



Revised: August 26, 2022

Master
Biological Sciences Program
ICBI 332 Medical Microbiology

Academic degree level Bachelor Graduate Diploma
 Higher Graduate Diploma Doctor
Mahidol University International College
Science Division

TQF 3 Course Specification

Section 1 General Information

1. Course Code and Title

In Thai ICBI 332 จุลชีววิทยาทางการแพทย์
In English ICBI 332 Medical Microbiology

2. Number of Credits

4 (Theory 4 hrs. Practice 0 hrs. Self-Study 8 hrs./week)

3. Curriculum and Course Type

3.1 Curriculum Bachelor Degree Program (International)
3.2 Course Type Elective course

4. Course Coordinator and Lecturer

4.1 Course Responsible Lecturers. Asst. Prof. Patsarin Wongkamhang, PhD
4.2 Lecturers Aumphaphan Subannaphong, MBBS

5. Trimester/Class Level

5.1 Trimester 1/2022-2023
5.2 Number of Students Allowed Approximately 30 students

6. Pre-requisite

ICBI 121 Biology 1 4 (3-2-7)
ICBI 214 General Microbiology (4-0-8)

7. Co-requisites

ICBI 271 General Microbiology Laboratory 2 (2-0-4)

8. Study Site Location

Mahidol University Salaya Campus

9. Date of Preparation/Latest Revision of the Course Specifications 26 August 2022



Section 2 Aims and Objectives

1. Course Goals

ICBI 332 Medical Microbiology 4 (4-0-8) is a 4-credits course taught over a 12-weeks trimester for students in the biological sciences program. The learning and teaching methods consist of lectures, discussions, written quizzes, written assignments, a field trip, and self-study. Student knowledge assessments include mid-term and final written examinations, written assignments, and presentations. This course aims to establish the basic foundation for pathogenic microbial species that cause human diseases including bacteria, viruses, protozoa, and fungi. The fundamental concepts are provided to understand essential aspects of pathogenic microorganisms such as their morphology, taxonomy, modes of transmission, and mechanisms of pathogenesis. Students will be able to recognize and diagnose common infectious diseases from patient histories, clinical manifestations, and laboratory investigations. Not only learn how pathogens attack but also understand how immunity defense against microorganisms. This course will portray the basic concepts of the immune response as well as the helpful and harmful aspects of immunity. Subsequently, students must be able to develop their clinical reasoning skills from learning and be able to select the appropriate antibiotics after comprehension of the common mechanism of antimicrobial action and resistance. In the end, students will perceive strategies of preventive control measures over infectious diseases for the sustainable well-being of population health. There will be no laboratory component in this course.

2. Course-level Learning Outcomes: CLOs

2.1 Course Objectives

To impart knowledge of the basic principles of bacteriology, virology, mycology, immunology, and parasitology including the nature of pathogenic microorganisms, pathogenesis, laboratory diagnosis, transmission, prevention, and control of diseases common in the country.

2.2 Course-level Learning Outcomes: CLOs

By the end of the course, students will be able to (CLOs)

CLO1 – Recognize the disease-causing microbial pathogens (e.g. viruses, bacteria, protozoa, helminths, and fungi) and describe their metabolism, strategies in escaping host immunity, mode of transmission, clinical manifestations, laboratory investigation, treatment, and prevention through written assignments and assessments.



CLO2 –Explain the basic concept of the immune response, select the correct antimicrobial agents that correspond to the infections effectively, and prevent microbes from being resistant to the drugs, using discussion and the latest Thailand treatment guidelines.

CLO3 – Develop diagnostic skills in clinical microbiology and preventive measures for infectious diseases through class presentations.

Section 3 Course Description and Implementation

1. Course Description

(Thai) ความรู้เบื้องต้นเกี่ยวกับขบวนการการก่อโรคที่เกิดจากเชื้อจุลชีพที่ทำให้เกิดโรคติดต่อในมนุษย์ หลักการการการวินิจฉัยโรคจากข้อมูลทางคลินิก และการส่งตรวจทางห้องปฏิบัติการ การควบคุมโรค และ ระบาดวิทยา

(English) The introduction to the pathogenicity of microorganisms that cause diseases in humans and the investigation concept of how to identify pathogens, diagnose and control infections.

