香港城市大學
City University of Hong Kong

**SYL**

# 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:***


| | | | |
|---|---|---|---|
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**City University of Hong Kong**
**Course Syllabus**

**offered by Department of Chemistry**
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## Part I Course Overview

| | |
|---|---|
| **Course Title:** | Cell Biology |
| **Course Code**: | CHEM2066 |
| **Course Duration:** | 1 semester |
| **Credit Units**: | 3 credits |
| **Level**: | B2 |
| **Proposed Area:** *(for GE courses only)* | ☐ Arts and Humanities<br>☐ Study of Societies, Social and Business Organisations<br>☐ Science and Technology |
| **Medium of Instruction:** | English |
| **Medium of Assessment:** | English |
| **Prerequisites**: *(Course Code and Title)* | Nil |
| **Precursors**: *(Course Code and Title)* | CHEM1200/BCH1200 Discovery in Biology (for normative 4-year students) or<br>A Level Biology (for advance standing I students) |
| **Equivalent Courses**: *(Course Code and Title)* | BMS2201 Molecular Biology of the Cell<br>BCH2066 Cell Biology |
| **Exclusive Courses**: *(Course Code and Title)* | Nil |

## Part II Course Details

### 1. Abstract

*(A 150-word description about the course)*

This course introduces the basic theme of life on earth: cells. Students will learn the interplay of morphology and functions in animal and plant cells in molecular terms. The main objective of this course is to let students appreciate the intimate relationship between "structure" and "function" in biology: how specialized cellular structures are evolved to accommodate and facilitate particular biochemical reactions and how the defects in cellular structures can lead to human diseases. This course, in company of other core courses in this programme such as Biochemistry, Genetics and Molecular Biology, will provide the basic conceptual framework in human biology, and prepare for more advanced courses such as Systems Biology, Cell Transport and Signalling, and Technology for Regenerative Medicine.

### 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. | Define the structure and functions of major organelles and subcellular structures in typical prokaryotic and eukaryotic cells | 10% | ✓ | ✓ | ✓ |
| 2. | Relate structures of the plasma membrane of prokaryotic and eukaryotic cells to their functions in sensing and reacting to the environment | 20% | ✓ | ✓ | ✓ |
| 3. | Explore the fundamental mechanisms of cell cycle and signal transduction | 20% | ✓ | ✓ | ✓ |
| 4. | Apply the principles of cytoskeleton on the mechanisms of intracellular transport and cell locomotion | 20% | ✓ | ✓ | ✓ |
| 5. | Integrate cell biology concepts to the developmental and physiological conditions in different cell types of the human body | 20% | ✓ | ✓ | ✓ |
| 6 | Apply knowledge of cell biology to critically read scientific literature | 10% | ✓ | ✓ | ✓ |
| | | 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 | |
| Lectures, group discussions and presentation | Teaching and learning will be primarily based on lectures, group discussions and presentation. | ✓ | ✓ | ✓ | ✓ | ✓ | |

## 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: 20% | | | | | | | |
| Quizzes | ✓ | ✓ | ✓ | ✓ | ✓ | 10% | |
| Essays and presentations | ✓ | ✓ | ✓ | ✓ | ✓ | 10% | |
| Examination: 80% (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. Quizzes | Basic knowledge and principle of cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Deep understanding the principle of cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Good understanding the principle of cell, organelles, the cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Fair understanding the principle of cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Partial understanding the principle of cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Fail to understand the principle of cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells |
| 2. Presentations | Understanding and analysis of the topics; knowledge depth, logic, and clarity of presentation; and collaboration among peers | Deep understanding and critical analysis of the topics; excellent knowledge depth, logic and clear oral presentation; and excellent collaboration among peers | Good understanding and critical analysis of the topics; good knowledge depth, logic and clear oral presentation; and good collaboration among peers | Fair understanding but lack of critical analysis of the topics; adequate knowledge depth, logic and clear oral presentation; and some collaboration among peers | Partial understanding and lack of critical analysis of the topics; marginal knowledge depth, and lacking logic and clear oral presentation; and some collaboration among peers | Fail to understand the topics; poor knowledge depth, and lacking logic and clear oral presentation; and poor collaboration among peers |

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D) | Failure (F) |
|---|---|---|---|---|---|---|
| 3. Examination | Principle, processes, and characteristics of cell biology; understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells | Excellent synthesis of principle, processes, and characteristics of cell biology; deep understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle | Good synthesis of principle, processes, and characteristics of cell biology; good understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle | Fair synthesis of principle, processes, and characteristics of cell biology; adequate understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle | Partial synthesis of principle, processes, and characteristics of cell biology; marginal understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle | Poor synthesis of principle, processes, and characteristics of cell biology; poor understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle |

**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.)*

The basic concept of cells as the functional units of life.
Major organelles in plant and animal cells such as membrane, mitochondria, chloroplast, ER, Golgi body, and cell nucleus. The main focus will be on how the structure of each organelle is closely linked to its functions.
The differences and similarities between prokaryotes and eukaryotes.
The basic concept of the cell cycle and cell death. Major events of cell cycle stages, mitosis, meiosis and apoptosis will be examined.
The cytoskeleton systems of microtubule and actin-myosn. How intracellular transport and vesicular transport can be achieved with the microtubule cytoskeleton. How changes in the actin-myosin cytoskeleton can affect cellular structures and movements, which in turn lead to muscle contractions and behavioural responses to the environment.

Different cell types in a multicellular organism have very different sizes, shapes and functions. The genome contains the instructions for building cells, but how this information is accessed, read and interpreted depends on the cell type and its stage of development. Examples of different cell types, such as nerve cells, immune cells, cancer and stem cells will be examined in the contexts of how these cells are specialized for their functions.

The embryonic development of human beings from a fertilised egg to the formation of the nervous system will be used as an example to illustrate the integral processes of cell division, cell differentiation and morphogenesis.

The malformation or malfunctioning of different cellular structures can lead to human diseases. Students are encouraged to explore examples such as lysosomal diseases, neurodegenerative diseases and nuclear envelope diseases. In addition, the action of natural toxins, such as bacterial alpha-toxins and algal toxins, on the cellular structures will also be explored.

## 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. | Molecular Biology of The Cell, Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter.<br>ISBN: 9780815344322 |
| 2. | |
| 3. | |
| … | |

### 2.2 Additional Readings

*(Additional references for students to learn to expand their knowledge about the subject.)*

| | |
|---|---|
| 1. | Becker's World of the Cell. Jeff Hardin, Gregory Bertoni, Lewis Kleinsmith. International Edition, 8th Edition (2011)<br>ISBN13: 9780321709783<br>ISBN10: 0321709780 |
| 2. | Molecular Cell Biology, Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher.<br>ISBN:142923413X |

**Annex**
**(for GE courses only)**

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.)*

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.

| **Selected Assessment Task** |
|---|
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