



香港城市大學  
City University of Hong Kong

專業·創新·觸動全球  
Professional·Creative  
For The World

## City University of Hong Kong Course Syllabus

offered by Department of Biomedical Sciences  
with effect from Semester A 2024/2025

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### Part I Course Overview

|  |                                    |
|--|------------------------------------|
| <b>Course Title:</b>   | <b>Genomics and Bioinformatics</b> |
| <b>Course Code:</b>  | <b>BMS8110</b>                     |
| <b>Course Duration:</b>                                      | <b>One semester</b>                |
| <b>Credit Units:</b>   | <b>3</b>                           |
| <b>Level:</b>  | <b>R8</b>                          |
| <b>Medium of Instruction:</b>                                | <b>English</b>                     |
| <b>Medium of Assessment:</b>                                 | <b>English</b>                     |
| <b>Prerequisites:</b><br><i>(Course Code and Title)</i>      | <b>Nil</b>                         |
| <b>Precursors:</b><br><i>(Course Code and Title)</i>         | <b>Nil</b>                         |
| <b>Equivalent Courses:</b><br><i>(Course Code and Title)</i> | <b>Nil</b>                         |
| <b>Exclusive Courses:</b><br><i>(Course Code and Title)</i>  | <b>Nil</b>                         |

## 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, evolutionary 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 literature reading, group 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 <sup>#</sup>  | Weighting | Discovery-enriched curriculum related learning outcomes |    |    |
|-----|---|-----------|---|----|----|
|     |   |           | A1  | A2 | A3 |
| 1.  | Identify and explain basic concepts and principles in Genomics and Bioinformatics |           | ✓   | ✓  |    |
| 2.  | Combine and compare the major information of 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 real-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. Learning and Teaching Activities (LTAs)

| LTA                  | Brief Description   | CILO No. |   |   |   | Hours/week                          |
|----------------------|---|----------|---|---|---|-------------------------------------|
|                      |   | 1        | 2 | 3 | 4 |                                     |
| Lectures             | Attend lectures to understand the basic concepts and principles, and build skills to use bioinformatic tools to address questions in biomedical research. | ✓        | ✓ |   |   | 2 hours/week<br>(26 hours in total) |
| Programming Practice | Identify tools and design appropriate approaches to analyse data in R.  |          |   | ✓ |   |                                     |
| Report writing       | Combine, compare and cite literature review and summarize results of data analysis for a real-world case study.   |          |   |   | ✓ |                                     |
| Tutorials            | Read literature and participate in group discussion on Genomics and Bioinformatics followed by presentation.  |          | ✓ |   |   | Tutorial 7hrs<br>(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 | ✓        | ✓ |   |   | 50%       |         |
| Assessment of programming                                    |          |   | ✓ |   | 30%       |         |
| Attendance of lecture and tutorial sessions                  |          |   | ✓ | ✓ | 20%       |         |
|  |          |   |   |   | 100%      |         |

## 5. Assessment Rubrics

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

| Assessment Task                                | Criterion   | Excellent<br>(A+, A, A-) | Good<br>(B+, B, B-) | Fair<br>(C+, C, C-) | Marginal<br>(D) | Failure<br>(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. Attendance of lecture and tutorial sessions | 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 |

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

| Assessment Task                | Criterion  | Excellent<br>(A+, A, A-) | Good<br>(B+, B) | Marginal<br>(B-, C+, C) | Failure<br>(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. Attendance of lecture and tutorial sessions | 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 |
|--|---|------|-------------|----------|-----------------------------------|

## 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                              |