

# BMS3205: OMICS, GENOME EDITING AND ADVANCED TECHNIQUES FOR BIOMEDICAL RESEARCH

---

## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Omics, Genome Editing and Advanced Techniques for Biomedical Research

### Subject Code

BMS - Biomedical Sciences

### Course Number

3205

### Academic Unit

Biomedical Sciences (BMS)

### College/School

College of Biomedicine (BD)

### Course Duration

One Semester

### Credit Units

2

### Level

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

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

BMS2205 Essential Techniques in Biomedical Sciences

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims at providing students with hand-on experience of working on the bench with advance molecular biology techniques. This course emphasises on the acquisition of experimental skills and practical abilities to conduct research in biomedical sciences. The main objective of the course is to allow the students to develop critical thinking and troubleshooting skills. At the end of the course, the students should be able to handle more complicated experiments in the laboratory of molecular biology setting, and perform experiments independently.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Familiarize with advance research technologies and principle	n/a	x	x	x
2	Develop advance research skills required for biomedical research	n/a	x	x	x
3	Design and setup of experiments to interrogate specific scientific questions in molecular biology	n/a	x	x	x
4	Analyse and critically evaluate the data collected from experiments	n/a	x	x	x
5	Summarize and report the observations in a concise scientific format	n/a	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	Practical	Teaching and learning is primarily based on the protocols set in the course	1, 2, 3, 4, 5
2	Lecture	Principle of practical and experimental background will be introduced before experiments	1, 2, 3, 4, 5

3	Experimental results and assignments	Data collection, group discussion and result analyses will be conducted after each practical	4, 5	
---	--------------------------------------	--	------	--

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?	
1	Practical performance (skill demonstration, participation in class activities, attendance)	1, 2, 3, 4, 5	50	-	No
2	Group discussion and quizzes	1, 2, 3, 4, 5	10	-	No
3	Experimental Reports and Assignments	1, 2, 3, 4, 5	40	-	No

**Continuous Assessment (%)**

100

**Examination (%)**

0

**Minimum Continuous Assessment Passing Requirement (%)**

40

**Minimum Examination Passing Requirement (%)**

0

**Additional Information for ATs**

“Minimum Passing Requirement” for this course: A minimum of 40% in both practical and assignment components.

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

1. Practical performance (skill demonstration, participation in class activities, attendance)

**Criterion**

Ability for self-learning, task implementation, team work and completion of experiment

**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. Group discussion and quizzes

**Criterion**

Ability to understand the principle of experiment

**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. Experimental Reports and Assignments

**Criterion**

Ability to present results and interpret data scientifically

**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

- Advance Bioinformatics: Genomics, proteomics, metabolomics analysis and interpretation
- Genome editing, LoxP-Cre system, CRISPR/Cas9 system
- Cell culture techniques
- Transfection, overexpression, Knockdown/knockout
- Immunofluorescence microscopy
- Chromatin immunoprecipitation
- ELISA

### Reading List

#### Compulsory Readings

Title	
1	Nil

#### Additional Readings

Title	
1	Practical skills in biomolecular sciences (3rd edition) Rob Reed, David Holmes, Jonathan Weyers, and Allan Jones. Pearson Education Limited. ISBN: 978-0-13-239115-3. Publication date: 2007