2. Number of hours per trimester

Theory (hours)	Practice/field trip (hours)	Self-study (hours)
44	4	88

3. Number of Hours per Week for Individual Advice 2 hrs



Section 4: Development of the Expected Learning Outcomes

1. A summary of the knowledge or skills expected to develop in students; the course-level expected learning outcomes (CLOs)

CLO1 Through lectures and case studies, students will learn the core concepts in medical microbiology

CLO2 Through lectures, recitation, and storytelling, students will comprehend the principle of the immune system and how to select antibiotics effectively.

CLO3 Through lectures, recitation, storytelling, case study, and report paper assignment, students will develop diagnostic and infectious control skills.

2. How to organize learning experiences to develop the knowledge or skills stated in number 1 and how to measure the learning outcomes

CLOs	Teaching and learning experience				Learning outcomes measurements			
	Lectures	Recitations	Online discussion forum	Assignment and presentations	Assignments	Report paper and presentations	Quizzes	Written examination
CLO1	X	X	X	X	Written submission	Written and recorded submission	MCQ	MCQ, short and long answer
CLO2	X	X	X	X	Written submission	Written and recorded submission	MCQ	MCQ, short and long answer
CLO3	X	X	X	X	Written submission	Written and recorded submission	MCQ	MCQ, short and long answer

Section 5 Lesson Plan and Evaluation

1. Lesson Plan

Date	Topic	Teaching methods	Instructors
12-9-2022	Introduction to Bacteriology -Classification & structures -Human microbiome in health & disease -Sterilization, disinfection & antiseptic	Lecture	AS



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14-9-2022	Mechanism of bacterial pathogenesis -Role of bacteria in disease -Laboratory investigations -antibacterial agents	Lecture	AS
19-9-2022	Basic concepts of immune response	Lecture	AS
21-9-2022	Gram-positive bacteria I	Lecture	AS
26-9-2022	Gram-positive bacteria II	Interactive lecture	AS
3-10-2022	Gram-negative bacteria I	Lecture	AS
5-10-2022	Gram-negative bacteria II	Interactive lecture	AS
10-10-2022	Bacteria: miscellaneous	Interactive lecture	AS
12-10-2022	Parasitology I -Classification & pathogenesis -Laboratory investigation	Lecture	AS
17-10-2022	Parasitology II -Diseases	Interactive Lecture	AS
19-10-2022	Mycology I -Classification and pathogenesis -Laboratory investigation	Lectures	AS
24-10-2022	Mycology II -Diseases	Interactive Lecture	AS
26-10-2022	Fieldtrip to Golden Jubilee Medical Center: Laboratory identification of pathogens	Fieldtrip & written report (4%)	AS
31-10-2022	Current topics in microbial pathogen	Student presentation (5%)	AS
2-11-2022	Examination I (45%)		
7-11-2022	Introduction to Virology <ul style="list-style-type: none"> ● Virus structure, genetics, and the classification ● How do they spread? 	Interactive Lecture	PW
9-11-2022	The Fightback - Human immune response against viruses	Interactive Lecture	PW
14-11-2022	Emerging infections and past emerging viruses	Interactive Lecture	PW



16-11-2022	21st century pandemics	Interactive Lecture	PW
21-11-2022	Lifelong residents	Interactive Lecture	PW
23-11-2022	Viruses and Cancers	Group discussion Interactive lecture	PW
28-11-2022	Turning the tables - Vaccines	Group discussion Interactive lecture	PW
30-11-2022 (Last day of class)	Current issue in virus - anti-virus and virus technology	student presentation (5%)	PW
To be announced by OAA	Examination II (25%)		

Course Composition

Presentation	x2	10%
Class participation		5%
Quizzes		5%
Assignments		10%
Examination	x2	70%

