

BMS4003: 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

4003

Academic Unit

Biomedical Sciences (BMS)

College/School

College of Biomedicine (BD)

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 Cell or BMS2206 Cell Biology

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

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 of biomolecules	x		
2	Demonstrate a working knowledge on the use of bioinformatics tools and databases for protein and DNA analysis		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%. Please note that attendance in all practical sessions is mandatory for the completion of the course. Practical sessions are an integral part of the curriculum, providing hands-on learning experiences and essential for medical laboratory science training. Failure to attend practical sessions (an unauthorized absence and/or lateness) may result in a deduction of marks or, in extreme cases, may lead to failure in the course.

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