Course Syllabus

offered by Department of Biomedical Sciences
with effect from Semester B 2023/24

Part I Course Overview

Course Title:	Fundamental and Advanced Multi-omics Research
Course Code:	BMS5008
Course Duration:	One semester
Credit Units:	3
Level:	5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	NIL
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

The course aims to provide lectures and practice to help students to understand the principles and applications of various -omics approaches. Topics include (1) principles of sequencing and commonly used sequencing platforms; (2) Genome sequencing transcriptome sequencing and their road applications; (3) Epigenetic modifications and regulation; (3) Transcriptional and post-transcriptional regulation; (4) Advances of proteomics and challenges; (5) Integrative data analyses and comprehensive functional genomics; (6) Gene editing, genome manipulation, emerging challenges during medical and therapeutic implementations (7) Novel inter-disciplinary and data-driven sciences. In all topics, special attention will be paid to building a fundamental understanding of omics research and applying knowledge to approach biological questions.

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.	Understand fundamental concepts of sequencing technology, and know the difference between distinct sequencing platforms, and their capacity and applications in various research scenarios.	40	✓	✓	
2.	Understand the advantages and disadvantages of commonly used assays in projects that use omics approaches. Able to determine/apply assays to appropriately capture the desired features given certain samples.	30	✓	✓	✓
3.	Build essential skills to evaluate the quality and merits of recent multi-omic research via critical thinking, and simultaneously gain the ability to design or improve experiments.	30		✓	✓
		100%			

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	
Lectures	Lecture introduction on course content	✓	✓	✓	
Tutorial	To give oral presentation on a certain topic for case study	✓	✓	✓	

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		
Continuous Assessment: 60 %					
Assignment	✓	✓	✓	40%	
Attendance	✓	✓	✓	20%	Lectures and tutorial sessions
Examination: 40% (Duration: 2 hours; covering studies from 1-13 weeks study)					
				100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Assignment /Attendance	Ability to analyse and criticise the multi-omics research	Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.	Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.	Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.	Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
2. Examination	Ability to analyse, state and apply the principles and subject matter learnt in the course				

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignment /Attendance	Ability to analyse and criticise the multi-omics research	Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.	Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.	Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.	Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.	Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
2. Examination	Ability to analyse, state and apply the principles and subject matter learnt in the course					

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.)

Principles of sequencing,
Genomics,
Proteomics,
Phylogenetic,
Epigenetics,
Evolution,
Gene editing,
Precision medicine,
Ethics

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.	Introduction to genomics, third edition, by Arthur M. LESK
2.	
3.	