BMS8110: GENOMICS AND BIOINFORMATICS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Genomics and Bioinformatics

Subject Code
BMS - Biomedical Sciences
Course Number
8110

Academic Unit
Biomedical Sciences (BMS)

College/School
College of Biomedicine (BD)

Course Duration
One Semester

Credit Units
3

Level
R8 - Research Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

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 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.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify and explain basic concepts and principles in Genomics and Bioinformatics		x	x	
2	Combine and compare the major information of scientific literature			x	
3	Apply computational and statistical methods to analyse data		x	x	x
4	Write a report about a real-world case study using bioinformatic data analysis		x	x	x

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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Attend lectures to understand the basic concepts and principles and build skills to use bioinformatic tools to address questions in biomedical research.	1, 2	2 hours/week (26 hours in total)
2	Programming Practice	Identity tools and desgin appropriate approaches to analyse data in R.	3	
3	Report writing	Combine, compare and cite literature review and summarize results of data analysis for a real-world case study.	4	

4	Tutorials	Read literature and participate in group discussion on Genomics and Bioinformatics followed by presentation.	2	Tutorial 7hrs (7 sessions x 1hr)

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Scientific presentation of selected topics in Bioinformatics	1, 2	50	
2	Assessment of programming	3	30	
3	Attendance of lecture and tutorial sessions	3, 4	20	

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)

Assessment Task

Presentation and discussion (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Demonstrate the ability to apply what has been taught in lectures/tutorials in their oral presentation

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Programming (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Demonstrate the ability to analyse data by programming in R

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Attendance of lecture and tutorial sessions (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Demonstrate the ability to do extensive literature review, search for data, analyse data, interpret results, propose hypothesis and design follow-up experiments.

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Presentation and discussion (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Demonstrate the ability to apply what has been taught in lectures/tutorials in their oral presentation

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Not even reaching marginal levels

Assessment Task
Programming (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Demonstrate the ability to analyse data by programming in R

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Not even reaching marginal levels

Assessment Task
Attendance of lecture and tutorial sessions (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Demonstrate the ability to do extensive literature review, search for data, analyse data, interpret results, propose hypothesis and design follow-up experiments.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

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

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
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