

## 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.

**Prepared / Last Updated by:**

Name: Prof. István T Horváth Academic Unit: Department of Chemistry

Phone/email: 3442 7878 /  
istvan.t.horvath@cityu.edu.hk Date: 18 November 2019

**City University of Hong Kong  
Course Syllabus**

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

---

---

**Part I Course Overview**

<b>Course Title:</b>	Industrial Chemistry
<b>Course Code:</b>	CHEM4033
<b>Course Duration:</b>	1 semester
<b>Credit Units:</b>	4 credits
<b>Level:</b>	B4
<b>Proposed Area:</b> <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
<b>Medium of Instruction:</b>	English
<b>Medium of Assessment:</b>	English
<b>Prerequisites:</b> <i>(Course Code and Title)</i>	CHEM2006/BCH2006 Principles of Inorganic Chemistry CHEM2007/BCH2007 Principles of Organic Chemistry CHEM2008/BCH2008 Principles of Physical Chemistry
<b>Precursors:</b> <i>(Course Code and Title)</i>	Nil
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	BCH4033 Industrial Chemistry
<b>Exclusive Courses:</b> <i>(Course Code and Title)</i>	Nil

## Part II Course Details

### 1. Abstract

(A 150-word description about the course)

In this course, students will be introduced to the fundamentals of industrial chemistry and its role in current technologies in the chemical, petrochemical, and pharmaceutical industries. Following completion of the course students will be able to describe the role of chemical, petrochemical, and pharmaceutical industries in the world; identify the key concepts and laws of physical chemistry used in technology; comprehend the fundamentals of chemical engineering; review the production of energy and raw materials. Describe the chemical processes related to water; identify the most important inorganic and organic products and the technologies for their production; and discuss the most important challenges for sustainable development.

### 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 <sup>#</sup>	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Explain the role of chemical, petrochemical, and pharmaceutical industries in the world.	5%	✓		
2.	Describe the use of the key concepts and laws of physical chemistry and chemical engineering in technology.	15%	✓		✓
3.	Analyse the role and the production of energy and raw materials including drinking water and waste water.	30%	✓	✓	
4.	Describe a technology using processes at the molecular level for the production of key inorganic and organic products.	40%		✓	✓
5.	Design a list of criteria to evaluate the feasibility of a project / plan related to sustainable developments.	10%	✓	✓	✓
		100%			

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

<sup>#</sup> 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	
Lectures and tutorials	The contribution of the chemical, petrochemical, and pharmaceutical industries to the economy will be demonstrated by using global data.	✓					
Lectures and tutorials	The key concepts industrial chemistry and the fundamentals of chemical engineering will be described.		✓				
Videos	Use of process schemes and videos to review and demonstrate the production of energy and raw materials, including the treatment waste water and the production of drinking water.			✓			
Animations	Use of animations to illustrate key inorganic and organic products and some of the production process.				✓		
Group discussion	Group work to compose a list of criteria to be assessed by peers through online discussion.					✓	

### 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		
Continuous Assessment: <u>40%</u>							
Recollection Tests & Tutorial Assignments	✓	✓	✓	✓	✓	20%	
Group Presentations				✓		15%	
Reports & Debates					✓	5%	
Examination: <u>60%</u> (duration: 2 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. Recollection Tests & Tutorial Assignments	Ability to explain the concepts of industrial chemistry and their use in chemical processes and technologies	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Group Presentations	Ability to explain an industrial chemical processes and the role of their products in society.	High	Significant	Moderate	Basic	Not even reaching marginal levels

3. Reports	3.1 Capacity for self-directed learning to understand the basics of industrial chemistry 3.2 Ability to explain industrial processes	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Ability to answer questions in details concerning the role of physical chemistry in industrial processes, the basics of chemical engineering, the production of energy, raw materials, inorganic and organic products and some of their production process, and discuss sustainable development.	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 role of chemical technology in the world.
- The role of physical chemistry in chemical technology.
- The fundamentals of chemical engineering.
- Energy production.
- The raw materials of the chemical and petrochemical industry.
- Chemical processes related to water.
- The products and processes of the inorganic chemical industry.
- Synthetic fuels.
- C1 chemical processes.
- The products and processes of the organic chemical industry.
- Polymers
- Agricultural chemicals.
- The fundamentals and products of biotechnology.
- Challenges for sustainable developments.

#### 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.	Slides of the lectures
----	------------------------

##### 2.2 Additional Readings

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

1.	Benvenuto, M. A. Industrial Chemistry, Walter de Gruyter; Berlin/Boston, 2014.
----	--

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:

<b>GE PILO</b>	<b>Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)</b>
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](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.

<b>Selected Assessment Task</b>