Academic degree level √ Bachelor ⬜ Graduate Diploma ⬜ Master

Program Biological Sciences Program

⬜ Higher Graduate Diploma ⬜ Doctoral

Course title Pathobiology

Mahidol University International College

Course code ICBI 309

Science

Division

TQF 3 Course Specification

Section 1 General Information

1. Course Code and Title

In Thai	ICBI 309 พยาธิชีววิทยา
In English	ICBI 309 Pathobiology

2. Number of Credits 4 (3-2-7)

(Theory 3 hrs. Practice 2. hrs. Self-Study 7 hrs./week)

3. Curriculum and Course Type

3.1 Curriculum	Bachelor Degree Program (International)
3.2 Course Type	Specific Course ❑ Compulsory Course ☐ Electives

4. Course Coordinator and Lecturer

4.1 Course Responsible Lecturers	Niwat Kangwanrangsan, PhD
	- +66 (0) 22015550 niwat.kan@mahidol.ac.th
4.2 Lecturers	Lecturer team from Department of Pathobiology,
	Faculty of Science, Mahidol University

5. Trimester/Class Level

5.1 Trimester	2
5.2 Number of Students Allowed	Approximately 25 Students

6. Pre-requisite ICBI 216 Cell Biology 4(4-0-8)

7. Co-requisites N/A

8. Study Site Location Mahidol University International College

9. Date of Preparation/Latest Revision of the Course Specifications

Day...18...Month...November...Year...2021..

Section 2 Aims and Objectives

1. Course Goals

With a 4-credit course taught over a 12-weeks for students in the Biological Sciences Program, students will experience on teaching and learning activities include lectures, discussion, in-class activities, practices on pathological tissue and organ observation and case study. In the end of the course, students will achieve the concept of general pathology, cell and tissue damages which are the elementary process of disease development from different conditions, pathogenesis, characteristics of pathological lesions found in tissues and organs of diseases. Assessments include mid-term and final written examination, together with formative assessments from quiz and class assignment.

2. Objectives of Course Development/Revision

2.1 Course Objectives

This course aims to provide knowledge and abilities as follows:

1. Understand the concept of general pathology which is the fundamental of medical science related to research and clinical investigations
2. Distinguish and explain pathogenesis, pathological lesions found on tissues and organs of common diseases
3. Analyze the pathological case studies and research articles

2.2 Course-level Learning Outcomes: CLOs

On completion of the course, the successful students will be able to:

CLO1 Describe the basic concept of pathology from cell, tissue, and organ of defects

CLO2 Explain pathogenesis and pathology in common groups of diseases

CLO3 Distinguish and explain the pathological lesions found on tissues and organs of diseases

CLO4 Apply the knowledge for analysis of pathological case studies and research articles

Section 3 Course Description and Implementation

1. Course Description

(Thai) กลไกการเกิดโรคทางสรีรวิทยาและพยาธิวิทยาการบาดเจ็บและการตายของเซลล์ กระบวนการอักเสบและการซ่อมแซม การติดเชื้อจากแบคทีเรีย ไวรัส รา และปรสิต การเสียสมดุลจากการขาดแร่ธาตุและรงควัตถุ โรคที่เกิดจากระบบภูมิคุ้มกันผิดปกติ ความ ผิดปกติของระบบไหลเวียนของเลือดและของเหลวในร่างกาย ภาวะไข้และภาวะที่อุณหภูมิร่างกายต่ากว่าปกติ การเปลี่ยนสภาพของเซลล์และการเกิดเนื้องอก มีตัวอย่างแสดง และปฏิบัติการประกอบ

(English) Pathophysiological mechanism of diseases; cell injury and cell death; inflammation and repair; bacterial, viral, fungal, and parasitic infections; disturbances of minerals and pigments; disorders of immune response; disturbance of body fluid and blood flow; fever and hypothermia; cellular differentiation and neoplasia; practical exercises included

2. Number of hours per trimester

Theory (hours)	Practice (hours)	Self-study (hours)
36 (3 hours x 12 weeks)	24 (2 hours x 12 weeks)	84 (hours x 12 weeks)

3. Number of Hours per Week for Individual Advice

30 min/student/week (or more as per individual needs) by appointment

Section 4: Development of the expected learning outcomes

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

With Lecturer and laboratory classes, students will gain knowledge on general concept of pathology start from mechanism of disease development. The practice on pathological sample observation including cell, tissue, and organ levels will develop their skills to distinguish and explain the lesions found in different groups of diseases. The investigations on case study and research article will make students practice on analysis and critical thinking.

