City University of Hong Kong
Course Syllabus

offered by Department of Biomedical Sciences
with effect from Semester A 2020/21

Part I Course Overview

Course Title:	Biology of Cells
Course Code:	BMS2803
Course Duration:	One Semester
Credit Units:	3 credits
Level:	B2
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Completion of all Year 1 courses with C grade or above
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course, together with the Animal Body courses and the Biology of Populations, Species and Ecosystems course, forms a series examining the levels of organisation of life. Biology of Cells or cell biology introduces the basic unit of life: the cell; and its constituent structures and cycle in their exposure to molecular biology. 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 certain disease states.

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 structure and functions of major organelles and subcellular structures in typical prokaryotic and eukaryotic cells, including both animal and plant 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 animal body	30%	✓	✓	✓
** If weighting is assigned to CILOs, they should add up to 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	Lectures will provide fundamental concepts and principles of biology at the cellular and subcellular level.	✓	✓	✓	✓	✓	2 hours/week
Small group workshops	Students explore fundamental concepts and principles of biology at the cellular and subcellular level and present their findings as a group report.	✓	✓	✓	✓	✓	1 hour/week
Laboratory classes	Students prepare appropriate slides including the use of differential staining then explore cell structure including observations of the nucleus and organelles, extending to chromosomes.	✓					3 hours every third week

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: 50%							
Quizzes	✓	✓	✓	✓	✓	20%	
Group presentation	✓	✓	✓	✓	✓	20%	
Laboratory skills	✓					10%	
Examination: 50% (duration: 3 hours)							
** The weightings should add up to 100%.*						100%	

"Minimum Passing Requirement" for BVM courses:

A minimum of 30% in coursework as well as in examination, and the total minimum passing requirement for the whole BVM course is 50%.

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 structure, cell, organelles, cell signalling, cell cycle, cytoskeleton, immune cells, nerve cells, cancer cells, and stem cells	Will exhibit excellent synthesis of principles, 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.	Will exhibit good synthesis of principles, 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.	Will exhibit basic competence in synthesis of principles, processes, and characteristics of cell biology; basic understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will exhibit some deficiencies in synthesis of principles, processes, and characteristics of cell biology; some deficiencies in understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will exhibit lack of competence in many aspects of the synthesis of principles, 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.
2. Group presentation	Understanding and analysis of the topic; knowledge depth, logic, and clarity of presentation; and collaboration among peers	Will exhibit excellent synthesis of principles, 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.	Will exhibit good synthesis of principles, 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.	Will exhibit basic competence in synthesis of principles, processes, and characteristics of cell biology; basic understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will exhibit some deficiencies in synthesis of principles, processes, and characteristics of cell biology; some deficiencies in understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will exhibit lack of competence in many aspects of the synthesis of principles, 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.

3. Laboratory skills	Student demonstrates technical and observational skills during laboratory exercises.	Will exhibit high competence in technical and observational skills during laboratory exercises.	Will exhibit good competence in technical and observational skills during laboratory exercises.	Will exhibit basic competence in technical and observational skills during laboratory exercises.	Will exhibit some deficiencies in technical and observational skills during laboratory exercises.	Will exhibit lack of competence in technical and observational skills during laboratory exercises.
4. Examination	Student can describe the principles, processes, and characteristics of cell biology; can analyse the functions of the major organelles and the interplay between structure and function; can explain cell signalling; can describe the cell cycle and the function of the cytoskeleton; can distinguish major cell types e.g. immune cells, nerve cells, cancer cells, and stem cells.	Will exhibit excellent synthesis of principles, 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.	Will exhibit good synthesis of principles, 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.	Will exhibit basic synthesis of principles, processes, and characteristics of cell biology; basic understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will exhibit some deficiencies in synthesis of principles, processes, and characteristics of cell biology; some deficiencies in understanding and analysis of functions of major organelles, the interplay between structure and function, cell signalling, cell cycle.	Will frequently exhibit lack of capacity to synthesise principles, processes, and characteristics of cell biology; little 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 diseases. Students are encouraged to explore examples such as lysosomal diseases, neurodegenerative diseases and nuclear envelope diseases. 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.	None

2.2 Additional Readings

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

1.	Hardin, J., Bertoni, G. and Kleinsmith, L. (2011). *Becker's World of the Cell. International Edition, 8th Edition*. ISBN13: 9780321709783; ISBN10: 0321709780
2.	Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., and Walter, P. *Molecular Biology of The Cell.* ISBN: 9780815344322
3.	Lodish, H., Berk, A., Kaiser, C., Krieger, M., and Bretscher, A. *Molecular Cell Biology.* ISBN:142923413X
4.	Chapter 12: Intracellular Transport, in "A comprehensive approach to Life Science". A web textbook edited by the University of Tokyo : http://csls-text3.c.u-tokyo.ac.jp/inactive/12_00.html