City University of Hong Kong
Course Syllabus

offered by Department of Biomedical Sciences
with effect from Semester A 2022/2023

Part I Course Overview

Course Title:	**Genomics and Bioinformatics**
Course Code:	**BMS8110**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**R8**
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

This course aims to introduce historical development, basic concepts, principles and tools of genomics and bioinformatics, with extensive case studies. The students will learn comprehensive functional genomics, evolutional biology, systems biology and cancer genomics in the context of cutting-edge technological development. The students will be trained to acquire various techniques and programming skills for computational and statistical analysis. It also aims to teach students important skills about how to communicate and collaborate in their future research projects. The assessment consists of presentation, programming and report writing. The students are expected to expand their knowledge and skills by intensive literature reading and practice within and after class.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs[#]	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes		
			A1	*A2*	*A3*
1.	Summarize historical milestones, basic concepts and principles in Genomics and Bioinformatics		✓	✓	
2.	Criticize and summarize the scientific literature			✓	
3.	Apply computational and statistical methods to analyse data		✓	✓	✓
4.	Write a report about a real-world case study using bioinformatic data analysis		✓	✓	✓
		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)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lectures	Teaching and learning will be based on lectures to understand the basic concepts and principles, and learn how to use bioinformatic tools to address challenges in biomedical research.	✓	✓			2 hours/week (26 hours in total)
Computer Practicals	To learn basic Bioinformatic analyses by programming in R.			✓		Practical 6hrs (3 sessions x 2hrs)
Report writing	To do literature review and summarize results of data analysis for a real-world case study.				✓	
Tutorials on Oral presentations	Emerging topics and tools in Genomics and Bioinformatics will be discussed and presented by different groups of students.		✓			Tutorial 7hrs (7 sessions x 1hr)

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: 100%						
Scientific presentation of selected topics in Bioinformatics	✓	✓			30%	
Assessment of programming			✓		20%	
Writing report for a case study using bioinformatic tools			✓	✓	50%	
Examination: 0%						
					100%	

5. Assessment 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. Presentation and discussion	Demonstrate the ability to apply what has been taught in lectures/tutorials in their oral presentation	High	Significant	Moderate	Not even reaching marginal levels
2. Programming	Demonstrate the ability to analyse data by programming in R	High	Significant	Moderate	Not even reaching marginal levels
3. Report writing	Demonstrate the ability to do extensive literature review, search for data, analyse data, interpret results, propose hypothesis and design follow-up experiments.	High	Significant	Moderate	Not even reaching marginal levels

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. Presentation and discussion	Demonstrate the ability to apply what has been taught in lectures/tutorials in their oral presentation	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Programming	Demonstrate the ability to analyse data by programming in R	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Report writing	Demonstrate the ability to do extensive literature review, search for data, analyse data, interpret results, propose hypothesis and design follow-up experiments.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information

1. Keyword Syllabus

Functional genomics; sequence alignment; phylogenetic trees; structural bioinformatics; gene perturbation screen; systems biology; network inference; cancer genomics

2. Reading List

2.1 Compulsory Readings

Nil

2.2 Additional Readings

1.	Introduction to Genomics, Oxford University Press; 2nd edition. ISBN-13: 978-0199564354, ISBN-10: 0199564353
2.	Introduction to Bioinformatics, Oxford University Press, 4th Edition. ISBN-13: 978-0199651566, ISBN-10: 0199651566
3.	Bioinformatics and Functional Genomics, Wiley-Blackwell, 3rd Edition. ISBN-13: 978-1118581780, ISBN-10: 1118581784
4.	R Cookbook, O'Reilly Media; 1st Edition. ISBN-13: 978-0596809157, ISBN-10: 0596809158