Data Analysis; SEE2002 Chemical Sciences for Energy and Environmental Engineers; and SEE3101 Engineering Thermofluids II
Precursors: *(Course Code and Title)*	BCH2004 OR CHEM2004 Principles of Analytical Chemistry
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

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.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Explain the scale and process of current air pollution and global warming problems	25%	✓		✓
2.	Relate physical and chemical principles to the process of air pollution	30%		✓	✓
3.	Run mathematical and/or computational models to solve air pollution formation, transport and dispersion problems	20%		✓	✓
4.	Demonstrate critical thinking skills in global environmental change and societal adaption strategies	25%	✓	✓	✓
		100%			

** If weighting is assigned to CILOs, they should add up to 100%.*

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Explain key concepts, such as physical and chemical principles to the process of air pollution	✓	✓	✓	✓	
Tutorial / Computational labs	Require students to run computational models to evaluate the behaviours of air pollutant formation, transport and dispersion		✓	✓	✓	

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	4		
Continuous Assessment: 60 %						
Term Project	✓	✓	✓	✓	25%	
Assignment		✓	✓	✓	10%	
Mid-term	✓	✓	✓	✓	25%	
Examination: 40 % (duration: 2 hrs , if applicable)						
** The weightings should add up to 100%.*					100%	

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 60% by coursework; 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 coursework (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.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Term Project	Ability to solve contemporary air pollution problems in creative ways	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Assignment	Capacity for self-directed learning to understand the principles of air pollutant behaviours using computational tools	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Mid-term	Ability to explain key concepts, such as physical and chemical principles to the process of air pollution	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Ability to explain key concepts, such as physical and chemical principles to the process of air pollution	High	Significant	Moderate	Basic	Not even reaching marginal levels

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

1. Keyword Syllabus

(An indication of the key topics of the course.)

- 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

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

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