

## 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: TBA Academic Unit: Department of Chemistry

Phone/email: TBA Date: 18 November 2019

**City University of Hong Kong  
Course Syllabus**

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**Part I Course Overview**

<b>Course Title:</b>	Advanced Analytical Chemistry
<b>Course Code:</b>	CHEM4029
<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>	CHEM2004/BCH2004 Principles of Analytical Chemistry
<b>Precursors:</b> <i>(Course Code and Title)</i>	CHEM3027/BCH3027 Analytical Chemistry
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	BCH4029 Advanced Analytical 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)

This course aims to give an overview of the rapid developments in various areas of analytical chemistry, in particular, advanced techniques and instrumentation, and to provide training and the understanding of the use of selected, sophisticated instrumental methods.

### 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 basic principles of measurement fundamentals in analytical chemistry and apply such principles to design and validate analytical chemistry experiment procedures.			✓	
2.	Critically evaluate different contemporary chemical instrumentation and techniques in chemical, biochemical and environmental analysis.			✓	
3.	Analyze data in the contemporary analytical chemistry literature and effectively communicate this knowledge to peers.		✓	✓	
4.	Design a code of practice for chemists applying advanced analytical chemistry knowledge to demonstrate concern for chemical safety and environmental issues.			✓	✓
		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	
Lectures and laboratory experiments	Teaching and learning will be primarily based around lectures and laboratory experiments examining various principles, applications and methodologies of selected state-of-the-art instruments.	✓				
Lectures, group discussions and problem-solving activities	Teaching and learning will be based on a combination of lectures and large and small group discussions; Problem-solving activities will provide students with experience in critically evaluating the literature of analytical chemistry.		✓			
Case studies and student presentations	Teaching and learning will be primarily by case studies and student presentations through group work, essay, and oral presentation which will be guided with staff feedback.			✓	✓	

### 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		
Continuous Assessment: <u>35%</u>						
Literature review and oral presentations	✓	✓	✓	✓	15%	
Lab work	✓	✓	✓	✓	20%	
Examination: <u>65%</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. Literature review and oral presentations	Ability to pick up a critical topic, give a comprehensive review and present the ideas.	High	Significant	Moderate	Basic	Not reaching marginal level
2. Lab work	Ability to carry out experiments, analyse the data and conclude the results.	High	Significant	Moderate	Basic	Not reaching marginal level
3. Examination	Ability to give correct answer to the examination questions.	High	Significant	Moderate	Basic	Not reaching marginal level

### 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.)

Topic 1: Separation Techniques

- Capillary electrophoresis
- Microfluidics techniques

Topic 2: Mass Spectrometry

- LC-MS technique
- MALDI-TOF technique

Topic 3: Bioanalytical Techniques

- Biosensor techniques
- Array techniques

Topic 4: Surface Analysis Techniques

- X-ray photoelectron spectroscopy/Auger electron spectroscopy
- Surface-enhanced Raman spectroscopy

Topic 5: Electron Microscope Techniques

- Scanning electron microscope/Transmission electron microscope
- Scanning tunneling microscope/Atomic force microscope

Topic 6: Current Trend and Future Perspectives of Analytical Chemistry

#### 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.	Articles from research journals will be provided for each topic.
2.	Online Resources: <ul style="list-style-type: none"><li>• “Analytical Chemistry” a journal published by American Chemical Society - <a href="http://pubs.acs.org/journal/ancham">http://pubs.acs.org/journal/ancham</a></li><li>• “Analyst” a journal published by Royal Society of Chemistry - <a href="http://pubs.rsc.org/en/journals/journalissues/an">http://pubs.rsc.org/en/journals/journalissues/an</a></li></ul>

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>