

City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2018/19

Part I Course Overview

Course Title: Air Pollution

Course Code: SEE3203

Course Duration: 1 semester

Credit Units: 3 credits

Level: B3

Arts and Humanities

Proposed Area:
(for GE courses only)

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 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	20%	✓		✓
2.	Relate physical and chemical principles to the process of air pollution	30%		✓	✓
3.	Apply mathematical models to solve pollution dispersion problems	35%		✓	✓
4.	Demonstrate critical thinking skills in global environmental change and societal adaption strategies	15%	✓	✓	✓
		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	✓	✓	✓	✓	
Hands-on experiment	Require students to run Gaussian plume model and to diagnose the behaviour of air pollutant dispersion		✓	✓	✓	
Field trip report	Connect scientific world with daily life	✓	✓		✓	

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: 50 %						
Assignment	✓	✓	✓	✓	20%	
Hands-on experiment	✓	✓	✓	✓	20%	
Field trip report	✓			✓	10%	
Examination: 50 % (duration: 2 hrs, if applicable)						
					100%	

* The weightings should add up to 100%.

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 50% by coursework; 50% 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. Assignment	Ability to explain in detail and with accuracy method	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hands-on experiment	Capacity for self-directed learning to understand the principles of plume model	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Field trip report	Ability to explain the methodology and procedure	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 of air pollution
Adiabatic lapse rate, Atmospheric stability, Air parcel buoyancy, Heat exchange in the lower Atmosphere, Temperature inversion, Effect of mixing layer depth, Katabatic and anabatic winds
- 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
- Geochemical cycles
Reservoirs and fluxes of important chemical species between the atmosphere, hydrosphere and lithosphere; Carbon cycle, nitrogen cycle, sulphur cycle
- Scavenging mechanisms
Behaviour of particles within the atmosphere; Deposition, coagulation, rainout and washout, settling velocity, inhalation into human respiratory system
- Modelling
Box models, Gaussian plume model, plume dispersion characteristics, plume rise, plume downwash, Physical models, tracer techniques

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, 2 nd 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. ISBN 0135772303 9780135772300
3.	Daniel Vallero, Fundamentals of Air Pollution, Academic Press, 5th Edition, 2014.ISBN-13:978-0124017337