

## 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.

**Prepared / Last Updated by:**

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**City University of Hong Kong  
Course Syllabus**

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**Part I Course Overview**

<b>Course Title:</b>	Biological Chemistry
<b>Course Code:</b>	CHEM2071(and CHEM2071A)
<b>Course Duration:</b>	1 semester
<b>Credit Units:</b>	4 (3) credits
<b>Level:</b>	B2
<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>	Nil
<b>Precursors:</b> <i>(Course Code and Title)</i>	CHEM1200/BCH1200 Discovery in Biology (for normative 4-year students) or A Level Biology (for advance standing I students)
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	BCH2071 (and BCH2071A) Biological Chemistry
<b>Exclusive Courses:</b> <i>(Course Code and Title)</i>	Nil

**Note: CHEM2071A 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 fundamental chemistry knowledge that is relevant and applicable to biological systems. Through the course, students will gain an understanding of the chemical structures and the functions of various biomolecules found in living systems. Students will learn the basic classification systems, functional groups, principles of nomenclature, aromaticity and chirality of organic compounds. Students will also be introduced to various fundamental and important biological molecules, including nucleic acids, proteins, carbohydrates and lipids. Through different learning activities such as lectures, tutorials and lab sessions, students will gain comprehensive and in-depth understanding of the functions and the biochemical roles of important biomolecules in life and their relationships with human health.

### 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) (CHEM2071)	Weighting* (if applicable) (CHEM2071A)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
				A1	A2	A3
1.	Explain the basic concepts of pH, buffer, chemical bonding, polar/nonpolar compounds, resonance and molecular interactions in biological systems.	10%	15%	✓	✓	
2.	Describe functional groups, basic reaction types, and different reaction mechanisms.	25%	25%	✓	✓	
3.	Explain the structures and functions of important biomolecules (DNAs, amino acids, lipids, proteins, enzymes and carbohydrates) and their fundamental reactions in biological processes.	40%	45%	✓	✓	
4.	Perform experiments to study the chemical and biochemical properties of different biomolecules.	15%	0%	✓	✓	✓
5.	Explain the relationships between biomolecules and human health.	10%	15%	✓	✓	✓
* If weighting is assigned to CILOs, they should add up to 100%.		100%	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	Students will be introduced to pH, buffer, chemical bonding, and classification of organic compounds.	✓					6 hrs
Lectures	Students will be introduced to functional groups, different types of chemical reactions and reaction mechanism.		✓				12 hrs
Lectures	Students will learn the structures and the functions of different biomolecules, including amino acids, peptides, proteins, lipids, DNAs and carbohydrates.			✓			18 hrs
Tutorials	Tutorials will be provided to help students to understand the relevant topics, including pH, chemical reactions, peptide synthesis, protein structures, enzyme catalysis, DNA structure, carbohydrate conformation and others.	✓	✓	✓			12 hrs
Practicals	Teaching and learning will be based on practical sessions to help students better understand the lecture materials and train their experimental skills.	✓	✓	✓	✓		20 hrs
Group projects and oral presentations	Students will be divided into small groups to carry out group projects and oral presentations to share their understanding of the relationship between biomolecules and human health. They will be encouraged to think creatively and critically.	✓	✓	✓	✓	✓	3 hrs

**4. Assessment Tasks/Activities (ATs)**  
(ATs are designed to assess how well the students achieve the CILOs.)

(CHEM2071 only)

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: <u>40%</u>							
Assignments		✓				5%	
Quiz			✓			10%	
Lab reports		✓	✓	✓		15%	
Project and oral presentation					✓	10%	
Examination: <u>60%</u> (duration: 3 hours)							
* The weightings should add up to 100%.						100%	

(CHEM2071A only)

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: <u>40%</u>							
Assignments		✓				10%	
Quiz			✓			15%	
Project and oral presentation					✓	15%	
Examination: <u>60%</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. Assignments	Understanding of the lecture and tutorial materials.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Quiz	Understanding of the lecture and tutorial materials; ability to analyse and solve the questions.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Lab reports (CHEM2071 only)	Conducting lab experiments; ability to analyse experimental data; ability to explain and discuss experimental results.	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Project and oral presentation	Developing innovative/insightful ideas; formulating solutions to solve real-life problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
5. Examination	Understanding of the lecture/tutorial materials, ability to analyse and solve questions; formulating solutions to solve real-life 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.)*

- Introduction to biological chemistry
- Buffers and indicators
- Organic nomenclature, functional groups and organic reactions
- Biomolecules (i.e. nucleic acids, proteins, carbohydrates and lipids)
- Enzyme classification, catalytic mechanism and kinetics
- Structure, chemical reactions and biological functions of biomolecules
- Bioenergetics and free energy

#### 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.	General, organic, and biological chemistry. Frost, Laura D. author. Deal, Todd S. author. Third edition / Laura Frost, Todd Deal. Upper Saddle River, N.J. : Pearson, 2017
2.	General, organic, and biochemistry Denniston, K. J (Katherine J.) 8th ed. New York, NY : McGraw-Hill Companies, c2014

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).)*

A. 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>