

Course Specification

Name of Institution Mahidol University
Campus/Faculty/Department Faculty of Veterinary Science

Section 1 General Information

1. Course Code and Title

VSPA 750 Advanced cell biology
สปปส ๗๕๐ ชีววิทยาของเซลล์ขั้นสูง

2. Number of Credits

3 (2-3-5) Credits (lecture – laboratory – self-study)

3. Curriculum and Course Type

Program of Study Master of Science Program in Veterinary Biomedical Sciences
Course Type Core Required Electives

4. Faculty Member in Charge of this Course and Advisor of Internship

4.1 Faculty Member in Charge of this Course

1. Dr.Warunya Chakritbudsabong (WC)
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2. Asst.Prof.Dr.Sasitorn Rungarunlert (SR)
Department of Pre-Clinic and Applied animal science
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4.2 Lecturers

1. Dr.Warunya Chakritbudsabong (WC)
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2. Asst.Prof.Dr.Sasitorn Rungarunlert (SR)
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3. Asst.Prof.Dr.Boonrat Chantong (BC)
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5. Dr. Panithi Sukho (PS)
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6. Dr. Sekkarin Ploypecth (SP)
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5. Semester/The training experience required in the curriculum

Semester 1 / Class Level or year 1

6. Pre-requisite

none

7. Co-requisite

none

8. Venue of Study

Faculty of Veterinary Science, Mahidol University

9. Date of Latest Revision

15 July 2023

Section 2 Goals and Objectives

1. Course Goals

This course aims to provide knowledge and abilities as follows:

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

2. Objectives of Course Development/Revision Field Experience Course

Update the curriculum to raise student achievement

3. Course-level Learning Outcomes: CLOs

This course aims to provide knowledge and abilities as follows:

- 1) CLO1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal
- 2) CLO2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine
- 3) CLO3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells
- 4) CLO4 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

Section 3 Course Management

1. Course Description

(Thai) VSPA 750 Advanced cell biology

(English) สพปส ๗๕๐ ชีววิทยาของเซลล์ขั้นสูง

2. Credit Hours per Semester

Lecture	2	Hour
Laboratory/Field Trip/Internship	3	Hour
Laboratory	-	Hour
Self Study	5	Hour

3. Number of hours that lecturers provide counseling and guidance to individual student

3

Section 4 Development of Students' Learning Outcome

1. A brief summary of the knowledge or skills expected to develop in students; the course-level expected learning outcomes (CLOs) On completion of the course, students will be able to:

1. CLO1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal
2. CLO2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine
3. CLO3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells
4. CLO4 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

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		
	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 5 Teaching and Evaluation Plans

1. Teaching Plan

No.	Topic	Hours			Teaching Methods / Media	CLOs	Lecturers
		Lecture	Laboratory	Self Study			
1	Cell membrane, organelles and nucleus	2	3	5	- Discussion - Assignment - Practice	CLO1	SR, WC
2	Central Dogma: from gene to protein	2	3	5	- Discussion - Assignment - Practice	CLO1	SR, WC
3	Cell division and cell cycle	2	3	5	- Discussion - Assignment - Practice	CLO1	BC, SB
4	Programmed cell death	2	3	5	- Discussion - Assignment - Practice	CLO1	SR, WC
5	Pathways of intracellular signal transduction	2	3	5	- Discussion - Assignment - Practice	CLO1	BC, SB
6	Bioenergetics and Metabolism	2	3	5	- Discussion - Assignment - Practice	CLO1	BC, SB
7	Cancer	2	3	5	- Discussion - Assignment - Practice	CLO2	SR, WC
8	Cancer stem cells	2	3	5	- Discussion - Assignment - Practice	CLO2	SR, WC
9	Stem cells: Adult stem cells	2	3	5	- Discussion - Assignment - Practice	CLO3	SR, WC, PS