2. Plan for Assessment of Expected Course-Level Learning Outcomes (CLOs)

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment



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Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1 Recognize the disease-causing microbial pathogens (e.g. viruses, bacteria, protozoa, helminths, and fungi) and describe their metabolism, strategies in escaping host immunity, mode of transmission, clinical manifestations, laboratory investigation, treatment, and prevention	Quiz 1	2.5%
	Written assignments 1,2,3,4	4%
CLO2 Explain the basic concept of the immune response, select the correct antimicrobial agents correspond to the infections effectively, and prevent microbes from being resistant to the drugs	Written assignment	2%
CLO3 Develop diagnostic skills in clinical microbiology and preventive measures for infectious diseases	Quiz 2	2.5%
	Written report	4%
	Presentation	10%
CLO1, 2, 3	Active learning and in-class participation	5%
Total		30%

B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1 Recognize the disease-causing microbial pathogens (e.g. viruses, bacteria, protozoa, helminths, and fungi) and describe their metabolism, strategies in escaping host immunity, mode of transmission, clinical manifestations, laboratory investigation, treatment, and prevention	Midterm and Final written assessment	30%
CLO2 Explain the basic concept of the immune response, select the correct antimicrobial agents correspond to the infections effectively, and prevent microbes from being resistant to the drugs		15%
CLO3 Develop diagnostic skills in clinical microbiology and preventive measures for infectious diseases		25%
Total		70%

3. Other assessments



N/A

4. Measurement and evaluation

Grade	Achievement	Final Score (% Range)	GPA
A	Excellent	90-100	4.0
B+	Very good	85-89	3.5
B	Good	80-84	3.0
C+	Fairy good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very poor	60-64	1.0
F	Fail	Less than 60	0.0

*Other letter grades, without credit points, are assigned as follows: I – Incomplete (awaiting evaluation); T – Transfer of credit; X – No report from the instructor; P – In progress (the study is incomplete); S – Satisfactory; U – Unsatisfactory; AU – Audit (a study which leads to no credit); W – Withdrawal

** assignment of other letter grades will follow the policies and rules outlined in Mahidol University International College Student Handbook 2022-2023.

5. Re-examination (if the course allows any.)

N/A - (Not applicable in MUIC)

6. Students' Appeal

Following MUIC policy



Section 6 Teaching Resources

1. Texts

- 1) Abbas AK, Lichtman AH, and Pillai S. *Cellular and Molecular Immunology* – 8th Edition. Elsevier Saunders; 2015.
- 2) Günther Witzany. *Viruses: Essential Agents of Life*. 2012
- 3) Murray, Patrick R. *Medical Microbiology* – 9th Edition. Elsevier 2021
- 4) Brooks GF, Butel JS, and Morse SA. *Jawetz, Melnick, & Adelberg's Medical Microbiology* – 28th Edition Edition International Edition. McGraw Hill; 2019

Documents and additional information

- 1) Latest updated Thailand or/and WHO clinical guidelines of infectious diseases, research/scientific publications

Section 7 Evaluation and Improvement of Course Implementation

1. Strategy for Course Effectiveness Evaluation by Students

- At the end of the course, students will assess the effectiveness of teaching and learning via MUIC Sky System. The evaluation will acquire anonymous students' feedback on course content, course management, faculty performance, and other suggestions
- Reflective paragraph of the end of the course

2. Strategy for Teaching Evaluation

- Students feedbacks
- Quantitative analysis of the performance of course assignments and assessments (mean, median, mode, and noticeable disparity)
- Reflection and submission of TQF5
- Reflective paragraph by the instructor

3. Teaching Improvement

- Continuously obtain students' feedback throughout the course



- A mid-course survey using the Start-Stop-Continue method
- Allocation of time and alteration of teaching pace as appropriate
- Invite a guest instructor to observe the class. The guest instructor provides class observation feedback

4. Verification of Standard of Learning Outcome for the Course

- Acquire students' verbal feedback on formal written assessments regarding the structure and management of the assignments and assessments

