澳門理工大學
Universidade Politécnica de Macau
Macao Polytechnic University

FACULTY OF HEALTH SCIENCES AND SPORTS

BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY (MEDICAL LABORATORY TECHNOLOGY)

LEARNING MODULE OUTLINE

Academic Year	2025/2026	Semester	2
Module Code	BSMB1102		
Learning Module	Microbiology		
Pre-requisite(s)	-		
Medium of Instruction	Chinese and English		
Credits	4	Contact Hours	60
Instructor	Elian, Zhou ChanChan	Email	T1678@mpu.edu.mo
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MODULE DESCRIPTION

This module, constituting 60 hours, serves as a fundamental cornerstone within the Biomedical Sciences programme. It is designed to provide students with an introduction to the essential principles of microbiology and elementary techniques for microorganism analysis.

The course adopts a theoretical approach to the study of microorganisms, aiming to equip students with a comprehensive understanding of microbiology's core concepts. These include an exploration of the history and fundamentals of microbiology, the classification and physiology of microorganisms (encompassing aspects such as nutrition, metabolism, growth, and variability), along with laboratory techniques and safe handling procedures for microorganisms.

The module is structured to comprise 40 hours of lectures, supplemented by 20 hours of practical sessions, allowing students to apply theoretical knowledge to hands-on experiences, thereby fostering a more holistic understanding of microbiology.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

On completion of this learning module, students will be able to:

M1.	**Firm Grasp of Microbial Characteristics and Taxonomies:** This refers to the student's understanding and classification of diverse microorganisms and their implications in healthcare.
M2.	**Comprehensive Understanding of Microbial Physiology and Genetics:** This emphasizes the student's in-depth familiarity with the complex physiological processes, growth dynamics, reproductive strategies, and genetic behaviours of various microorganisms.
M3.	**In-depth Dissection of Microbial Pathogenesis:** This indicates the student's deep understanding and analysis of the pathogenic mechanisms employed by different microorganisms in causing infectious diseases.
M4.	**Proficient Mastery of Fundamental Microbiological Practices:** This highlights the student's high-level proficiency in fundamental microbiological practices, including microscopy, microbial culture, aseptic techniques, and stringent laboratory safety protocols.

M5.	**Demonstrated Excellence in Laboratory Competencies:** This underscores the student's outstanding performance in carrying out practical tasks in the laboratory, including pathogenic isolation and identification, cultivation of infectious agents, basic staining technique, and maintaining high-quality control standards.
M6.	**Introductory Understanding and Presentation of Microbial Entities:** This pertains to the student's initial ability to deliver a basic presentation on a common infectious agent, outlining its clinical features, laboratory diagnostics, and therapeutic strategies.

These ILOs aims to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
P1. To demonstrate understanding of a range of subjects, fields, principles and approaches relevant to medical laboratory technology	✓	✓	✓	✓	✓	✓
P2. To demonstrate understanding of theories, analytical approaches and practices that underpin medical laboratory operations and management	✓	✓	✓	✓	✓	
P3. To demonstrate understanding of major trends and issues related to medical laboratory technology	✓	✓	✓			✓
P4. To apply professional knowledge and skills to analyse, interpret and solve problems, challenges and risks in medical laboratory practice			✓	✓	✓	
P5. To critically appraise and interpret scientific and clinical literature and apply evidence-based practice	✓	✓	✓			✓
P6. To acquire and apply research skills in medical laboratory technology	✓	✓	✓	✓	✓	
P7. To demonstrate effective communication and teamwork skills					✓	✓
P8. To maintain professional and ethical standards in medical laboratory practice and research				✓	✓	✓

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	**Content Coverage**	**Contact Hours**
1	**1. Characteristics of microorganism** a. Introduction to microbiology: Introduction to microbiology, covering the history of microbiology, its impact on human life, and the basics of cell theory b. Classification and Identification: , discussing principles of taxonomy, nomenclature, and the use of dichotomous keys	4
2	c. Bacteriology I: Introduction to bacteriology, exploring prokaryotic cell structure, bacterial morphology, and the importance of bacterial cell walls. Discussion on different types of bacteria based on their cell wall structure, shape, and metabolic characteristics	4
3	d. Bacteriology II: : In-depth look into bacterial nutrition, metabolic diversity, and bacterial growth patterns e. Bacteriology III: Exploration of bacterial genetics including transformation, transduction, and conjugation f. Virology I: Introduction to viral structure, classification, and replication strategies	6

