BMS4003B: CLINICAL BIOCHEMISTRY AND MOLECULAR DIAGNOSTICS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Clinical Biochemistry and Molecular Diagnostics

Subject Code
BMS - Biomedical Sciences
Course Number
4003B

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
BMS2201 Molecular Biology of Cell or BMS2206 Cell Biology

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Additional Information
Note: BMS4003B does not contain the wet-lab practical component, and has a credit unit value of 2.

Part II Course Details

Abstract

The course aims to correlate the basic knowledge obtained in the previous modules and provides students with the fundamental concepts of biomolecule and genetics to further enhance the students' knowledge in clinical biochemistry. A diverse range of biomolecules including DNA, RNA, proteins and metabolites will be studied. Protein structures and the biochemical logic of the metabolic pathways will also be discussed. For the lab sessions, students will be able to perform wet-lab experiments using advance molecular biology techniques, such as digital PCR and next-generation sequencing systems and dry-lab experiments using latest clinical bioinformatics tools. Students will learn how to apply the practical aspects of the latest techniques used in a molecular diagnostics laboratory through the lab sessions.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify the structures and functions of biomolecules and describe cellular production and manipulation ofbiomolecules		x		
2	Demonstrate a working knowledge on the use of bioinformatics tools and databases for protein and DNAanalysis			x	
3	Evaluate the test results for genetic disorders by using recombinant DNA techniques. Employ practical knowledge in operation of the Molecular Diagnostics Laboratory			x	x
4	Critically analyses scientific papers and journals		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	Student will engage in gaining knowledge in key theories, principles and technologies in molecular diagnostics and clinical chemistry.	1, 2, 3, 4	

2	Tutorials and Lab sessions [BMS4003 requires both wet-lab and dry-lab. BMS4003B requires dry-lab only.]	Demonstrate subject-specific skills in carrying out experimental work	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Web-lab and dry-lab practical reports and group project	1, 2, 4	30	Wet-lab is not applicable for BMS4003B.	No
2	Term paper (Individual assignment)	1, 2, 3, 4	10	-	No

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

3

Minimum Continuous Assessment Passing Requirement (%)

40

Minimum Examination Passing Requirement (%)

40

Additional Information for ATs

Minimum Passing Requirement: - Continuous assessment: 40%; and - Written examination: 40%.

Assessment Rubrics (AR)

Assessment Task

1.Research project (Group project)

Criterion

Demonstrate the ability to explain the methodology and procedure

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.Term paper (Individual assignment)

Criterion
Practical reports are based on specific their knowledge and demonstrate subject-specific skills in carrying out experimental work and data analysis

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.Final Exam

Criterion
To test students' application of material taught in class and evaluate their performance based on their performance on the exam

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

- Lipids
- Polysaccharides
- Nucleic acids
- Protein structures
- Metabolic pathways
- Molecular biology of the gene
- DNA-protein interaction
- Patterns, Motifs and profiles analysis
- Sequence analysis
- Design and Operation of the Molecular Diagnostics Laboratory
- Enzyme-linked immunosorbent assays (ELISAs)

Reading List

Compulsory Readings

	Title
1	Burtis, C., Ashwood, E., & Burns, D. (2005). Tietz Textbook of Clinical Chemistry and Molecular Diagnostics.ISBN: 978-1-4557-3412-2
2	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3107405/

Additional Readings

	Title
1	Nil