5. Revision Process and Improvement Plan for Course Effectiveness

- Review the course before the trimester starts
- Review the objectives and goals before each teaching period
- Students verbal feedback



Appendix

Relations between the course and the program

Table 1 Relations between the course and the PLOs

Medical Microbiology	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
ICBI 332	R	R	R			

Table 2 Relations between CLOs and PLOs

ICBI 332	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Recognize the disease-causing microbial pathogens (e.g. viruses, bacteria, protozoa, helminths, and fungi) and describe their metabolism, strategies in escaping host immunity, mode of transmission, clinical manifestations, laboratory investigation, treatment, and prevention	1.1, 1.2	2.2, 2.3	3.1, 3.2	4.2	5.1, 5.3, 5.4	
CLO2 Explain the basic concept of the immune response, select the correct antimicrobial agents correspond to the infections effectively, and prevent microbes from being resistant to the drugs	1.1, 1.2	2.2 2.3	3.1, 3.2	4.2	5.3, 5.4	
CLO3. Develop diagnostic skills in clinical microbiology and preventive measures for infectious diseases	1.1, 1.2	2.2, 2.3	3.1, 3.2	4.2	5.1, 5.3, 5.4	6.1



Table 3 PLOs and SubPLOs that the course is responsible for

Program Learning Outcomes (PLOs)	SubPLOs
1. Apply knowledge and technical skills of diverse biological disciplines to address health, societal and environmental issues	1.1 Explain the fundamental and detailed knowledge of biological sciences
	1.2 Apply knowledge in biological sciences to address health, societal and environmental issues
	1.3 Perform experimentation in laboratory or field
	1.4 Apply technical skills in biological sciences to address health, societal and environmental issues
	1.5 Integrate biological sciences knowledge and technical skills across different disciplines to solve problems in biological sciences
2. Critically appraise information from scientific articles/journals, biological research methodology, and experimentation to draw a meaningful conclusion from the materials	2.1 Explain qualitative and quantitative data and/or ideas in basic biological sciences
	2.2 Draw meaningful conclusion from the learning materials such as scientific articles, research methodology, and scientific findings
	2.3 Retrieve relevant scientific information independently from textbooks, literatures, and databases
	2.4 Manage scientific literatures using a reference-management program
	2.5 Assess the scientific relevance of information acquired to the objective at hand



3. Proficient in oral and written communication of biological sciences concepts formally and informally to both scientific community and general audience	3.1 Proficient in oral communication of ideas, concepts, and findings in biological sciences to both the scientific community and the wider society
	3.2 Proficient in written communication of ideas, concepts, and findings biological sciences to both the scientific community and the wider society
4. Apply scientific integrity, professionalism, and competencies to function independently as well as as a team player	4.1 Maintain data integrity using appropriate tools and acceptable methods
	4.2 Work independently or coordinate with others to complete tasks at hand
	4.3 Apply concepts of lab and fieldwork safety when carrying out the tasks
	4.4 Set, plan and accomplish the assigned project in a timely manner
5. Apply moral and ethical values when dealing with issues relating to humans, animals, and the environment, enabling actions based on moral and ethical judgment	5.1 Recognize ethical issues in human and animal experimentation
	5.2 Recognize emerging ethical issues in biological sciences
	5.3 Apply accepted ethical standards to resolve ethical dilemma
	5.4 Implement the course of action in accordance with moral and ethical judgment
6. Demonstrate innovative mindset to formulate and create solutions for situations relevant to oneself, the well-being of others, and the natural environment	6.1 Formulate lines of enquiry to drive problem-solving relevant to oneself, the well-being of others, and the natural environment
	6.2 Formulate a process for data acquisition based on scientific methodology



	6.3 Demonstrate systematic and logical thinking in formulating solutions through the application of knowledge and technical skills acquired from the different biological science disciplines
	6.4 Explain the potential for knowledge transfer to innovation
	6.5 Create networks to learn from others and create new ideas