

## Course Syllabus

**offered by Department of Chemistry  
with effect from Semester A 2021/22**

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:**

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**City University of Hong Kong  
Course Syllabus**

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**Part I     Course Overview**

**Course Title:** Independent Research I

**Course Code:** CHEM4086

**Course Duration:** 1 semester

**Credit Units:** 8

**Level:** B4

**Proposed Area:**  
(for GE courses only)

☐ Arts and Humanities  
☐ Study of Societies, Social and Business Organizations  
☐ Science and Technology

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites:**  
(Course Code and Title) Nil

**Precursors:**  
(Course Code and Title) Nil

**Equivalent Courses:**  
(Course Code and Title) Nil

**Exclusive Courses:**  
(Course Code and Title) CHEM4036/BCH4036 Project

## Part II Course Details

### 1. Abstract

(A 150-word description about the course)

Under the supervision of an academic staff member(s) and at a high level of independence, students undertaking this course will:

- develop the ability to synthesize relevant background literature and demonstrate detailed knowledge of the context of their research project, and hypothesize scientific concepts and formulate methods to verify them
- learn to manage a substantial piece of individual laboratory-based research project, and a literature-based investigation
- develop skills in problem-solving and in scientific communication in the form of written and verbal presentation of information

### 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.	Develop, state and justify a testable hypothesis related to a practical scientific problem and recognizes the limits of the hypotheses involved.		✓		
2.	Research, assemble, and critically evaluate literature relevant to the hypothesis being tested.		✓		
3.	Design experiments relevant to the hypothesis being tested, and utilize appropriate laboratory skills and instrumentation(s) to undertake the experiments.			✓	
4.	Analyze and interpret research data in a critical manner and present experimental results in a clear, concise and accurate scientific format.				✓
5.	Provide a timely and comprehensive update of work progress in the form of both written and oral presentations.			✓	
6.	Write a dissertation presenting the hypothesis being tested, a relevant literature review, findings and their interpretation, conclusions, and suggest further lines of investigation organized in the format of a scientific paper.			✓	
7.	Make a formal oral presentation of the research project, effectively summarizing the project's background, the hypothesis being tested, the methods involved, the results achieved and the conclusions.			✓	

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

100%

<sup>#</sup> Please specify the alignment of CILOs to the Gateway Education Program 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	7	
Discussions	Discussions with the student's supervisor(s), and student's reading of the current literature will lead to the development, and refinement, of a testable hypothesis.	✓							
Library and web-based searching and literature review	Library and web-based searching of the literature, reading and interpretation of relevant scientific literature, and assembly of a literature review relating to the testable hypothesis.		✓						
Undertaking of suitable experiments	Undertaking of suitable experiments under supervision, and maintaining a log book of data relevant to the experimental process.			✓					
Data analysis	Data analysis, including the use of appropriate statistical techniques and the presentation of data in summary graphs and tables where appropriate.				✓				
Update of work progress	Offering an update of work progress in the form of an interim written report and oral presentation (10 min + 5 min Q&A)					✓			
Writing a scientific report	Writing, under guidance, a formal scientific report summarising the experimental results in the context of knowledge related to the subject matter.						✓		
Oral presentation	Delivery of a formal oral presentation of the research project (20 min + 5 min Q&A).							✓	

#### 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	7		
Continuous Assessment: <u>100%</u>									
Discussions and Benchwork	✓	✓	✓	✓				25	
Interim Update					✓			5	
Written Dissertation						✓		60	
Oral Presentation							✓	10	
Examination: <u>0%</u> (Duration: -)									
* 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. Discussions and Benchwork	Ability to comprehend the background of the project, to set the aims and objectives with the supervisor(s), to design experiments independently and allow control of all variables selected, to appropriately use materials for all procedures without any wastage, to set up apparatuses in the most effective way, to record raw data including units in a way that is clear and appropriate, to be actively, diligently, and independently engaged in the research, and to discuss the findings with the supervisor(s) at regular frequencies.	High	Significant	Moderate	Sufficient	Inadequate
2. Interim Update	Ability to provide an update of work progress in the form of a written report and oral presentation, to identify problems and suggest solutions together with backup plans, to present a feasible schedule to complete the project, to suggest alternatives if required.	High	Significant	Moderate	Sufficient	Inadequate
3. Written Dissertation	Ability to demonstrate thorough understanding of the project topic and excellent execution of a wide range of conventions relevant to science, to logically illustrate mastery of the subject, to use existing references to support the ideas, to present and analyse data in excellent ways, to discuss the assumptions, limitations, and weaknesses, to present logical and excellent explanations for the findings and accurately address the hypothesis, and to use scientific languages that skillfully communicate meaning to readers with clarity and fluency.	High	Significant	Moderate	Sufficient	Inadequate
4. Oral Presentation	Ability to clearly organize a presentation with cohesive contents, to deliver a compelling presentation with confidence using different techniques (posture, gesture, eye contact, and vocal expressiveness), to understand the questions completely, and to answer the questions as precisely as they can be.	High	Significant	Moderate	Sufficient	Inadequate

### **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.)*

- Management of a substantial piece of individual research and developmental research project at a high level of independence
- Critical thinking and problem-solving skills
- Effective communication in the form of written and verbal presentations of scientific information

#### **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.	Online Resources: to be provided as required.
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- A. Please specify the Gateway Education Program 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-organized and fluent text	
PILO 6: Demonstrate effective oral communication skills	
PILO 7: Demonstrate an ability to work effectively in a team	
PILO 8: Recognize 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 Organizations; 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 program: [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.

Selected Assessment Task