

## 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:	<u>Prof. Michael C. W. Chan</u>	Academic Unit:	<u>Department of Chemistry</u>
Phone/email:	<u>3442 9678 / mcwchan@cityu.edu.hk</u>	Date:	<u>18 November 2019</u>

**City University of Hong Kong  
Course Syllabus**

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**Part I Course Overview**

<b>Course Title:</b>	Chemistry Beyond the Molecule: Supramolecular Chemistry
<b>Course Code:</b>	CHEM3052
<b>Course Duration:</b>	1 semester
<b>Credit Units:</b>	3 credits
<b>Level:</b>	B3
<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>	CHEM2006/BCH2006 Principles of Inorganic Chemistry CHEM2007/BCH2007 Principles of Organic Chemistry
<b>Precursors:</b> <i>(Course Code and Title)</i>	Nil
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	BCH3052 Chemistry Beyond the Molecule: Supramolecular 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 will introduce students to the basic concepts of host-guest (supramolecular) chemistry and molecular recognition. The course will build from fundamental knowledge in organic and inorganic chemistry to illustrate the relationship between these topics and supramolecular chemistry. In this course, students will use relevant chemical concepts to analyze aspects of supramolecular chemistry and their applications, and current examples will be used. The skills and understanding accumulated during this course will prepare students for studies in advanced supramolecular chemistry.

### 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.	Describe the major types of supramolecular interactions, and apply relevant chemical concepts to explain the nature and origins of these interactions.	15%	✓		
2.	Describe, identify and compare the nature, synthesis, supramolecular interactions and applications of host molecules and receptors.	30%	✓		
3.	Based on the nature and chemical features of a supramolecular species, apply concepts (CILO 1) to rationalize its reactivity and behavior.	25%	✓	✓	
4.	Based on the analysis of a series of host molecules, identify and hypothesize the trends in reactivity and binding of guests.	20%	✓	✓	✓
5.	Analyze research on supramolecular chemistry in the current literature, apply relevant concepts and knowledge, and discuss findings using a presentation.	10%	✓	✓	✓
		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	5	
Lectures, two-way questioning and tutorials	Lectures, two-way questioning and tutorials will enable students to recognize the basic concepts and interactions and give them practice in explaining these to peers. Moreover, each student will individually use interactive software to visualize (in 3-D) the host molecules, in order to help them identify the interactions and geometry and improve their interpretation skills.	✓					
Lectures and online teaching material	Lectures and online teaching material (videos and websites) will enable students to acquire knowledge regarding nature and applications of important host molecules, in order to draw comparisons.		✓				
Problem-solving activities and interactive tutorials	Problem-solving activities and interactive tutorials will provide students with experience in critically evaluating the nature and chemical features of supramolecular species, in order to predict their reactivity and behavior.			✓			
Problem-based tutorials and assignments	From step-by-step problem-based tutorials and assignments (with timely model answers), students will learn to practice the technique to analyze the host molecules. This will be facilitated by the use of interactive software for visualization in 3-D.				✓		
Literature research	Students will peruse and examine the current literature research on supramolecular chemistry, and practice explaining relevant concepts and findings to peers.					✓	

### 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		
Continuous Assessment: <u>30%</u>							
Tutorials & Assignments	✓	✓	✓	✓		20%	
Presentation					✓	10%	
Examination: <u>70%</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. Tutorial & Assignments	Ability to perform CILOs 1-4, especially with regards to problem-based tutorials and assignments	High	Significant	Moderate	Basic	Not reaching marginal level
2. Presentation	Ability to perform CILO 5	High	Significant	Moderate	Basic	Not reaching marginal level
3. Examination	Ability to perform CILOs, especially CILOs 1-4	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.)*

Lock-and-Key Principle  
Hydrogen Bonding and Intermolecular Bonds  
Molecular Recognition  
Chelate, Conformational and Macrocyclic Effects  
Ionic Recognition: Cation- and Anion-Binding Hosts  
Selectivity in Host Molecules  
Preparation of Synthetic Host Molecules  
Natural Host Molecules  
Self-Assembly  
Applications of Supramolecular 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.	"Core Concepts in Supramolecular Chemistry and Nanochemistry", Jonathan W. Steed, David R. Turner, Karl Wallace, Wiley, 2007 (ISBN: 978-0-470-85867-7).
2.	"Supramolecular Chemistry", Jonathan W. Steed, Jerry L. Atwood, Wiley, 2000 (ISBN: 978-0-471-98791-8).
3.	"Supramolecular Chemistry : An Introduction", Fritz Vogtle, Wiley, 1991 (ISBN: 047192802X).
4.	Online Resources: <ul style="list-style-type: none"><li>• <a href="http://www.uni-saarland.de/fak8/schneider/">www.uni-saarland.de/fak8/schneider/</a> (under "Supramolecular Structures")</li><li>• This enables visualization of some host molecules. Please first install the MDL Chime plug-in (<a href="http://www.mdl.com/products/framework/chime">www.mdl.com/products/framework/chime</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>