

**City University of Hong Kong
Course Syllabus**

**offered by School of Energy and Environment
with effect from Semester A 2021/22**

Part I Course Overview

Course Title: Combustion and Air Pollution Control

Course Code: SEE4216

Course Duration: One semester

Credit Units: 3

Level: B4

Arts and Humanities

Study of Societies, Social and Business Organisations

Science and Technology

Proposed Area:
(for GE courses only)

Medium of Instruction: English

Medium of Assessment: English

Prerequisites: PHY1201 General Physics I; AND
SEE2101 Engineering Thermofluids I; AND
SEE3101 Engineering Thermofluids II
(Course Code and Title)

Precursors: CHEM2004 Principles of Analytical Chemistry; AND
SEE3203 Air Pollution
(Course Code and Title)

Equivalent Courses: Nil
(Course Code and Title)

Exclusive Courses: Nil
(Course Code and Title)

Part II Course Details

1. Abstract

(A 150-word description about the course)

The course is designed for the senior undergraduate students to understand the basics of air pollution control approaches and technologies. The course will provide the students with the fundamental knowledge of the air pollution sources and properties, the currently available air pollution control technologies and devices, including the theory behind the control methods, their design and efficiency analysis, as well as their applications.

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 fundamentals of combustion and air pollution generation | 20% | | ✓ | |
| 2. | Describe the operational principles of air pollution control devices and discover their respective application | 30% | ✓ | ✓ | |
| 3. | Apply the knowledge innovatively in the calculation, design and engineering of the air pollution control processes | 50% | | ✓ | ✓ |
| | | 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 | |
| Lectures | Explain the fundamental of combustion and air pollution, describe the operational principles of air pollution control devices and their practical design considerations for different application | ✓ | ✓ | ✓ | |
| Tutorials | Solidify students' understanding of key concepts and principles via practice and tackling difficulties encountered in the lectures and exercises | ✓ | ✓ | ✓ | |

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: <u>40</u> % | | | | | |
| Assignments | ✓ | ✓ | ✓ | 40% | |
| Examination: <u>60</u> % (duration: 2 hours , if applicable) | | | | | |
| * The weightings should add up to 100%. | | | | 100% | |

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 40% by coursework; 60% 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. Assignments | Ability to explain the fundamentals of combustion and air pollution and provide control solutions to air pollution due to combustion processes | Excellent understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions 1 | Good understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Acceptable understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Marginally acceptable understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Poor understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions |
| 2. Examination | Ability to explain the fundamentals of combustion and air pollution and provide control solutions to air pollution due to combustion processes | Excellent understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions 1 | Good understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Acceptable understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Marginally acceptable understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions | Poor understanding of fundamentals of combustion and air pollution and ability to provide air pollution control solutions |

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.)

- 1. Introduction to air pollution**
- 2. Basics of gas combustion**
- 3. Combustion process and air emissions formation**
- 4. Air pollution control approaches**
 - a. Pre-combustion control
 - b. In-combustion control
 - c. Post-combustion control
- 5. Key air pollution control 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. | Zhongchao Tan, Air Pollution and Greenhouse Gases from Basic Concepts to Engineering Applications for Air Emission Control Springer Science+Business Media Singapore, 2014. ISBN: 978-981-287-211-1 |
| 2. | David Cooper, F. C. Alley Air Pollution Control (3rd Edition), Waveland Press, 2002. ISBN: 978-1577662181 |
| 3. | Kenneth W. Ragland & Kenneth M. Bryden, Combustion Engineering, 2nd ed. Boca Raton, FL : CRC Press, c2011, ISBN: 9781420092509 |