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 management					Learning outcomes measurements				
	Lecture	Group Discussion	Group Work	Individual Work	Demonstration	MCQ	Short Answer	Essay	Group Work	Individual Work
CLO1 Describe the basic concept of pathology from cell, tissue, and organ of defects	X	X		X		X	X	X		X
CLO2 Explain pathogenesis and pathology in common groups of diseases	X	X		X	X	X	X	X		X
CLO3 Distinguish and explain the pathological lesions found on tissues and organs of diseases	X	X	X		X	X	X	X	X	
CLO4 Apply the knowledge for analysis of pathological case studies and research articles	X	X	X			X	X	X	X	

SECTION 5 LESSON PLAN AND EVALUATION

1. Lesson Plan

Teaching Period	Topics/Details	Number of hours		Methods: Teaching/Media	Lecturer
		Theory *	Practice**		
1	1 – Introduction to Pathobiology 2 – Basic Medical Terminology 3 – Histopathological technique	3		Lectures: ppt & video clips; Group discussion: Why is Conservation Biology a crisis discipline?	NK
	Lab 1 – Observation on the pathological specimens		2	Lectures: ppt & video clips; Group discussion: How is biodiversity measured, and how do new taxa come about?	
2	4 – Cell Injury 5 – Cell Death 6 – Adaptation and Accumulations	3		Lectures: ppt & video clips; Group discussion: What are the causal factors for biodiversity distribution & concentration?	TS
	Lab 2 – Organ and histopathological samples of injury, adaptation and necrosis		2	Lectures: ppt & video clips; Group discussion: What assessment methods are to be used when, and what are the pros & cons of each method?	
3	7-9 – Inflammation and Repair	3		Lectures: ppt & video clips; Group discussion: Can the same values apply to all human groups?	TS
	Lab 3 – Organ and histopathological samples of acute and chronic inflammation		2	Lectures: ppt & video clips; Group discussion: How biodiversity relates and contributes to SDGs	

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Teaching Period	Topics/Details	Number of hours		Methods: Teaching/Media	Lecturer
		Theory *	Practice**		
4	10-12 – Hemodynamic Disorders, Thromboembolism, and Shock	3		Lectures: ppt & video clips; Group discussion: How do ecosystems relate and contribute to human well-being?	SN
	Lab 4 – Case study on septic shock		2	Lectures: ppt & video clips; Group discussion: How do ecosystems relate and contribute to human well-being?	
5	13-15 – Disorders of Immune System	3		Lectures: ppt & video clips; Demonstration: Accessing the IUCN Red List Database and data management	WP
	Lab 5 – Case study on autoimmune diseases		2	Individual exercise: Accessing the IUCN Red List Database and data management – species or geographic scope assessment; Individual exercise: Presenting and Interpreting data	
6	16-18 – Neoplasia	3		Lectures: ppt & video clips; Group discussion: Distinguishing direct threats, indirect threats, impacts, stressors, and consequences.	PS
	Lab 6 – Organ and histopathological samples of tumors and cancers		2	Lectures: ppt & video clips; Group discussion: Distinguishing direct threats, indirect threats, impacts, stressors, and consequences.	
7	19-21 – Genetic Disorders	3		Lectures: ppt & video clips; Group discussion: What are the causes & drivers of habitat loss, degradation & fragmentation?	ANJ
	Lab 7 – Class activity on genetic diseases		2	Lectures: ppt & video clips; Group discussion: What are the immediate and long-term consequences of habitat loss, degradation & fragmentation?	
8	22-24 – Environmental and Nutritional Diseases	3		Lectures: ppt & video clips Group discussion: What are the direct & indirect causal factors to biodiversity crisis?	YN

Teaching Period	Topics/Details	Number of hours		Methods: Teaching/Media	Lecturer
		Theory *	Practice**		
	Lab 8 – Class activity on environmental and nutritional diseases		2	Lectures: ppt & video clips Group discussion: How to deal with conflicting questions on climate change - fake vs fact and human-caused vs natural?	
9	25-27 – Viral Infection	3		Lectures: ppt & video clips Demonstration: Identifying causes, consequences, and drivers of threats	PC
	Lab 9 – Case study or PBL		2	Group work: Identifying causes, consequences, and drivers of threats	
10	28-30 – Bacterial Infection	3		Lectures: ppt & video clips Group discussion: What tools & approaches when & where?	YN
	Lab 10 – Case study or PBL		2	Lectures: ppt & video clips Group discussion: What issues & constraints deter effective conservation of biodiversity & protection of ecosystems?	
11	31-33 – Fungal Infection	3		Lectures: ppt & video clips Group discussion: One health approach relationship to biodiversity & climate crises.	NC
	Lab 11 – Case study or PBL		2	Lectures: ppt & video clips Group discussion: What are the gaps & linkages?	
12	34-36 – Parasitic Infection	3		Group work project presentation: Education/awareness video on pre-approved aspects of Conservation Biology, One Health, and SDGs	NK
	Lab 12 – Case study or PBL		2	Group reflection & group discussion: summary of lessons learned, best practices, & short-term & long term measures	

