香港城市大學
City University of Hong Kong

SYL

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:

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Part I Course Overview

Course Title:	Advanced Inorganic Chemistry
Course Code:	BCH8130
Course Duration:	1 semester
Credit Units:	4 credits
Level:	R8
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ 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)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course is a postgraduate taught course tailored for postgraduate research students only.

The aim of this course is to help students to develop an understanding of the principles and concepts of modern inorganic chemistry with an emphasis on the role of transition metals in inorganic redox reaction mechanisms, metalloproteins, and inorganic photophysics and photochemistry.

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.	Analyse the principles for the extraction of various elements from their ores based on redox potentials and Ellingham diagrams.		✓	✓	
2.	Evaluate the redox stability of inorganic species in water and the products of inorganic redox reactions using Latimer diagrams, Frost diagrams and Pourbaix diagrams.		✓	✓	
3.	Analyse the rate of mechanism of an inorganic electron transfer reactions using Marcus Theory.			✓	✓
4.	Evaluate the roles of transition metal centres and amino acid residues on the structural and functional properties of metalloproteins.		✓	✓	
5.	Analyse the photophysical and photochemical properties of inorganic and organometallic transition metal complexes.		✓	✓	
6.	Discover examples encountered in our daily lives that involve the applications of transition metal systems.				✓
** If weighting is assigned to CILOs, they should add up to 100%.*		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	5	6	
Group activities	Teaching and learning will be based on large and small group activities in which the principles of extraction of various elements will be examined and discussed.	✓						
Group activities	In large and small group activities the basic concepts of Latimer diagrams, Frost diagrams and Pourbaix diagrams will be examined and discussed.		✓					
Group critical evaluation tasks	In large and small group critical evaluation tasks students will discuss and rationalise the various factors affecting the rate of electron transfer reactions.			✓				
Group activities	Teaching and learning will be in the form of large and small group activities; students will develop an understanding on the structural and functional properties of metalloproteins.				✓			
Group activities	In large and small group activities, students will discuss and examine the photophysical and photochemical properties of inorganic and organometallic transition metal complexes.					✓		
Literature search and presentation	Students, in small groups, will take part in the literature search on identification of their daily life encounters related inorganic chemistry. They will then present, evaluate and discuss their findings in the light of modern day living in the form of written reports and oral presentations.						✓	

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		
Continuous Assessment: 30%								
Short Quizzes and Tutorial Questions	✓	✓	✓	✓	✓		5%	
Assignments	✓	✓	✓	✓	✓		10%	
Tests	✓	✓	✓	✓	✓		10%	
Written Reports and Group Presentations						✓	5%	
Examination: 70% (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. Short Quizzes and Tutorial Questions	ABILITY to develop an understanding on the concepts of element extraction; Latimer, Frost and Pourbaix diagrams; electron transfer; bioinorganic chemistry; and inorganic photochemistry	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Assignments	ABILITY to develop an understanding on the aforementioned concepts	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Tests	ABILITY to describe and explain the aforementioned concepts to solve problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Written Reports and Group Presentations	ABILITY to conduct literature search and give written and oral presentations on different topics on inorganic chemistry at the advanced level	High	Significant	Moderate	Basic	Not even reaching marginal levels
5. Examination	ABILITY to describe, explain, and integrate the aforementioned concepts and apply them to solve problems	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.)

Oxidation and Reduction

Extraction of the elements. Ellingham diagrams. Redox potentials. Redox stability in water. Latimer diagrams, Frost diagrams and Pourbaix diagrams.

Inorganic Reaction Mechanisms

Inner-sphere and outer-sphere electron transfer reactions. Marcus theory. Factors affecting rates of reactions.

Metalloproteins

Role of transition metal centres and amino acid residues. Structures and functions of selected metalloproteins.

Inorganic Photochemistry

Absorption and emission properties of luminescent transition metal complexes. Excited-state nature. Energy- and electron-transfer. Potential applications.

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.	*Inorganic Chemistry*, Shriver and Atkins, 3rd Edition, Oxford University Press, Oxford 1999.
2.	*Basic Inorganic Chemistry*, Cotton, Wilkinson and Gaus, 3rd Edition, J. Wiley, 1995.
3.	*Advanced Inorganic Chemistry*, Cotton and Wilkinson, 5th Edition, Wiley, 1988.
4.	*Principles of Bioinorganic Chemistry*, Lippard and Berg, University Science Books, 1994.
5.	Photochemistry of Polypyridine and Porphyrin Complexes, Kalyanasundaram, Academic Press, 1992.

Annex
(for GE courses only)

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