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	2024 / 2025	Semester	I
Module Code	BSCM2101		
Learning Module	Clinical Microbiology		
Pre-requisite(s)	Microbiology		
Medium of Instruction	Chinese and English		
Credits	6	Contact Hours	90
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MODULE DESCRIPTION

This subject is one of the foundation subjects of the biomedical sciences program. It will introduce basic concepts of clinical microbiology and basic technique of clinical microbiologic laboratory. This course covers the classification, identification, and pathology of disease-causing organisms such as bacteria, fungi, yeasts, Rickettsiae, and Chlamydiae. Major emphasis is on the related theory and performance of microbiological procedures such as sterilization, collection and preparation of specimens, culturing methods, media preparation, staining techniques, antibiotic susceptibility testing, and identification of commonly cultured bacteria. The course is 6 credits, 90 hours, includes 72 lecture hours and 18 practical hours.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Demonstrate knowledge of and adhere to established guidelines for working with potential pathogens to ensure biohazard safety
M2.	Apply knowledge of specimen integrity. Evaluating patient samples for potential pathogens and indigenous microflora.
M3.	Apply the principles of various staining techniques used in the microbiology laboratory to evaluate direct smears from specimens and culture smears
M4.	Identify the phenotypic characteristics of common pathogenic bacteria, fungi ,yeasts, Rickettsiae, and Chlamydiae.
M5.	Identify unknown organisms using techniques presented in laboratory exercises. Develop laboratory skill competencies used to: a) isolate & identify bacteria； b) cultivate infectious agents; c) perform phenotypic and genotypic diagnostic methodologies; d) set up and interpret antimicrobial susceptibility testing e) issue a finalized microbiology reports and f) maintain quality control standards.
M6.	Give a presentation on a common infectious agent including clinical symptoms, laboratory diagnostics and treatment of the microbe

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, methodologies 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 develop research skills in medical laboratory technology and contribute to the health of the community	✓	✓	✓	✓	✓	
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. Introduction of clinical microbiology (3hours).** 1.1. Clinical microbiology laboratory rules 1.2. Safety policy, safety equipment 1.3. Quality control in the microbiology laboratory **2. Medical microbiological techniques (20hours).** 2.1. Sterilization 2.2. Collection and preparation of specimens	**6h**
2	2.3. Media preparation 2.4. Culturing methods 2.5. Correct terminology to describe colonies on commonly used media	**6h**
3	2.6. Smear preparation 2.7. Staining techniques	**6h**
4	2.8. Biochemical tests 2.9. Antibiotic susceptibility testing	**6h**
5	**3. Identification of cocci (9hours).** 3.1. Growth requirements 3.2. Morphology 3.3. Diseases caused by Staphylococci, Streptococci, Enterococci, Neisseria and other cocci 3.4. Culture 3.5. Identify	**6h**

6	3.6. Differentiate Staphylococci and Streptococci 3.7. Describe techniques for identification of Neisseria **4. Identification of bacilli (9hours).** 4.1. Growth requirements 4.2. Morphology 4.3. Diseases caused by the Enterobacteriacea	**6h**
7	4.4. Culture 4.5. Identify 4.6. Differentiate the Enterobacteriaceae **5. Identification of Vibrio(3hours).** 5.1. Growth requirements 5.2. Morphology 5.3. Diseases caused by the Vibrio 5.4. Culture 5.5. Identify 5.6. Differentiate the Vibrio.	**6h**
8	**Presentation**（4h）	**4h**
9	**6. Identification of Non-fermentative gram negative bacilli, fastidious bacterium, Bordetella，Gram positive aerobic bacilli, Corynebacterium. (6hours).** 6.1. Growth requirements 6.2. Morphology 6.3. Diseases caused by the Non-fermentative gram negative bacilli, fastidious bacterium, Bordetella and Corynebacterium, Gram positive aerobic bacilli 6.4. Culture 6.5. Identify	**6h**
10	**7. Describe epidemiology, pathogenicity, and growth requirements of the acid fast bacilli (3hours).** **8. Describe general characteristics and microscopic morphology of the spirochetes, list diagnostic procedures for syphilis (3hours).**	**6h**
11	**9. Explain characteristics of Mycoplasm, Rickettsiae and Chlamydiae (4hours).** **Midterm test (2h)**	**6h**
12	**10. Introduction of clinical Mycology (2hours).** 10.1. Morphology 10.2. Growth characteristics **11. Laboratory diagnosis of fungi (4hours).** 11.1. Explain lab methods for mycology studies 11.2. Give examples of dermatophytes, cutaneous fungi, and systemic fungi	**6h**
13	**12. Experiment (18hours).** 12.1. Unknown bacteria identification	**10h**
14	**12.2. Lab exam**	**8h**
15	**Final Exam (2hours).**	**2h**

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. Lectures and videos	✓	✓	✓	✓	✓	✓
T2. Case studies	✓	✓	✓	✓	✓	✓
T3. Review Writing and presentation						✓
T4. Experiment	✓	✓	✓	✓	✓	

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. Homework (Review of literature)	5%	M6
A2. Presentation	5%	M6
A3. Experimental Skills Exam	10%	M1-M5
A4. Experimental Report	10%	M1-M5
A5. Mid–term Test	20%	M1-M4
A6. Final Exam	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. Review of literature Writing	Knowledge and writing skills of frontiers and research in the field of clinical microbiology	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A2.Presentation	Teamwork and personal presentation skills	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A3.Experimental Skills Exam	Demonstrate technical understanding and operational ability	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A4.Experimental Report	Report and summary of experimental results	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A5.Mid-term Test	Demonstrate the ability to identify and apply appropriate concepts, methods and techniques	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A6.Final Examination	Demonstrate the ability to understand and apply the subjects covered in the classroom	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels

REQUIRED READINGS

1. Textbook of Diagnostic Microbiology, 5 nd Ed. (2015) Connie R. Mahon, George Manuselis, W.B. Saunders Company

2. Textbook of Microbiology for paramedicals. Logeswari Selvaraj. Copyright © 2008 by Jaypee brothers medical publishers(P) LTD.

3. Mirobiology, an introduction eighth edition. Gerard J. Tortora ,Berdell R. Funke, Christine L. Case. Copyright © 2004 by Pearson Education,Inc.,publishing as Benjamin Commings, San Francisco,CA 94111.

4. 臨床微生物學與檢驗 全國高等學校教材(供醫學檢驗專業用) 第四版，倪語星 尚紅主編，人民衛生出版社。

REFERENCES

1. 微生物學和微生物學檢驗，衛生部規範教材，俞樹榮主編，人民衛生出版社。

2. Microbiological Applications(Laboratory Manual in General Microbiology Complete Version), Twelfth Edition. Alfred E. Brown. Copyright © 2012 by The McGraw-Hill Companies,Inc.

3. Biochemical Tests for Identification of Medical Bacteria, Jean F. MacFaddin, 臺灣藝軒出版社

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/.