# BMS3008: MODERN MEDICAL LABORATORY TECHNIQUES AND INSTRUMENTATION

**Effective Term**
Semester A 2025/26

## Part I Course Overview

**Course Title**
Modern Medical Laboratory Techniques and Instrumentation

**Subject Code**
BMS - Biomedical Sciences
**Course Number**
3008

**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**
Nil

**Precursors**
Nil

**Equivalent Courses**
Nil

**Exclusive Courses**
Nil

## Part II Course Details

**Abstract**

Students will take essential clinical practice in approved facilities under the direction and supervision of laboratory educators. Students will demonstrate routine analytical procedures, develop adequate laboratory skills, apply learned knowledge, and have the opportunity to access acquired laboratory competencies. Also, students can apply the scientific concepts and principles to recent methodologies used in today's clinical laboratory relating laboratory results to clinical diagnosis. In this regards, the course will introduce some of the classical diagnostic techniques and provide therapeutic approaches to various human disorders. The most up-to-date methods used to aid in the detection of certain diseases will also be discussed.

**Course Intended Learning Outcomes (CILOs)**

| | CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|---|---|---|---|---|---|
| 1 | Demonstrate competency in the processing and analysis of biological specimens in the clinical laboratory | | | x | |
| 2 | Apply the basic concepts and principles to recent methodologies used in today's clinical laboratory relating laboratory results to clinical diagnosis | | | x | |
| 3 | Use the equipment properly, accurately, and safely and correctly computerize instruments for each laboratory procedure | | | x | |
| 4 | Demonstrate professional conduct consistent with ethical guidelines of a health care professional | | x | | |
| 5 | Critically evaluate the immunodiagnostic techniques of those commonly used in clinical laboratories | | | 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 | Lectures deliver subject-specific knowledge | 1, 2, 4 | |
| 2 | Laboratory sessions | Laboratory sessions will allow the students todevelop practical skills | 1, 2, 3, 4, 5 | |

**Assessment Tasks / Activities (ATs)**

| | ATs | CILO No. | Weighting (%) | Remarks ("-" for nil entry) | Allow Use of GenAI? |
|---|---|---|---|---|---|
| 1 | Laboratory Exercises | 1, 2, 3 | 30 | - | No |

**Continuous Assessment (%)**

30

**Examination (%)**

70

**Examination Duration (Hours)**

3

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

40

**Minimum Examination Passing Requirement (%)**

40

**Additional Information for ATs**

Minimum Passing Requirement: A minimum of 40% in continuous assessment as well as in examination. 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. Laboratory Exercises

**Criterion**

Practical classes allow students to utilize subject-specific knowledge gained from lectures

**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

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**Assessment Task**

2.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

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# Part III Other Information

**Keyword Syllabus**

- Spectrophotometry and Flow cytometry
- Mass spectrometry
- Positron emission tomography (PET) scan
- Computerized tomography
- Electrophoresis
- DNA microarray
- Immunochemical technique
- Electrochemistry and Biosensor
- Electrophysiology: whole-cell recording
- Optical Imaging techniques
- Brain mapping
- Optogenetics
- Magnetic resonance imaging (MRI)

**Reading List**

**Compulsory Readings**

| | Title |
|---|---|
| 1 | A Manual of Laboratory and Diagnostic Tests (Manual of Laboratory & Diagnostic Tests), 9th edition |
| 2 | Textbook: Badrinath, Sengamedu Srinivasa. Manual of Medical Laboratory Techniques. Eds. S. Ramakrishnan, and K. N. Sulochana. JP Medical Ltd, 2012. |
| 3 | Medical Laboratory Science, University of Otago http://www.otago.ac.nz/medlabsci |
| 4 | National Center for Biotechnology Information, U.S. National Library of Medicine http://www.ncbi.nlm.nih.gov/mesh/68019411 |

**Additional Readings**

| | Title |
|---|---|
| 1 | Nil |