

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.

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**City University of Hong Kong
Course Syllabus**

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

Part I Course Overview

Course Title:	Principles of Inorganic Chemistry
Course Code:	CHEM2006 (and CHEM2006A)
Course Duration:	1 semester
Credit Units:	4 (3) credits
Level:	B2
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>	BCH2006 (and BCH2006A) Principles of Inorganic Chemistry
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Note: CHEM2006A does not contain any practical component, and has a credit unit value of three (3).

Part II Course Details

1. Abstract

(A 150-word description about the course)

The aim of this course is to allow students to develop an understanding of the basic principles and modern concepts of inorganic chemistry from a discovery approach with an emphasis on atomic structures and properties, chemical bonding and coordination chemistry; Students undertaking CHEM2006 will also acquire practical experience on inorganic chemistry experiments.

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) (CHEM2006)	Weighting* (if applicable) (CHEM2006A)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
				A1	A2	A3
1.	Relate the atomic structures of elements with their physical and chemical properties.	15%	20%	✓		
2.	Apply Lewis structures, Valence-Shell Electron-Pair Repulsion Theory, Valence Bond Theory and Molecular Orbital Theory to explain the physical and chemical properties of molecules, leading to the design and discovery of new molecules.	20%	20%	✓	✓	
3.	Describe and explain the chemistry of Groups 17 and 18 elements.	10%	10%	✓	✓	
4.	Describe possible isomerism of a metal complex and explore the role of the electronic configuration of a metal complex on its coordination number, geometry and reactivity.	15%	15%	✓		
5.	Predict and explain the colour, stability, geometry and magnetic properties of a metal complex using Valence Bond Theory and Crystal Field Theory.	15%	20%	✓	✓	
6.	Explain the properties of solvents, acids and bases.	15%	15%	✓		
7.	Apply principles and synthetic techniques to conduct inorganic chemistry experiments from a discovery approach.	10%	0%		✓	✓
* If weighting is assigned to CILOs, they should add up to 100%.		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	7	
Lectures and tutorials	Students will develop an understanding on atomic structures and correlation with the physical and chemical properties in lectures and tutorials from a discovery approach.	✓							0.5
Lectures and tutorials	In lectures and tutorials, students will apply various theories to explore, predict and explain the structures, bonding and properties of simple molecules, leading to the design and discovery of new molecules.		✓						1
Lectures and tutorials	In lectures and tutorials, students will develop an understanding on the chemistry of Groups 17 and 18 elements			✓					0.5
Lectures and tutorials	Students will develop an understanding of isomerism of a metal complex and correlate properties of a metal complex with its electronic configuration in lectures and tutorials.				✓				0.5
Lectures and tutorials	In lectures and tutorials, students will apply Valence Bond Theory and Crystal Field Theory to explain various properties of a metal complex from a discovery approach.					✓			0.5
Lectures and tutorials	Students will develop an understanding of solvents, acids and bases and predict their properties in lectures and tutorials.						✓		0.5
Experiments and written reports	Students, in the form of small groups, will conduct inorganic chemistry experiments from a discovery approach, and present their results in written reports. (CHEM2006 only)							✓	2

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

(CHEM2006 only)

Assessment Tasks/Activities	CILO No.							Weighting*	Remarks
	1	2	3	4	5	6	7		
Continuous Assessment: <u>30%</u>									
Tutorial Questions and Assignments	✓	✓	✓	✓	✓	✓	✓	10%	
Tests	✓	✓	✓	✓	✓	✓	✓	10%	
Lab Reports							✓	10%	
Examination: <u>70%</u> (duration: 3 hours)									
								100%	

* The weightings should add up to 100%.

(CHEM2006A only)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5	6		
Continuous Assessment: <u>30%</u>								
Tutorial Questions and Assignments	✓	✓	✓	✓	✓	✓	15%	
Tests	✓	✓	✓	✓	✓	✓	15%	
Examination: <u>70%</u> (duration: 3 hours)								
							100%	

* The weightings should add up to 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. Tutorial questions and assignments	ABILITY to develop an understanding on basic concepts of inorganic chemistry	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Tests	ABILITY to describe and explain basic concepts of inorganic chemistry to solve problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Lab reports (CHEM2006 only)	ABILITY to conduct inorganic chemistry experiments and present results in written reports	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	ABILITY to describe, explain, and integrate basic concepts of inorganic chemistry 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.)

Atomic Structure

The quantisation of energy. Bohr's theory of the hydrogen atom. Quantum theory and atomic orbitals. Many-electron atoms.

Atomic Properties

Atomic radii. Ionisation energies. Electron affinities. Electronegativity. Periodic trends.

Chemical Bonding

Lewis structures. Resonance. VSEPR method and molecular geometry. Hybrid orbitals. Molecular orbitals. Bonding in solids.

Main Group Chemistry

Group 17 chemistry: hydrogen halides, interhalogen compounds, and oxidation state. Group 18 chemistry: VSEPR.

Coordination Chemistry

Coordination numbers and coordination geometries. Types of ligands. Bonding. Reactivity of coordination compounds.

Solvents, Solutions, Acids and Bases

Solvent properties. Definitions of acids and bases. Hard and soft acid base concepts.

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 6th Edition, Duward Shriver, Mark Weller, Tina Overton, Fraser Armstrong, Jonathan Rourke, Publisher: W. H. Freeman, 2014.
2.	Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson, P. L. Gaus, 2nd Edition, Wiley, New York, 1995.

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