

**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: | Organic Chemistry |
| Course Code: | BCH3015 (and BCH3015A) |
| Course Duration: | 1 semester |
| Credit Units: | 4 (3) credits |
| Level: | B3 |
| 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> | BCH2007 Principles of Organic Chemistry |
| Equivalent Courses: <i>(Course Code and Title)</i> | BCH2221 Organic Chemistry (from the "old" curriculum) |
| Exclusive Courses: <i>(Course Code and Title)</i> | Nil |

Note: BCH3015A 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)

This course aims to provide students with an understanding of the principles of carbonyl, aromatic and heterocyclic chemistry, a practical experience in laboratory in simple and multistep chemical synthesis and characterization of organic compounds, and analytical skill to identify various classes of organic compounds using NMR spectroscopy and mass spectrometry.

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) (BCH3015) | Weighting* (if applicable) (BCH3015A) | Discovery-enriched curriculum related learning outcomes (please tick where appropriate) | | |
|--|--|--|---|---|----|----|
| | | | | A1 | A2 | A3 |
| 1. | Describe the principle of aromaticity. | 15% | 20% | ✓ | ✓ | ✓ |
| 2. | Describe the chemistry of carbonyl and aromatic compounds and their use in chemical synthesis. | 15% | 20% | ✓ | ✓ | ✓ |
| 3. | Explain the characteristics of various types of reactions related to carbonyl and aromatic compounds. | 20% | 25% | ✓ | ✓ | ✓ |
| 4. | Explain the principles of NMR and mass spectrometry and apply them to identify various classes of organic compounds. | 25% | 35% | ✓ | ✓ | ✓ |
| 5. | Design and implement organic chemical syntheses and characterization in a laboratory and report their findings. (BCH3015 only) | 25% | 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 | |
| Lectures and tutorials | Teaching and learning will be based on a combination of lectures and tutorials to explain the structure and bonding of aromatic compounds. | ✓ | | | | | |
| Lectures and tutorials | Teaching and learning will be based on a combination of lectures and tutorials to explain the chemistry of carbonyl compounds. | | ✓ | | | | |
| Lectures and tutorials | Teaching and learning will be based on a combination of lectures and tutorials to explain the use of carbonyl and aromatic compounds in synthesis. | | | ✓ | | | |
| Lectures and tutorials | Teaching and learning will be based on a combination of lectures and tutorials to explain the principles of spectroscopy and students will have hands-on experience in using spectroscopic instruments. | | | | ✓ | | |
| Experiments (BCH3015 only) | Teaching and learning will be primarily by a series of five experiments some of which are designed by students to be carried out in the laboratory. | | | | | ✓ | |

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> | | | | | | | |
| Short quizzes | ✓ | ✓ | ✓ | | | 30 | |
| Tutorial assignments | ✓ | ✓ | ✓ | ✓ | | | |
| Laboratory reports (BCH 3015 only) | | | | | ✓ | | |
| 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 | Student completes the activity demonstrates grasp of the important concepts to the topic concerned. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 2. Tutorial assignments | Student completes the activity demonstrates grasp of the important concepts to the topic concerned. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 3. Laboratory reports (BCH3015 only) | Student completes the assessment tasks/activities and demonstrates writing and presentation skills. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 4. Examination | Student demonstrates grasp of the important concepts to the topic concerned, and can apply these concepts to solve problems. Strong evidence of demonstrated use of concepts for rationalization, with some originality in thought and argument. | 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.)

Aromatic and heterocyclic Chemistry

Introduce, with general examples and applications, aromatic and heterocyclic chemistry. Nomenclature. Physical and chemical properties. Preparations and reactions. Ring synthesis.

Carbonyl Chemistry

Introduce, with general examples and applications, carbonyl chemistry. Nomenclature. Physical and chemical properties. Preparations, reactions and use in synthesis.

Reaction Mechanisms

Nucleophilic and electrophilic aromatic substitution. Carbonyl Addition reactions. The influence of electronic and steric factors on the course of chemical reactions.

Application of NMR and MS in organic chemistry

Nuclear magnetic resonance spectroscopy and mass spectrometry: basic principles and uses of these techniques, with special reference to various characteristic spectroscopic properties of the various classes of organic compounds.

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. Graham Solomons, Craig B. Fryhle |
| 2. | Introduction To Spectroscopy : A Guide For Students Of Organic Chemistry / Donald L. Pavia, Gary M.Lampman, George S. Kriz, Jr. |

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 |
|---------------------------------|
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