SEE3203: AIR POLLUTION

Effective Term
Semester A 2022/23

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	Run 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.

Teaching and Learning Activities (TLAs)

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

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Term Project	1, 2, 3, 4	25	
2	Assignment	2, 3, 4	10	
3	Mid-term	1, 2, 3, 4	25	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

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.

Assessment Rubrics (AR)

Assessment Task

1. Term Project

Criterion

Ability to solve contemporary air pollution problems in creative ways

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Assignment

Criterion
Capacity for self-directed learning to understand the principles of air pollutant behaviours using computational tools

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Mid-term

Criterion
Ability to explain key concepts, such as physical and chemical principles to the process of air pollution

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
4. Examination

Criterion
Ability to explain key concepts, such as physical and chemical principles to the process of air pollution

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

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