

Course Specification

Doctor of Philosophy Program in Veterinary Science (International Program)

Section 1 General Information

1. Course Code and Title

In Thai	สปปส ๘๖๓	จุลกายวิภาคทางสัตวแพทย์และชีววิทยาของเซลล์
In English	VSPA 863	Veterinary Histology and Cell Biology

2. Number of Credits 3 (2-3-5)

(Theory 2 hrs. Practice 3 hrs. Self-Study 5 hrs./week)

3. Curriculum and Course Type

3.1 Program Doctor of Philosophy Program in Veterinary Science
(International Program)

3.2 Course Type Specific Course ☒ Compulsory Course ☐ Elective Course

4. Course Coordinator and Instructor

4.1 Course Responsible Instructor

1. Dr.Warunya Chakritbudsabong (WC)
Department of Pre-Clinic and Applied animal science
phone number 1518 E-mail: warunya.cha@mahidol.ac.th
2. Asst.Prof.Dr.Sasitorn Rungarunlert (SR)
Department of Pre-Clinic and Applied animal science
phone number 1448 E-mail: sasitorn.run@mahidol.ac.th

4.2 Instructors

1. Dr.Warunya Chakritbudsabong (WC)
Department of Pre-Clinic and Applied animal science
phone number 1518 E-mail: warunya.cha@mahidol.ac.th
2. Asst.Prof.Dr.Sasitorn Rungarunlert (SR)
Department of Pre-Clinic and Applied animal science
phone number 1448 E-mail: sasitorn.run@mahidol.ac.th

- 2) To develop the capacity for critical analysis and informed discussion of research findings presented in academic journals, particularly those concerning cell development, cellular biology, and molecular biology within the context of veterinary medicine.

2. Course Description

(In Thai) หลักการทางการพัฒนาของเซลล์ ชีววิทยาระดับเซลล์และโมเลกุลที่เกี่ยวข้องกับอายุรศาสตร์ทางสัตวแพทย์

(In English) Principles of cell development; cellular and molecular biology related to veterinary medicine

Section 3

Course Objectives, Course-level Learning Outcomes and Course Implementation

1. Course Objectives

- 1) Evaluate and synthesize complex information from current academic journals and research literature pertaining to advanced cellular and molecular biology concepts, including cell organization, organelle function, cell junctions, cytoskeleton, cell cycle, programmed cell death, cell signaling, chromatin remodeling, gene expression regulation, and mitochondrial function.
- 2) Articulate the advanced cellular and molecular mechanisms of cancer development, progression, and metastasis, specifically discussing their relevance and implications within veterinary oncology.
- 3) Detail the fundamental characteristics, classification, differentiation pathways, and therapeutic potential of various stem cell types, with a particular focus on their applications in veterinary regenerative medicine.
- 4) Explain advanced concepts in cellular immunology, including the roles and interactions of various immune cells, immune recognition, and the cellular basis of immune responses, as they apply to animal health and disease.
- 5) Assess the principles, methodologies, and current and prospective applications of organoid technology and 3D bioprinting in veterinary research, disease modeling, and potential therapeutic interventions.
- 6) Effectively discuss and present advanced cell biology topics, demonstrating a comprehensive understanding of the subject matter and the ability to engage in scientific discourse.

2. Course-level Learning Outcomes: CLOs

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

- 1) CLO 1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal
- 2) CLO 2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine
- 3) CLO 3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells
- 4) CLO 4 Understanding and able to discuss advanced knowledge of the cellular immunology as it relates to veterinary medicine
- 5) CLO5 Understanding and able to discuss advanced knowledge of the organoids and 3D bioprinting as it relates to veterinary medicine

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

CLOs	Teaching and learning experience management		Learning outcomes measurements		
	Discussion with Lecturer	Assignment	Presentation	Answering and discussion	Class attention
CLO1	X	X	X	X	X
CLO2	X	X	X	X	X
CLO3	X	X	X	X	X
CLO4	X	X	X	X	X
CLO5	X	X	X	X	X

