

Module Outline Template

1. Module Identity

Module Code: LSM3225

Module Title: MOLECULAR MICROBIOLOGY IN HUMAN DISEASES

Module Credit: 4MC

2. Module description

With the application of advanced technologies in molecular biology to the study of microorganisms, there are many implications on how we can identify and detect microbes, as well as treat and prevent diseases caused by both existing and newly emerged pathogens. In this course, the students will be taught the molecular principles of the physiological processes involved in the life cycle of different types of microbes and how these affect human health and disease. There will be lectures and practical sessions to emphasize the importance of using multiple methodologies to discover, detect and study microbes that infect humans and cause diseases. In addition, there are also specialized talks by guest lecturers who will illustrate how molecular microbiology is used in laboratories that handle the diagnosis and surveillance of infectious diseases.

3. Eligibility and requirements

Prerequisites (prior knowledge required): LSM2211 or LSM2232 or LSM2233 or LSM2191 or LSM2291 or LSM2105 or LSM2106

Corequisites: NIL

Non-allowed subjects (if any): NIL

4. Intended learning outcomes (ILOs) with regard to knowledge and cognitive development

After taking this module, students will:

- a. Understand the molecular principles of the physiological processes involved in the life cycle of different types of microbes
- b. Understand how infection can affect human health and disease
- c. Know the types of methods used to detect and study microbes
- d. Understand the importance of diagnosis and surveillance of infectious diseases.

This module will provide good opportunities for practicing the following cognitive skills

- a) Remember: Recognize, Recall, and Know
- b) Understand: Question, Connect & Explain

- c) Analyze: Differentiate, Organize & Attribute
- d) Apply: Use, Execute & Implement

5. Intended learning outcomes with regard to generic skills and attributes development

This module will provide good opportunities for learning the following:

- a) Analytical & Critical Thinking
- b) Verbal/Oral Communication
- c) Collaboration & Teamwork

This module will provide average opportunities for learning the following:

- a) Adaptability & Learnability
- b) Problem-solving & Decision-making
- c) Planning, Organizing & Management skills

6. Course content and syllabus

1. Introduction to molecular microbiology and host-pathogen relationships
2. Control and treatment of microbial growth
3. Molecular Virology Part 1: Implications for vaccine and antiviral development
4. Molecular Virology Part 2: Viral evolution and antiviral resistance
5. Introduction to medical parasitology
6. Diagnostic parasitology
7. Host-Parasite Interactions
8. Anti-parasite Strategies
9. Introduction to Bacteriology-Basic principles and diagnostic methods
10. Host immune responses to bacterial infection
11. Fungi and fungal infection
12. Communicable disease outbreak investigation and public health surveillance
13. Environmental surveillance of viruses and bacteria: Impact on public health, risk assessment and responses
14. Practical session 1: One-step Real-Time PCR detection and quantification of Chikungunya virus infection
15. Practical session 2. ELISA & immunofluorescence assay for the detection of influenza A virus infection
16. Practical session 3: Analysis ELISA results and microscopy
17. Practical session 4: PCR detection of antimalarial resistance; novel drug-screening methods; demonstration of medically-important parasites
18. Practical session 5: Bacterial infection and host responses

7. Instructional methods

The following instructional methods will be employed to deliver content and achieve intended learning outcomes:

a) Lecture

b) Laboratory

c) Blended Learning

8. Learning activities

The following learning activities will be employed to achieve the learning outcomes of knowledge, cognitive, generic skills and/or 'employability' attributes development stated in items 4 and 5 above:

Table for Learning Activities

| | |
|---------------------|-----------------------|
| Case Studies, | Laboratory Activities |
| Interactive Lecture | Report/Essay Writing |

- a. Students will need to integrate knowledge in different aspects of microbiology.
- b. Students will need to go through reading assignments to develop reading skills.
- c. Students will work in groups in practicals so that they can develop communication skills.
- d. Students will learn from case study to develop thinking skills in application and analysis
- e. Students will have to generate concept maps so that they can make connections between different lectures as well as between lectures and practical classes.
- f. Students will learn from case study to develop thinking skills in application and analysis.
- g. Students will need to do experiments to develop finger skills, analytical skills and problem-solving skills.
- h. Students will need to have good time management skills when doing experiments and writing reports.

9. Assessments for evaluating students' performance

The following assessments will be employed to encourage and evaluate formative and summative learning in this module:

- a. Writing Report = 20%
- b. Continuous Assessment=30%
- c. Final Examination = 50%

10. Required and/or recommended readings

Strlkauskas, Strelkauskas and Moszyk-Strelkauskas, Microbiology, a clinical approach, Garland Science, Taylor & Francis Group, New York. 2010

11. Contact information for Module Coordinator and other instructors

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