

Course Syllabus

**offered by Department of Chemistry
with effect from Semester A 2019/20**

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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with effect from Semester A 2019/20**

Part I Course Overview

Course Title:	Solid State Analysis
Course Code:	BCH8016
Course Duration:	1 semester
Credit Units:	3 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>	Nil
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)

This course provides students the principles and applications of some widely used instruments in materials chemistry. The course will focus on the understanding of the working principles, advantages and limitations of different instruments in the characterization of compositions, morphologies and electronic properties of materials.

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.	Evaluate the working principles of advanced instruments in the characterization of composition, morphologies and electronic properties of materials including XPS, SEM, TEM, and XAS.		✓		
2.	Evaluate the advantages and limitations of the instruments in characterization in comparison to the traditional instruments such as elemental combustion and optical microscope.		✓		
3.	Interpret and analyse the data. Extrapolate compositional and structural information from data and correlate with materials performance.		✓	✓	✓
4.	Critically evaluate various characterization techniques and rationally select appropriate instruments for characterizations in research.		✓	✓	✓
		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 (Fundamental)	Explain the physical principles and design principles of instrument.	✓	✓			
Lectures (Case Study)	Review data in literatures. Understand the data interpretation and the correlation between structure and performance.	✓	✓	✓	✓	
Presentation and Report	Students will select a new technique for materials characterization, starting from the principles and instrumentation to applications.	✓	✓	✓	✓	

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		
Presentations	✓	✓	✓	✓	50%	
Reports	✓	✓	✓	✓	50%	
* 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. Presentations	Demonstration of understanding the principles and practice of the selected characterization technique.	Excellent organization of the content and presentation skills; Excellent explanation of the selected instrument design principle with data.	Good organization of the content and presentation skills; Good explanation of the selected instrument design principle with data.	Moderate organization of the content and presentation skills; Moderate explanation of the selected instrument design principle with data.	Basic organization of the content and presentation skills; Basic explanation of the selected instrument design principle with data.	Not even reaching marginal levels
2. Reports	Demonstration of understanding the principles and practice of the selected characterization technique.	Excellent organization of the content and writing skills; Excellent explanation of the selected instrument design principle with data.	Good organization of the content and writing skills; Good explanation of the selected instrument design principle with data.	Moderate organization of the content and writing skills; Moderate explanation of the selected instrument design principle with data.	Basic organization of the content and writing skills; Basic explanation of the selected instrument design principle with data.	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.)

Materials characterization, elemental composition, surface morphology, electronic structure, X-ray spectroscopy, electron microscope

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.)

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2.2 Additional Readings

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

L. Reimer, "Scanning Electron Microscope", 2nd Ed., Springer-Verlag, 1998 D. Koningsberger & R. Prins, "X-ray Absorption Spectroscopy: Principles, Applications and Techniques of EXAFS, SEXAFS and XANES", Wiley, 1988 John F. Moulder, "Handbook of X-ray Photoelectron Spectroscopy", Perkin-Elmer Corp. 1992 Frans D. Tichelaar, "Transmission Electron Microscopy as Nanolab", Wiley, 2012
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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.)

- A. 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