Section 4 Lesson Plan and Evaluation

1. Lesson Plan

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
1	Cell membrane, organelles and nucleus	2	3	- Discussion/Assignment/Practice	SR, WC
2	Central Dogma: from gene to protein	2	3	- Discussion/Assignment/Practice	SR, WC
3	Cell division and cell cycle	2	3	- Discussion/Assignment/Practice	BC, SB
4	Programmed cell death	2	3	- Discussion/Assignment/Practice	SR, WC
5	Pathways of intracellular signal transduction	2	3	- Discussion/Assignment/Practice	BC, SB
6	Bioenergetics and Metabolism	2	3	- Discussion/Assignment/Practice	BC, SB
7	Cancer	2	3	- Discussion/Assignment/Practice	SR, WC
8	Stem cells: Adult stem cells	2	3	- Discussion/Assignment/Practice	SR, WC, PS
9	Stem cells: Pluripotent stem cells and other induced pluripotent stem cells	2	3	- Discussion/Assignment/Practice	SR, WC
10	Application of stem cells	2	3	- Discussion/Assignment/Practice	SR, WC
11	Stem cells detection and proteomics	2	3	- Discussion/Assignment/Practice	SR, WC, SP
12	Cellular immunology	2	3	- Discussion/Assignment/Practice	SR, WC
13	Preparation of tissue for study and microscopic technique, Cell culture, Histochemistry and Cytochemistry	2	3	- Discussion/Assignment/Practice	SR, WC
14	Organoids and bioreactor	2	3	- Discussion/Assignment/Practice	SR, WC
15	3D bioprinting	2	3	- Discussion/Assignment/Practice	SR, WC
	Total hours of the entire semester	30	45		

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

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment

The assessment is performed during the course to measure the progress and development of students' learning by observing the behavior change and improvement of students' behavior and performance. The assessment results will be notified to the students (feedback) so that the students are constantly able to improve themselves. The assessment results are not included with the test scores at the end of the course.

B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Course Learning Outcome	Evaluation Method*			Weight (%)
	Presenta- tion	Answering and discussion	Class attention	
CLO1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal	12	24	4	40
CLO2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine	4.5	9	1.5	15
CLO3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells	7.5	15	2.5	25
CLO4 Understanding and able to discuss advanced knowledge of the cellular immunology as it relates to veterinary medicine	1.5	3	0.5	5
CLO5 Understanding and able to discuss advanced knowledge of the organoids and 3D bioprinting as it relates to veterinary medicine	4.5	9	1.5	15
Total	30	60	10	100

(2) Grading Rules

The grading symbols are: A, B+ , B, C+ , C, D+ , D, and F. Students must receive a 'D' grade or above to pass the criteria.

(3) Measurement and Evaluation

The measurement and evaluation use the criteria-based, according to the conditions and methods for academic results evaluation of the Faculty of Veterinary Science, Mahidol University.

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

In case that students received an 'F' grade, the course coordinator and the program's Teaching and the program administration committee should, altogether, agreed to allow the students to take the re-examination or extra-course work to pass the course with the following conditions. The minimum score is not less than 45.00. to take to re-examination or extra-course work. Once students took the re-examination (extra-course work) and the course coordinator had considered the students' re-examination/course work to pass the criteria, then the students will receive the 'D' grade. While waiting for the re-examination or extra-course work result, the students' score should be indicated as 'I' grade.

3. Students' Appeal

Should the students have any suspicion or appeals to the teaching and learning activities and the grade assessment, students could make the appeal by filling in the form at MUVS' Academic Affairs. The appeal will be proposed to the course coordinator to consider the request. If the appeal could not be addressed at this point, it will be further process by the program administration committee. In case that the committee suggested further investigation should be done, the appeal will be purposed to the faculty's appealing committee to address the issue.

Section 5 Teaching Resources

1. Required Texts

1.1 Mescher AL. Junqueira's Basic Histology. 12th ed. Singapore: McGraw-Hill Education (Asia); 2010.

1.2 Cooper GM, Hausman RE. The Cell: A Molecular Approach. 6th ed. Sunderland: Sinauer Associates; 2013.

1.3 Darnell JE, Lodish HF, Baltimore D. Molecular Cell Biology. 2nd ed. New York: Scientific American Books; 1990.

2. Suggested Materials
Pubmed, Science Direct, Google Scholar
3. Other Resources (if any)
none

Section 6 Evaluation and Improvement of Course Implementation

1. Analysis and Evaluation of Course Implementation

A. Data for Analysis

Teaching and learning efficiency evaluation form

B. Course Effectiveness Evaluation

At the end of each course, it is required for the students to assess the teaching of each instructor based on the following criteria: punctuality, good role model, application of morals and ethics for the instruction, ability to convey knowledge and encourage students to learn, giving opportunities for students to ask questions and to comment during the study.

The overall outcomes of each course will also be assessed by the students for the following issues: the instructor's knowledge and competency, the course's effectiveness, student's satisfaction with the study, and other comments from students. The evaluation is conducted through online platform.

2. Revision Process and Improvement Plan for Course Effectiveness

Prior to each academic year, there are meetings/seminars for the instructors of each course to plan to improve the course's teaching and learning management based on the following information.

