



FACULTY OF HEALTH SCIENCES AND SPORTS
BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY
(MEDICAL LABORATORY TECHNOLOGY)
LEARNING MODULE OUTLINE

| | | | |
|-----------------------|-------------------------|---------------|--|
| Academic Year | 2024/2025 | Semester | 1 |
| Module Code | BSVR2101-211 | | |
| Learning Module | Virology (病毒學與病毒檢驗) | | |
| Pre-requisite(s) | Nil | | |
| Medium of Instruction | Chinese and English | | |
| Credits | 2 | Contact Hours | 30 hours |
| Instructor | LAM Im Fong, Cristina | Email | iflam@mpu.edu.mo |
| Office | M706, Meng Tak Building | Office Phone | (853) 85993432 |

MODULE DESCRIPTION

The objectives of this module are the following:

This 30-hour module will give an overview of medically important virus families, utilize the theoretical approach to studying viruses, and offer comprehensive knowledge of virology fundamentals. It includes an introduction to classifications and physiology of virology, laboratory techniques and methods of handling, mechanisms of antiviral drugs, epidemiology of viral infections, and usage of vaccines to prevent viral infections. It includes 26 lecture hours and 4 clinical case study hours.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

| | |
|-----|---|
| M1. | Master the fundamental characteristics and types of viruses. |
| M2. | Explain viral replication strategies; compare and contrast replication mechanisms used by viruses relevant to human disease. |
| M3. | Understand viral physiology, growth, reproduction, and genetics. |
| M4. | Explain host antiviral immune mechanisms at a cellular and molecular level. Describe viral strategies to evade host immune and cellular factors. |
| M5. | Understand the sample handling processes and master the basic laboratory techniques for analysis and identification techniques, including microscopy, culture, aseptic techniques, commercial kits use, and microbiology laboratory safety. |
| M6. | Explain viral vaccine strategies and mechanisms of antiviral drugs, coherently analyze and report outcomes of virological research in oral and written output. |



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

| PILOs | M1 | M2 | M3 | M4 | M5 | M6 |
|--|----|----|----|----|----|----|
| P1. To demonstrate an understanding of a range of subjects, fields, principles, and approaches relevant to medical laboratory technology | ✓ | | | | | |
| P2. To demonstrate an 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 analyze, 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 |
|------|--|---------------|
| 2 | Introduction of viral structure, chemical compositions, classification, and replication. Explain how viruses differ from cellular organisms. Describe the components of virions; illustrate the variety of virus genomes. Outline the functions of virus structural and non-structural proteins. | 2 |
| 2-3 | Laboratory methods for diagnosis of viral infections, cultivation, cytology, assay of viruses, and serology. Outline methods for cultivation, purification of viruses, detection of viruses and their components, assay of virus infectivity, and investigation of virus gene function. Assess the value of virus genome sequencing. | 2 |
| 3 | Respiratory tract infection viruses: Influenza, Measles, Mumps, Rubella, Respiratory syncytial virus, Adenovirus, SARS and COV-19. Infections, genetics, diagnosis, treatment, and vaccination. Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, and treatment of Influenza, Measles, Mumps, Rubella, Respiratory syncytial virus, Adenovirus, and SARS infections. | 2 |
| 4 | Gastrointestinal tract infection viruses: Polioviruses, Coxsackievirus, Enteroviruses, and Rotaviruses. Classification, biological properties, virion structure and genome, disease mechanism, clinical syndromes, treatment, and vaccines. | 2 |



| | | |
|-------|---|---|
| | Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, and treatment of Polioviruses, Coxsackievirus, Enteroviruses, and Rotaviruses. | |
| 4-5 | Hepadnaviruses - Hepatitis B, A, C, D, and E: virion structure, genome structure and organization, replication cycle, pathogenesis, vaccination for Hepatitis B and Hepatitis D. Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, and treatment of Hepadnaviruses - Hepatitis B, A, C, D, and E. | 4 |
| 6,9 | Herpesviruses: classification, biological properties, virion structure and genome, diseases and clinical syndromes, treatment, and vaccines. Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, and treatment of Herpesviruses. | 4 |
| 8 | Midterm exam | 2 |
| 12-13 | Retroviruses and Human Immunodeficiency Virus (HIV) and Correlations: structure and composition of virion, reproductive cycle, HIV glycoproteins and regulatory proteins, and clinical disease - potential for blocking infection. Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, treatment, and prevalence of Retroviruses and Human Immunodeficiency Virus (HIV) | 4 |
| 14 | Human Papillomaviruses and Dengue virus and Encephalitis B virus: virion structure and genome, biology and pathogenesis, laboratory diagnosis. Describe the virion and virus genome, illustrate the replication cycle, explain the roles of the virus proteins, and master the pathogenesis, diagnosis, and treatment of Human Papillomaviruses, Dengue virus, and Encephalitis B virus. | 2 |
| 15-16 | Clinical case study | 4 |
| 17 | Final exam | 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: in-depth coverage of principles of virology is presented with PowerPoint slides and other supplementary materials if necessary. | ✓ | ✓ | ✓ | ✓ | | |
| T2. Q & A during class: allowed to raise questions from instructor or students for discussion. | | | ✓ | ✓ | ✓ | ✓ |
| T3. Clinical case study: in-class discussion with real viral infection case. Demonstrate and apply professional knowledge and skills to analyse, interpret, and guidance for professional and ethical suggestions. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |



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. Midterm exam | 40 | M1-M6 |
| A2. Final exam | 52 | M1-M6 |
| A3. Clinical Case Study Report | 8 | M1-M6 |
| A4. Re-sit exam | -- | 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

| Marks Ranges | Grade | Grade Point | Grade Definitions** |
|--------------|-------|-------------|---------------------|
| 93–100 | A | 4.0 | Excellent |
| 88 – 92 | A- | 3.7 | |
| 83 – 87 | B+ | 3.3 | Very Good |
| 78–82 | B | 3.0 | Good |
| 73 – 77 | B- | 2.7 | |
| 68–72 | C+ | 2.3 | Satisfactory |
| 63–67 | C | 2.0 | |
| 58 – 62 | C- | 1.7 | |
| 53 – 57 | D+ | 1.3 | Passed |
| 50 – 52 | D | 1.0 | |
| 0 – 49 | F | 0 | Failed |



REQUIRED READINGS

1. Peter M. Howley· David M. Knipe, (2021), Fields Virology, 7th Edition, Lippincott Williams & Wilkins. ISBN-13: 978-1-9751-1254-7
2. S. Jane Flint, Vincent R. Racaniello, Glenn F. Rall and Anna-Marie Skalka., (2020), Principles of Virology 5th edition, ASM Press. ISBN-13: 978-1-6836-7282-1

REFERENCES

1. Michael Loeffelholz, Richard L. Hodinka, Benjamin Pinsky, Stephen Young., 2016 Knipe, Clinical virology Manual 5th edition, Amer Society for Microbiology. ISBN-13: 978-1555819149
2. Douglas D. Richman, Richard J. Whitley, Frederick G. Hayden., 2017 Clinical Virology 4th edition, ASM Press. ISBN-13: 978-1555819422

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/.