City University of Hong Kong
Course Syllabus

offered by Department of Biomedical Sciences
with effect from Semester A 2017 /2018

Part I Course Overview

Course Title:	Genetics and Proteomics for Bioengineering
Course Code:	BMS4802
Course Duration:	One Semester
Credit Units:	3 credits
Level:	B4
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)*	BCH2804 (Molecules and Cells) or BMS2801 (Molecules and Cells), MBE2104 (Tissue Engineering) ** Students of BSc in Applied Biology (BSAB) and BSc in Biomedical Sciences (BMS) Majors are not allowed to take this course
Precursors: *(Course Code and Title)*	
Equivalent Courses: *(Course Code and Title)*	BCH4806 Genetics and Proteomics for Bioengineering (for students who took BCH4806 during academic year from 2011/2012 to 2014/2015)
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course gives a detailed insight into the fields of genetics (including aspects of genomics and epigenetics) and proteomics. Genetics is the study of fundamental relationships between genes and traits in living organisms, and the functions and interactions of the genes in a genome. Proteomics is defined as the study of all the proteins expressed by the genome. Advances in genetics and proteomics are central to a wide range of areas in the biological sciences including bioengineering. Genetics and the proteome are intimately linked by complex pathways of transcription and translation, which involve mRNA processing, protein folding and post-translational modifications. Both genetics and proteomics incorporate areas of biotechnology, bioinformatics and biology, and utilize a multitude of methods and techniques to study the gene and protein expression profiles of cells and whole biological systems. This knowledge can be further manipulated and exploited for development of new diagnostic or therapeutic methods or industrial processes.

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.	Explain the basic structure of DNA, and the processes and importance of DNA replication and genetic recombination in living cells.		✓	✓	
2.	Describe gene and genome organization, and demonstrate an understanding of how genetic information is stored and expressed in cells, and how phenotype is affected by both genetic and epigenetic (environmental) factors.		✓	✓	
3.	Identify the key features of proteomic methods and proteomic tasks that are useful for network reconstruction (interactomics).			✓	✓
4.	Discover examples in daily life which involve the application of various bioinformatics tools in the analyses and modelling of biological networks and critically evaluate the implications of these technologies.		✓	✓	✓
** 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			
Lectures	Students will be taught in lectures about the various "omics" methods and the characteristics of these datasets and various bioinformatic methods for analysing biological networks.			✓	✓			
Tutorials	Students will be taught in tutorials to examine the structure of prokaryotic and eukaryotic DNA and the environmental factors that influence gene expression.		✓					
Large and small group discussion	Students will apply the knowledge to provide examples from daily life related to recent advances in applied genetics and proteomics and relate to different models of DNA replication and genetic recombination mechanisms in bacteria and eukaryotes.	✓			✓			
Quizzes & presentations	Quizzes and presentations will test students' learning outcomes relating to different models of DNA replication and genetic recombination mechanisms in bacteria and eukaryotes.	✓						

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				
Continuous Assessment: _40_%								
Tutorial Assignments	✓	✓	✓	✓			20%	
Short quizzes/ Oral Presentation	✓	✓	✓	✓			20%	
Examination: _60_% (duration: 3hrs, if applicable)								
** The weightings should add up to 100%.*							100%	

"Minimum Passing Requirement" for BMS courses:

A minimum of 30% in coursework as well as in examination, in addition to a minimum of 40% in coursework and examination taken together.

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. Tutorial assignments	The number of correct answers and the quality of the answer.	Accurately answered all the questions. Well organised text and coherent logic.	Correctly answered >80% of the questions.	Correctly answered 60% to 80% of the questions.	Correctly answered 40% to 60% of the questions.	Did not hand in the assignment on time. Or correctly answered < 40% of the questions.
2. Short quizzes	The number of correct answers.	Accurately answered all the questions. Well organised text and coherent logic.	Correctly answered >80% of the questions.	Correctly answered 60% to 80% of the questions.	Correctly answered 40% to 60% of the questions.	Correctly answered < 40% of the questions.
3.Oral presentation	The content and the style of the presentation. Handling of questions.	Correct questions > 90%.	Correct questions between 75% and 90%.	Correct questions between 60% and 75%.	Correct questions between 50% and 60%.	Correct questions < 50%.

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.)

- Chemistry of genetic materials
- Gene and genome organization, structure, function and regulation
- Genetic and epigenetic mechanisms
- Applied genetics and proteomics
- Proteomics technologies for protein analysis and studying the protein interactome
- Protein databases and bioinformatics resources

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.	Robert J. Brooker (2011*). Genetics: analysis and principles*. McGraw-Hill Co., Inc.
2.	Campbell, A. and Heyer, L. (2006) *Discovering Genomics, Proteomics and Bioinformatics*. Benjamin-Cummings Publishing Company.

2.2 Additional Readings

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

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