

BMS3301: BIOINFORMATICS

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Bioinformatics

Subject Code

BMS - Biomedical Sciences

Course Number

3301

Academic Unit

Biomedical Sciences (BMS)

College/School

Jockey Club College of Veterinary Medicine and Life Sciences (VM)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

BMS2201 Molecular Biology of the Cell or BMS1901 Calculus for Life Sciences or BMS2901 Introductory Biostatistics and Data Analysis

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to introduce basic concepts, principles, popular tools in Bioinformatics, with extensive case studies. The student will learn comprehensive functional genomics, evolutionary biology, systems biology and cancer genomics in the context of latest technological development. The students will be trained to acquire various techniques and programming skills for critical data 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.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Summarize basic concepts and principles in Bioinformatics		x	x	
2	Criticize and summarize the scientific literature			x	
3	Apply Bioinformatic methods to analyse data		x	x	x
4	Write a report to summarize results of Bioinformatic 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.

Teaching and Learning Activities (TLAs)

TLAs		Brief Description	CILO No.	Hours/week (if applicable)
1	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.	1, 2	Lecture 26hrs (13 lectures x 2 hrs)
2	Computer Practicals	To learn critical Bioinformatic analyses by programming in R.	3	Practical 6hrs (3 sessions x 2hrs)
3	Report writing	To do literature review and summarize results of analysis.	4	

4	Tutorials on Oral presentations	Emerging topics and tools in Bioinformatics will be discussed and presented by different groups of students.	2	Tutorial 7hrs (7 sessions x 1hr)
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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	30	
2	Assessment of programming	3	20	
3	Writing report to summarize results of Bioinformatic analysis	3, 4	50	

Continuous Assessment (%)

100

Examination (%)

0

Additional Information for ATs

""Minimum Passing Requirement": A minimum of 40% in continuous assessment as well as in examination."

Assessment Rubrics (AR)**Assessment Task**

1. Presentation and discussion

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

2. Programming

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

3. Report writing

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

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 Bioinformatics, Oxford University Press, 4th Edition. ISBN-13: 978-0199651566, ISBN-10: 0199651566
2	Bioinformatics and Functional Genomics, Wiley-Blackwell, 3rd Edition. ISBN-13: 978-1118581780, ISBN-10: 1118581784
3	R Cookbook, O'Reilly Media; 1st Edition. ISBN-13: 978-0596809157, ISBN-10: 0596809158
4	Online materials for R learning: https://www.rstudio.com/online-learning/