Teaching Period	Topics/Details	Number of hours		Methods: Teaching/Media	Lecturer
		Theory *	Practice**		
	Total hours of the entire trimester	36	24		

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

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment

i. Through interactive and adaptive lectures, the course instructor will raise short-response questions to assess the students' comprehension and needs for additional explanations on specific topics or aspects of the topics delivered.

ii. Assignment and quiz will also integrated into formative assessment.

iii. Students will be divided into groups to discuss and practice on laboratory

B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	MCQ	Short Answer	Essay	Group work	
CLO1 Describe the basic concept of pathology from cell, tissue, and organ of defects	4		20	-	**24**

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	MCQ	Short Answer	Essay	Group work	
CLO2 Explain pathogenesis and pathology in common groups of diseases	4	2	20	-	**26**
CLO3 Distinguish and explain the pathological lesions found on tissues and organs of diseases	4	2	20	-	**26**
CLO4 Apply the knowledge for analysis of pathological case studies and research articles	-	-	-	24	**24**
Total	**12**	**4**	**60**	**24**	**100**

(2) 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+	Fairly 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

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

Re-examination is possible only when due to a *force majeure* accompanied by a plausible explanation and supporting evidence, and upon written approval by the Program Director, Division Chair, and the Associate Dean of Academic Affairs, or subject to the latest policy instructions of MUIC.

3. Students' Appeal

Any appeal process on any matter related to the course shall be submitted to the Program Director and copied to the course instructor. The Program Director shall consider the appeal in consultation with the course instructor and, if needed, with the Divisional Chair and the Associate Dean of Academic Affairs, or per the latest MUIC procedural policy.

Section 6 Teaching Resources

1. Required Texts

1) Kumar V, Abbas AK, Aster JC. Robbins' Basic Pathology. 10th Edition. Elsevier Saunders. 2017.
2) Brooks G, Carroll K, Butel J, Morse S, Mietzner. Jawetz, Melnick, & Adelberg's Medical Microbiology. 28th Edition. McGraw Hill. 2019.

2. Suggested Materials

1) Kumar V, Abbas AK, Aster JC. Robbins and Cotran Pathologic Basis of Disease. 10th Edition, 2020.
2) References that indicated in the lecture handout of each lecture class.

3. Other Resources (if any)

1) https://histologyguide.com/
2) https://webpath.med.utah.edu/

Section 7 Evaluation and Improvement of Course Implementation

1. Strategy for Course Effectiveness Evaluation by Students

1.1 Student feedback of instructors, teaching methods and materials, and course content through MUIC student evaluation forms

1.2 Students' reflection and oral feedback at the end of course

2. Strategy for Teaching Evaluation

2.1 Evaluation of effectiveness based on student evaluation scores and comments.

2.2 Students' reflection and oral feedback at the end of course

2.3. Evaluation through peer observations by co-instructor or other Division faculty.

3. Teaching Improvement

3.1 Adjustments based on student feedback

3.2 Adjustments based on comments from peer observations

3.3 Adjustments based on discussions with supervisor, other Division faculty in one-on-one or group meetings as specified by MUIC guidelines

3.4 Adaptive in-class adjustments based on personal observations of gaps in students' learning,

4. Verification of Standard of Learning Outcome for the Course

4.1 Verification through student feedback on assessments employed,

4.2 Verification through student performance on assessments based on MUIC/Division standards,

5. Revision Process and Improvement Plan for Course Effectiveness

5.1 Adjustments based on student feedback

5.2 incorporation of up-to-date information related to the course's topics.

5.3 Course instructors (and coordinator/supervisor) to meet, as necessary, and discuss results of student evaluations and student performance based on learning outcomes to identify improvement points.

5.5 Adjustments as per strategy for improvement set according to MUIC/Division guidelines.

Appendix

Relations between the course and the program

Table 1 Relations between the course and the PLOs

Conservation Biology, One Health, and UN-SDGs	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
ICBI 309	R	-	-	-	-	R

Table 2 Relations between CLOs and PLOs

ICBI 309	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Describe the basic concept of pathology from cell, tissue, and organ of defects	1.1, 1.2					6.1, 6.2
CLO2 Explain pathogenesis and pathology in common groups of diseases	1.1, 1.2					6.1, 6.2
CLO3 Distinguish and explain the pathological lesions found on tissues and organs of diseases	1.3					6.3
CLO4 Apply the knowledge for analysis of pathological case studies and research articles	1.4					6.3

Table 3 The description of PLOs and Sub PLOs of the course

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