4	g. Virology II: Discussion on viral replication, mutation, and evolution. Examination of medically important viruses and their diseases. h. Mycology and Other organism: Introduction to fungi, their structure, reproduction, and medically important species	6
5	**2. Biological reciprocity, Infection and Immunity** a. Normal flora; Pathogenesis and Immunity & Vaccine: Examination of the relationship between hosts and microbes, including symbiosis and pathogenesis. Discussion of immune responses to infections and vaccines **3. Preventions of Infections** a. Sterilization and Disinfection; hospital acquired infections: Review of methods for sterilization and disinfection, and strategies to prevent hospital-acquired infections	6
6	**Mid-term Examination (2h)** **4. Characteristics of parasite** a. Parasitology I: Introduction to parasitology, discussing parasite life cycles, host-parasite interactions, and major groups of parasites	4
7	b. Parasitology II: Detailed study of specific parasites and the diseases they cause **5. Common infections:** In-depth look at the causes, symptoms, and treatments of microbial diseases of the respiratory, gastrointestinal, urinary, and reproductive systems a. Microbial diseases I: Respiratory tract infection: trachoma, pharyngitis, diphtheria, whooping cough, common cold, influenza, tuberculosis, pneumonia b. Microbial diseases II: Gastroenteritis, typhus, dysentery, cholera, intestinal tract parasitic disease; Urinary tract and reproductive systems infection: urethritis, cystitis, and urethritis, pyelonephritis; sexually transmitted diseases	8
8	**6. Laboratory: Practice** a. Microbiology media preparation b. Aseptic transfer of bacterial cultures c. Microscope slide techniques d. Gram staining	16
9	**Laboratory Practice Examination** (Practical examination testing students' proficiency in lab techniques)	4
10	**Final Examination** (Comprehensive examination covering all course content)	2

TEACHING AND LEARNING ACTIVITIES

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
T1. Interactive lectures	✓	✓	✓	✓	✓	✓
T2. Group Discussion				✓		✓
T3. Supplementary reading	✓	✓	✓			✓
T4. Laboratory Practice				✓	✓	✓

ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Bachelor's Degree Programmes of the Macao Polytechnic University. Students who do not meet the attendance requirements for the learning module shall be awarded an 'F' grade.

ASSESSMENT

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	**Weighting (%)**	**ILOs to be Assessed**
A1. Mid-term Examination	20	M1-M4
A2. Experimental Report	10	M1-M6
A3. Laboratory Practice Examination	20	M1-M5
A4. Final Examination	50	M1-M6

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

Any students scoring less than 35% of the total mark in the final examination will be given an "F" grade for the module even if the overall grade is 50% or higher.

The assessment will be conducted following the University's Assessment Strategy (see www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

MARKING SCHEME

Assessment Activities	Assessment Criteria	Mark Ranges				
		88-100	73-87	58-72	50-57	<50
A1. Mid-term Examination	Thorough understanding of topics covered, accurate and well-explained answers, clear and logical reasoning	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A2. Experimental Report	Detailed and accurate report, well-analysed results, clear and concise writing, correct use of scientific terminology	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A3. Laboratory Practice Examination	Correct and efficient use of lab techniques, safe lab conduct, accurate and well-documented results	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels

A4. Final Examination	Comprehensive understanding of all course material, well-argued and well-substantiated answers, clear and logical reasoning	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels

REQUIRED READINGS

1. Ryan, R. J., Ray, C. G., & Brooks, G.F. (2006). Textbook of medical microbiology and parasitology. Beijing, Science Press.
2. 李凡，醫學微生物學，第七版，全國高等學校教材 (供基礎、臨床、預防、口腔醫學類專業用)。人民衛生出版社。

REFERENCES

1. Gerard J. Tortora, Berdell R. Funke, Christine L. Case. (2014). Microbiology: An Introduction 12th, Prentice Hall PTR.
2. Alfred E. Brown. (2012). Benson's Microbiological Applications (Laboratory Manual in General Microbiology Complete Version), Twelfth Edition. McGraw-Hill Companies, Inc.
3. Murray, P. R. (2017). Basic Medical Microbiology (1st ed.). Philadelphia, PA: Elsevier.
4. Jawetz, E., Melnick, J. L., & Adelberg, E. A. (2019). Medical Microbiology (26th ed.). New York, NY: McGraw-Hill.

STUDENT FEEDBACK

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

ACADEMIC INTEGRITY

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at www.mpu.edu.mo/student_handbook/.