

Course Syllabus

**offered by Department of Chemistry
with effect from Semester A 2020/21**

This form is for the completion by the Course Leader. The information provided on this form is the official record of the course. It will be used for the City University's database, various City University publications (including websites) and documentation for students and others as required.

Please refer to the Explanatory Notes on the various items of information required.

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**City University of Hong Kong
Course Syllabus**

**offered by Department of Chemistry
with effect from Semester A 2020/21**

Part I Course Overview

Course Title:	Environmental Control and Waste Treatment
Course Code:	CHEM4034
Course Duration:	1 semester
Credit Units:	4 credits
Level:	B4
Proposed Area: <i>(for GE courses only)</i>	<input type="checkbox"/> Arts and Humanities <input type="checkbox"/> Study of Societies, Social and Business Organisations <input type="checkbox"/> Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: <i>(Course Code and Title)</i>	Nil
Precursors: <i>(Course Code and Title)</i>	Nil
Equivalent Courses: <i>(Course Code and Title)</i>	BCH4034 Environmental Control and Waste Treatment
Exclusive Courses: <i>(Course Code and Title)</i>	CHEM4023/BCH4023 (and CHEM4023A/BCH4023A) Biological Treatment of Wastes

Part II Course Details

1. Abstract

(A 150-word description about the course)

In this course, students will:

- develop knowledge in environmental policies and legislations related to air and water pollution control and their economic and social implications and investigate various air and water pollution control strategies and technology
- develop knowledge in various modern approaches and philosophies in integrated waste management and investigate techniques and methodologies in integrated waste management

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.	Describe and evaluate various pollution-control strategies and programmes, with special reference to Hong Kong.	NA	NA	NA	NA
2.	Compare and contrast the various strategies to control different types of pollution.	NA	NA	NA	NA
3.	Critically evaluate, using case studies and via group presentations, environmental policies and legislations related to pollution control and their economic and social implications.	NA	NA	NA	NA
4.	Describe and evaluate how different types of wastes are generated, transported and disposed of and their impact on the environment.	NA	NA	NA	NA
5.	Compare and contrast the various strategies in the treatment of wastes.	NA	NA	NA	NA
6.	Critically evaluate, using case studies and via group presentations, appreciate the importance of clean-production and waste-minimization philosophies.	NA	NA	NA	NA
		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	5	6	
Group activities	Teaching and learning will be primarily based around large and small group activities examining various pollution-control strategies and programmes, with special reference to Hong Kong.	✓						
Group activities	Teaching and learning will be based on small group activities laying the basis for various strategies to control different types of pollution.		✓					
Group activities, written assignments and presentations	Teaching and learning will be primarily by large and small group activities, written assignments, and presentations related to environmental policies and legislations related to pollution control and their economic and social implications.			✓				
Group activities	Teaching and learning will be primarily based around large and small group activities examining how different types of wastes are generated, transported and disposed of and their impact on the environment.				✓			
Group activities	Teaching and learning will be based on small group activities laying the basis for various strategies in the treatment of wastes.					✓		
Group activities, written assignments and presentations	Teaching and learning will be primarily by large and small group activities, written assignments and presentations related to the importance of clean-production and waste-minimization philosophies.						✓	

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	5	6		
Continuous Assessment: <u>40%</u>								
Tutorial Assignments & Quizzes	✓		✓	✓		✓	NA	
Practicals		✓				✓	NA	
Group Presentations			✓			✓	NA	
Examination: <u>60%</u> (duration: 3 hours)								
* The weightings should add up to 100%.							100%	

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM:

“A minimum of 40% in both coursework and examination components.”

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. Tutorial Assignments & Quizzes	understanding of the topic and reading materials; correctness of interpretation and analysis of experimental data	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Practicals	Understanding of the topic and material; completeness of the presentation; logic of the presentation structure; clarity of talk; appropriate use of photos and figures in the illustration of concepts; ability to discuss the presented topic	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Group Presentations	Correctness of interpretation and analysis of experimental data; understanding of the topic and reading materials; application of knowledge in solving real life problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Completeness and correctness of	High	Significant	Moderate	Basic	Not even reaching marginal levels

	calculations/answers; correctness of interpretation and analysis of experimental data; application of knowledge in solving real life problems; logic of argumentation and intelligent use of course content/ original thinking					
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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.)

Environmental Control

- Types and sources of pollution with special reference to Hong Kong and China.
- Environmental policy making in relation to pollution control in Hong Kong, China and overseas.
- Legal aspects of environmental pollution in Hong Kong, China and overseas. Environmental standards and regulations. Pollution Control Ordinances.
- Economic and social implications of environmental protection policies and legislations. The "beneficial use" approach in environmental protection.
- Process chemistry for pollution control.
- Modern control technologies for land, water, air and noise pollution, e.g. adsorption, ion exchange, precipitation, membrane separation technology, electrochemical methods, electrostatic precipitator, control technology for nitrogen oxides and sulphur oxides in flue gas, gas absorption and stripping, use of sound absorbers and barriers, etc.
- Application of microbiology and biotechnology in pollution control.
- Case studies in Hong Kong, China and overseas.

Waste Treatment

- Sources and kinds of wastes. The concept of sustainable development.
- Clean production technology; reduction, reuse, recovery and recycle; end-of-pipe treatment, "Cradle to Grave" approach to waste management.
- Life-cycle analysis; process modification; raw materials and end-product substitutions, waste minimization and separation.
- Chemical, biological and physical remediation of contamination sites. Application of microbiology and biotechnology in waste management.
- Management of toxic and hazardous wastes e.g. chemical, biomedical and nuclear wastes.
- Options in waste disposal and treatment in Hong Kong e.g. landfill, incineration, ocean dumping etc. Socio-economic considerations.
- Selected studies/examples in Hong Kong, China and overseas.

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.)

1.	
2.	
3.	
...	

2.2 Additional Readings

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

1.	To be provided, as required, in lectures and tutorials.
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A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

GE PILO	Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)
PILO 1: Demonstrate the capacity for self-directed learning	
PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology	
PILO 3: Demonstrate critical thinking skills	
PILO 4: Interpret information and numerical data	
PILO 5: Produce structured, well-organised and fluent text	
PILO 6: Demonstrate effective oral communication skills	
PILO 7: Demonstrate an ability to work effectively in a team	
PILO 8: Recognise important characteristics of their own culture(s) and at least one other culture, and their impact on global issues	
PILO 9: Value ethical and socially responsible actions	
PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation	

GE course leaders should cover the mandatory PILOs for the GE area (Area 1: Arts and Humanities; Area 2: Study of Societies, Social and Business Organisations; Area 3: Science and Technology) for which they have classified their course; for quality assurance purposes, they are advised to carefully consider if it is beneficial to claim any coverage of additional PILOs. General advice would be to restrict PILOs to only the essential ones. (Please refer to the curricular mapping of GE programme: http://www.cityu.edu.hk/edge/ge/faculty/curricular_mapping.htm.)

B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task