BMS3203A: GENETICS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Genetics

Subject Code
BMS - Biomedical Sciences
Course Number
3203A

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
CHEM1200/BCH1200 Discovery in Biology

Precursors
CHEM2013/BCH2013 Microbiology

Equivalent Courses
BCH3012/CHEM3012 (and BCH3012A/CHEM3012A) Genetics

Exclusive Courses
Nil

Additional Information
BMS3203A does not contain any practical component, and has a credit unit value of three (3).

Part II Course Details

Abstract

In this course, students will:

- explore the fundamental relationships between genes and traits in "living organisms" ranging from viruses to higher eukaryotes;
- develop an understanding of a range of basic genetic principles and their application to gene mapping in viruses and bacteria;
- explain the activities and functions of DNA;
- critically review and evaluate contemporary issues related to recent advances in applied genetics and recombinant DNA technology;
- This course builds on (and complements) knowledge covered in Biochemisty and Microbiology; and underpins the more advanced concepts and applications that are covered in Molecular Biology and final year project.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic structure of DNA, and the processes and importance of DNA replication and genetic recombination in living cells.	20	x		
2	Describe gene and genome organisation and expression in prokaryotes and eukaryotes; and demonstrate an understanding of how genetic information is stored and expressed in cells, and the way in which phenotype is affected by both genetic and environmental effects.	20	x		
3	Demonstrate an understanding of the molecular basis of variation and mutation (and relation to evolution and population genetics), of natural and artificial genetic recombination, of extrachromosomal inheritance, of gene dosage compensation and X inactivation, and of genetic analysis and its importance in biology	40	x	x	
4	Discover examples encountered in our daily lives, which involve the application of genetics and recombinant DNA technology and critically evaluate their impact to modern day living. Critically review, discuss and evaluate contemporary issues related to recent advances in applied genetics and recombinant DNA technology.	20		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	Group discussion activities, written assignments, quizzes and presentations	Students will undertake large and small group discussion activities, written assignments, quizzes and presentations related to different models of DNA replication and genetic recombination in viruses, bacteria and eukaryotes.	1	
2	Written assignments, tutorials and/or laboratory practicals	In large and small group sessions including written assignments, tutorials and/or laboratory practicals, students will examine the structure of prokaryotic and eukaryotic DNA and the environmental factors that govern gene expression.	2	
3	Quizzes, tutorials and/or laboratory practicals	Teaching and learning will be primarily by large and small group sessions including quizzes, tutorials and/or laboratory practicals supplemented with case examples to enable students to collect, process, present and interpret molecular genetic data.	3	

4	Internet resources and investigation of the literature	Through extensive use of Internet resources and investigation of the literature on genetics, students in small groups will apply their knowledge to provide daily life examples related to recent advances in applied genetics (of their choice; e.g. GM foods, genetic basis of cancer, gene therapy or human cloning, etc) and clearly communicate and evaluate their findings orally and in writing.	4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Short Quizzes	2, 3	10	
2	Tutorial / Discussion	1, 2, 3, 4	15	
3	Oral Presentation / Essay	3, 4	15	

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Additional Information for ATs

Minimum Passing Requirement: A minimum of 40% in both coursework and examination components.

Assessment Rubrics (AR)

Assessment Task

1. Short Quizzes

Criterion

CAPACITY for the understanding of basic genetic concept and ABILITY of utilising these concepts in real life problems

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)
Moderate

Failure (F)
Not even reaching marginal levels

Assessment Task
2. Laboratory Report (for BMS3202 only)

Criterion
ABILITY to REPORT experimental procedures and EXPLAIN the principles behind. CRITICALLY REVIEW the cause of experimental errors and DISCUSS the applications of these procedures in real life problems

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. Tutorial/Discussion

Criterion
ABILITY to EXPLAIN in DETAIL and with ACCURACY basic concepts in genetics and DISCUSS their implications in real life problems

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
4. Oral Presentation / Essay

Criterion
ABILITY to APPLY genetic concepts in real life problems especially those involved in topical issues

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
5. Examination

Criterion
STRONG COMMAND of genetic concepts, and ABILITY to APPLY these concepts in problem solving

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

- · Chemistry of genetic materials
- · Gene structure, function and regulation
- · Genetic variation, evolution and population genetics
- · Genetics of viruses and bacteria
- · Eukaryotic genetics

- · Population genetics
- · Applied Genetics

Reading List

Additional Readings

	Title
1	Robert J. Brooker (2005) Genetics: analysis and principles. (2nd edition), McGraw-Hill Co., Inc., USA
2	Peter D. Snustad and Michael J. Simmons (2006) Principles of Genetics. (4th edition), John Wiley & Sons, Inc.
3	Online Resources: To be provided, as required, in lectures and tutorials