

Course Syllabus

offered by Department of Chemistry
with effect from Semester B 2017/18

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: 30 November 2017 _____

**City University of Hong Kong
Course Syllabus**

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with effect from Semester B 2017/18**

Part I Course Overview

Course Title:	Advanced Analytical Biochemistry
Course Code:	BCH8132
Course Duration:	1 semester
Credit Units:	4 credits
Level:	R8
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>	BCH2003 Biochemistry BCH2004 Principles of Analytical Chemistry
Equivalent Courses: <i>(Course Code and Title)</i>	Nil
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

The course aims to study recently developed analytical methods and techniques for analysis of cells, proteins, nucleic acids, and metabolites. Applications of these techniques in biological, biochemical, biomedical, and chemical biological research will be discussed.

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.	Apply the concepts of modern analytical and instrumental techniques relevant to quantitative measurements in biology, biochemistry, biomedicine, and chemical biology.	30%	✓	✓	
2.	Justify the selection of bio-analytical methods to characterize the composition of a complex, multi-component sample such as genomes, transcriptomes, proteomes, metabolomes, and different cell types.	30%	✓	✓	
3.	Critically evaluate the merits, limitations and future trends, of various bioanalytical techniques, and critically evaluate the most up-to-date research literatures in terms of the applications of bioanalytical techniques.	25%		✓	✓
4.	Apply bioanalytical techniques in a multidisciplinary research and discovery-based approach to postgraduate research projects in the areas of biology, biochemistry, biomedicine, and chemical biology.	15%		✓	✓
		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	
Lectures and tutorials	Teaching and learning will be primarily based around lectures and tutorials examining various principles, application and methodologies of analytical biochemistry.	✓				
Lectures and tutorials	Teaching and learning will be primarily based on a combination of lectures and tutorials to explain the selection of bio-analytical methods to characterize the composition of a complex, multi-component sample such as genomes, proteomes, and different cell types.		✓			
Case studies, discussions/presentations and literature review	Teaching and learning will be primarily based on case studies, along with student discussions/presentations through individual and/or group work, and a literature review to apply analytical principles to discover underlying molecular information and further understand advances in the biological and biochemical fields and to analyze the merits, limitations and applicability of various analytical biochemistry techniques.			✓		
Case studies	Teaching and learning will be primarily based on case studies presented by students on their research projects.				✓	

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: 40%						
Continuous assessment	✓	✓			10%	
Literature review essay writing			✓	✓	15%	
Oral presentation	✓	✓	✓		15%	
Examination: 60% (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 BCH courses:

“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. Continuous assessment	Ability to solve problems related to analytical biochemistry	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Literature review essay writing	Ability to critically evaluate the merits, limitations and future trends, of various bioanalytical techniques, and critically evaluate the most up-to-date research literatures in terms of the applications of bioanalytical techniques	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Oral presentation	Ability to present a topic related to analytical biochemistry	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Ability to apply the concepts of modern analytical and instrumental techniques relevant to quantitative measurements in biology, biochemistry, biomedicine, and chemical biology, to justify the selection of bio-analytical methods to characterize the composition of a complex, multi-component sample such as genomes, transcriptomes, proteomes, metabolomes, and different cell types	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.)

Topic 1: Introduction and Review

Cells, its components, and biomolecules;
Bioanalytical techniques: A survey

Topic 2: Cell-based techniques

Flow cytometry, Coulter counter
Cell culture: 2D and 3D
Confocal fluorescence microscope (including GFP and FRET)

Topic 3: Nucleic Acids

Genotyping and forensic DNA techniques
RNA interference
Delivery of DNA and RNA into cultured cells

Topic 4: Proteins

Cloning and expression of recombinant proteins
Production of antibodies and hybridoma technique
Protein identification & separation (including Immunoprecipitation, Western blotting)
Heterogeneous and homogeneous immunoassays

Topic 5: Omics Techniques

Microarray techniques (DNA, protein, tissue)
Functional genomics (including Yeast 2 hybrid)
Proteomics and metabolomics (including MS techniques)
Basic bioinformatics (NCBI Entrez, UCSC genome browser)

Topic 6: Other Frontiers

Analytical chemistry in drug discovery
Analytical chemistry of brains
Nanotechnology & nanomedicine

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 journals and magazines will be used for selected lectures.
2.	Online Resources: “Nature Biotechnology” It publishes new concepts in technology/methodology of relevance to the biological, biomedical, agricultural and environmental sciences as well as covers the commercial, political, ethical, legal, and societal aspects of this research. http://www.nature.com/nbt/index.html

	<p>“Biotechniques” The International Journal of Life Science Methods - http://www.biotechniques.com/</p> <p>“Analytical Chemistry” a journal published by American Chemical Society - http://pubs.acs.org/journal/ancham</p> <p>“Analyst” a journal published by Royal Society of Chemistry - http://pubs.rsc.org/en/journals/journalissues/an</p> <p>Articles related to techniques in genomics, proteomics and metabolomics http://www.nature.com/omics/subjects/index.html</p>
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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