- (1) the students' academic performance
- (2) the students' evaluation results
- (3) the instructors' assessment results

3. The self-assessment report of the course

At the end of each academic year, the course coordinators, instructors, the Program Committee, and the Teaching and Learning Development Committee will consider the assessment results and the Learning Outcome for the Course to plan for the improvement of the next academic year.

Appendix

1. Relations between the course and the program

Table 1 Relations between the course and the PLOs

	Program-Level Learning Outcomes (PLOs)				
VSPA 863 Veterinary Histology and Cell Biology	PLO1	PLO2	PLO3	PLO4	PLO5
		R	R	P	P

Table 2 Relation between CLOs and PLOs

VSPA 863 Veterinary Histology and Cell Biology	Program-Level Learning Outcomes (PLOs)				
	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal		R	R	P	P
CLO2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine		R	R	P	P
CLO3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells		R	R	P	P
CLO4 Understanding and able to discuss advanced knowledge of the cellular immunology as it relates to veterinary medicine		R	R	P	P
CLO5 Understanding and able to discuss advanced knowledge of the organoids and 3D bioprinting as it relates to veterinary medicine		R	R	P	P

3. Relations between the course and Sustainable Development Goals (SDGs)

- | | | |
|-------------------------------------|-------|---|
| ☐ | SDG1 | No poverty |
| ☐ | SDG2 | Zero Hunger |
| ☒ | SDG3 | Good Health and Well – being |
| ☐ | SDG4 | Quality Education |
| ☐ | SDG5 | Gender Equality |
| ☐ | SDG6 | Clean Water and Sanitation |
| ☐ | SDG7 | Affordable and Clean Energy |
| ☐ | SDG8 | Decent Work and Economic Growth |
| ☐ | SDG9 | Industry, Innovation and Infrastructure |
| ☐ | SDG10 | Reduced Inequalities |
| ☐ | SDG11 | Sustainable Cities and Communities |
| ☐ | SDG12 | Responsible Consumption and Production |
| ☐ | SDG13 | Climate Action |
| ☐ | SDG14 | Life Below Water |
| ☐ | SDG15 | Life on Land |
| ☐ | SDG16 | Peace, Justice and Strong Institutions |
| ☐ | SDG17 | Partnerships for the goals |

Course Schedule
VSPA 863 Veterinary Histology and Cell Biology
Semester 1 Academic Year 2026

Week or No.	Date	Time	Teaching Methods / Media	Topic	Lecturers
1	6/8/2026	10:00-12:00	Lecture	Cell membrane, organelles and nucleus	SR, WC
		13:00-16:00	Lab		
2	13/8/2026	10:00-12:00	Lecture	Central Dogma: from gene to protein	SR, WC
		13:00-16:00	Lab		
3	20/8/2026	10:00-12:00	Lecture	Pathways of intracellular signal transduction	SR, WC
		13:00-16:00	Lab		
4	27/8/2026	10:00-12:00	Lecture	Bioenergetics and Metabolism	SR, WC
		13:00-16:00	Lab		
5	3/9/2026	10:00-12:00	Lecture	Cell division and cell cycle	SR, WC
		13:00-16:00	Lab		
6	10/9/2026	10:00-12:00	Lecture	Stem cells: Pluripotent stem cells and other induced pluripotent stem cells	SR, WC
		13:00-16:00	Lab		
7	17/9/2026	10:00-12:00	Lecture	Stem cells: Adult stem cells	SR, WC
		13:00-16:00	Lab		
8	24/9/2026	10:00-12:00	Lecture	Stem cells detection and proteomics	SR, WC
		13:00-16:00	Lab		
9	1/10/2026	10:00-12:00	Lecture	Application of stem cells	SR, WC
		13:00-16:00	Lab		
10	8/10/2026	10:00-12:00	Lecture	Cell immunology	SR, WC
		13:00-16:00	Lab		
11	15/10/2026	10:00-12:00	Lecture	Programmed cell death	SR, WC
		13:00-16:00	Lab		
12	22/10/2026	10:00-12:00	Lecture	Cancer	SR, WC
		13:00-16:00	Lab		

Week or No.	Date	Time	Teaching Methods / Media	Topic	Lecturers
13	29/10/2026	10:00-12:00	Lecture	Preparation of tissue for study and microscopic technique, Cell culture, Histochemistry and Cytochemistry	SR, WC
		13:00-16:00	Lab		
14	5/11/2025	10:00-12:00	Lecture	Organoids and bioreactor	SR, WC
		13:00-16:00	Lab		
15	12/11/2025	10:00-12:00	Lecture	3D bioprinting	SR, WC
		13:00-16:00	Lab		