

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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**City University of Hong Kong
Course Syllabus**

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

Part I Course Overview

Course Title:	Advanced Organic Chemistry
Course Code:	BCH8131
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>	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 aims to:

- introduce organic chemistry of aldol reactions and enolate anions;
- explain the structures and reactions of carbohydrates and lipids;
- introduce basic strategies of multi-step organic syntheses;
- explain conformational, steric, and stereoelectronic effects of organic molecules;
- critically evaluate organic reaction mechanisms;
- develop knowledge of nucleophilic substitution reaction.

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.	Describe the concepts and basic principles of aldol reactions and enolate anions.		✓	✓	
2.	Describe the principles of chemistry in carbohydrates and lipids.		✓		
3.	Apply the strategies and principles in multi-step organic syntheses.		✓	✓	✓
4.	Compare and contrast conformational, steric, and stereoelectronic effects of organic molecules.		✓	✓	
5.	Apply various techniques in studying organic reaction mechanisms.		✓	✓	✓
6.	Explain various factors affecting nucleophilic substitution reactions.		✓	✓	
		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	5	6	
Lectures and tutorials	Teaching and learning activities will be discovery-based relying primarily on lectures and tutorials explaining the concept of enolate, and principles of aldol reaction.	✓						
Lectures and tutorials	Teaching and learning will be discovery-based relying primarily on lectures and tutorials introducing structures and reactions of carbohydrates and lipids.		✓					
Lectures and tutorials	Teaching and learning will be discovery-based relying primarily on lectures and tutorials explaining basic strategies of multi-step organic syntheses.			✓				
Lectures and tutorials	Teaching and learning will be discovery-based relying primarily on lectures and tutorials examining conformational, steric, and stereoelectronic effects of organic molecules.				✓			
Lectures and tutorials	Teaching and learning will be discovery-based relying primarily on lectures and tutorials explaining basic concepts and principles of modern techniques used in studying organic reaction mechanisms.					✓		
Lectures and tutorials	Teaching and learning will be discovery-based relying primarily on lectures and tutorials introducing various factors affecting nucleophilic substitution reactions.						✓	

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: <u>30%</u>								
Short Quizzes	✓	✓	✓	✓	✓	✓	30%	
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 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	Ability to explain chemical reaction/reactivity based on the knowledge of organic chemistry listed in section 3.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Examination	Ability to propose practical solutions/methods to new organic chemical transformation; ability to explain the mechanism of organic chemical reaction.	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.)

- aldol reactions and enolate anions: keto and enol tautomers, crossed aldol reaction, cyclization via aldol condensation, Michael addition, Robinson annulation
- carbohydrates and lipids: mutarotation, monosaccharide, alditol, osazone, disaccharide, polysaccharide, reducing sugar vs non-reducing sugar, fatty acids and triacylglycerols, terpenes and terpenoids, steroids, prostaglandins, phospholipids and cell membranes, waxes
- multi-step organic syntheses: protective group, synthetic analysis and planning, retrosynthetic analysis, control of stereochemistry, convergent and linear synthesis
- conformational, steric, and stereoelectronic effects: steric strain, heteroatom, angle strain, conformational analysis, axial vs equatorial
- organic reaction mechanisms: kinetic vs thermodynamic control, substituent effect, isotope effect, solvent effect, catalysis
- nucleophilic substitution reaction: S_N1 vs S_N2 reaction, carbocations, nucleophilicity, leaving group effects, neighboring-group participation, rearrangement

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.	Organic Chemistry, T.W.G. Solomons (John Wiley and Sons, 7 th or 8 th edition)
2.	Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg
3.	
...	

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