

# BMS2806: GENES, INHERITANCE AND GENETIC DISORDERS

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## Effective Term

Semester A 2022/23

## Part I Course Overview

### Course Title

Genes, Inheritance and Genetic Disorders

### Subject Code

BMS - Biomedical Sciences

### Course Number

2806

### 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

Completion of all Year 1 courses with C grade or above

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This genetics and molecular biology course considers the attributes of genetic material and the role of genes in determining the characteristics of organisms including microbes and vertebrates, individual variation, mechanisms of inheritance, natural selection, and artificial selection in breeding programs. Topics will include: the distinction between genotype and phenotype, meiosis and Mendel's Laws, Mendelian inheritance, modes of inheritance, the Hardy-Weinberg equilibrium, genetic linkage, recombination and genetic mapping, types and sources of genetic variation, heterosis and hybrid vigour, gene structure and function, gene expression and regulation, epigenetics, mutations, inherited defects, genetic testing, and genetically-modified organisms.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify the composition of chromosomes and distinguish different mechanisms of inheritance in order to describe the relationship between genotype and phenotype.		x		
2	Apply an understanding of population genetics in order to explain the evolutionary forces and population dynamics.		x	x	
3	Identify genetic aberrations in order to explain and deduct how genetic dysfunction can lead to disorders.		x	x	
4	Perform basic experiments and computer analysis in order to apply knowledge of genetic relevance.				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	Learn the components and the mechanisms enabling inheritance and selective breeding	1, 2, 3	1 hr/wk
2	Practical classes	Laboratory and computer exercises of genetic relevance	1, 4	2 hrs x 6
3	Tutorials	Problem-based learning	1, 2, 3	1 hr/wk

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes	1, 2, 3	15
2	Laboratory reports	1, 4	10
3	Problem-based learning reports	1, 2, 3	20

**Continuous Assessment (%)**

45

**Examination (%)**

55

**Examination Duration (Hours)**

3

**Additional Information for ATs**

Minimum Passing Requirement : A minimum of 30% in coursework as well as in examination, and the total minimum passing requirement for the whole BVM course is 50%.

**Assessment Rubrics (AR)****Assessment Task**

1. Quizzes

**Criterion**

Ability to describe and explain the course topics and concepts

**Excellent (A+, A, A-)**

Will exhibit high competence in describing and explaining the course topics and concepts

**Good (B+, B, B-)**

Will exhibit good competence in describing and explaining the course topics and concepts

**Fair (C+, C, C-)**

Will exhibit basic competence in describing and explaining the course topics and concepts

**Marginal (D)**

Will exhibit some deficiencies in describing and explaining the course topics and concepts

**Failure (F)**

Will exhibit lack of competence in describing and explaining the course topics and concepts

**Assessment Task**

2. Laboratory reports

**Criterion**

Ability to perform basic laboratory techniques and computer analyses relevant to the course

**Excellent (A+, A, A-)**

Will exhibit high competence in performing basic laboratory techniques and computer analyses

**Good (B+, B, B-)**

Will exhibit good competence in performing basic laboratory techniques and computer analyses

**Fair (C+, C, C-)**

Will exhibit basic competence in performing basic laboratory techniques and computer analyses

**Marginal (D)**

Will exhibit some deficiencies in performing basic laboratory techniques and computer analyses

**Failure (F)**

Will exhibit lack of competence in performing basic laboratory techniques and computer analyses

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**Assessment Task**

3. Problem-based learning reports

**Criterion**

Ability to work in a group to apply course topics and concepts to problems

**Excellent (A+, A, A-)**

Will exhibit high competence in working in a team to apply course topics and concepts to problems

**Good (B+, B, B-)**

Will exhibit good competence in working in a team to apply course topics and concepts to problems

**Fair (C+, C, C-)**

Will exhibit basic competence in working in a team to apply course topics and concepts to problems

**Marginal (D)**

Will exhibit some deficiencies in working in a team to apply course topics and concepts to problems

**Failure (F)**

Will exhibit lack of competence in working in a team to apply course topics and concepts to problems

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**Assessment Task**

4. Examination

**Criterion**

Ability to describe the composition of chromosomes and the mechanism of inheritance

**Excellent (A+, A, A-)**

Will exhibit high competence in describing and explaining the course topics and concepts in written format

**Good (B+, B, B-)**

Will exhibit good competence in describing and explaining the course topics and concepts in written format

**Fair (C+, C, C-)**

Will exhibit basic competence in describing and explaining the course topics and concepts in written format

**Marginal (D)**

Will exhibit some deficiencies in describing and explaining the course topics and concepts in written format

**Failure (F)**

Will exhibit lack of competence in describing and explaining the course topics and concepts in written format

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**Part III Other Information****Keyword Syllabus**

Individual variation, mechanisms of inheritance, natural selection, artificial selection, breeding programs, genotype, phenotype, chromosome, meiosis, Mendel's Laws, Mendelian inheritance, alleles, modes of inheritance, Hardy-Weinberg equilibrium, genetic linkage, recombination, genetic mapping, genetic variation, heterosis, hybrid vigour, inbreeding depression, gene structure, gene function, gene expression, gene regulation, mutations, inherited defects, genetically-modified organisms.

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	Pierce, B. (2013). Genetics: A Conceptual Approach, 5th Edition. Freeman Publishers.
2	Brooker, R. (2014). Genetics: Analysis and Principles, 2nd Edition. McGraw-Hill.