10	Stem cells: Pluripotent stem cells and other induced pluripotent stem cells	2	3	5	- Discussion - Assignment - Practice	CLO3	SR, WC
11	Application of stem cells	2	3	5	- Discussion - Assignment - Practice	CLO3	SR, WC
12	Stem cells detection and proteomics	2	3	5	- Discussion - Assignment - Practice	CLO3	SR, WC, SP
13	Cellular immunology	2	3	5	- Discussion - Assignment - Practice	CLO4	SR, WC
14	Organoids and bioreactor	2	3	5	- Discussion - Assignment - Practice	CLO5	SR, WC
15	3D bioprinting	2	3	5	- Discussion - Assignment - Practice	CLO5	SR, WC
รวมจำนวนชั่วโมงตลอดภาคการศึกษา		30	45	75			

2. Evaluation Plan

Learning Outcomes	Evaluation Method	Weight
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	Presentation	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

Note*

1. Show the methods/tools and weight for measuring and evaluating each CLO.
2. Total the weight from every tool and CLO to 100
3. Verify the information to be consistent with the evaluation methods shown in Section 4 Table.

3. Measurement and evaluation

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.

4. 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's Teaching and Learning Development 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 6 Teaching Materials and Resources

1. Textbooks and Main Documents

- 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. Documents and Important Information

Pubmed, Science Direct, Google Scholar

3. Documents and Recommended Information

Pubmed, Science Direct, Google Scholar, MU library website

Section 7 Evaluation and Improvement of Course Management

1. Strategies for Evaluation of Course Effectiveness by Students

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. Strategies for Evaluation of Teaching Methods

The instructors or the course coordinators are assigned to conduct the evaluation as follows.

2.1 the students' evaluation for the instruction and overall outcomes of the course in accordance to criteria mentioned in No. 1 – Strategy for Course Effectiveness by Students.

2.2 The instructors must perform self-assessment for the following criteria.

- (1) Appropriate time spent to prepare for the teaching.
- (2) The instructor's satisfaction with the teaching results.
- (3) Solutions or recommendations for the program's teaching improvement or self-improvement for the next class/academic year.

3. Improvement of Teaching Methods

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

4. Verification of Students' Learning Outcome

The verification of the standard of the Learning Outcome for the Course is conducted by the course coordinators based on the following aspects.

- (1) The goals of the learning outcomes are clear and feasible.
- (2) The learning experience is aligned with the expected goals.
- (3) The learning experience encourages the students to research and practice self-learning skills.

(4) The evaluation methods are appropriate to assess the expected goals and learning experience.

(5) The program applied the educational theory and the results from the previous evaluation to plan for improvement.

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.

5. Review and Plan to Improve Course Effectiveness

After the course evaluation and verification, the course effectiveness will be improved through the following:

(1) The course is revised every 3 years according to the evaluation and verification.

(2) Rotation or changing of instructors so students get different research points of view.

Appendix

Relations between the course and the program

Table 1 Relations between the course and the PLOs

	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
VSPA750/Advanced cell biology/3 (2-3-5)		P	R	P	R	R

Program Learning Outcomes (TQF.2)

PLO 1 Manage ethical and moral problems in field practice with evidence-base approaches and leadership together with appropriate logic and value.

PLO 2 Prioritize scientific information in biomedical veterinary science and apply the beneficial output to develop laboratory practice and research study.

PLO 3 Integrate the theory and experiences together with scientific evidences to develop the new knowledge in veterinary science through research study.

PLO 4 Communicate efficiently with multidisciplinary academic colleagues and staff by using the communicate appropriately with the individual groups, both in academic and professional

PLO 5 Utilize digital and information technology (IT) to encourage working network communication, data analysis together with presentation and research publication.

PLO 6 Evaluate principles, purposes, strong critical-thinking with problem-solving skills, to utilizing veterinary science literacy as integral part of the thought process.

Table 2 Relations between CLOs and PLOs

CLOs	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Understanding and able to discuss advanced knowledge of cell biology, and cellular and molecular biology from academic journal		P	R			
CLO2 Understanding and able to discuss advanced knowledge of the cell biology of cancer as it relates to veterinary medicine			R	P	R	R
CLO3 Understanding and able to discuss advanced knowledge of the cell biology of stem cells			R	P	R	
CLO4 Understanding and able to discuss advanced knowledge of the cellular immunology as it relates to veterinary medicine			R	P	R	
CLO5 Understanding and able to discuss advanced knowledge of the organoids and 3D bioprinting as it relates to veterinary medicine			R	P	R	

Week or No.	Date	Time	Teaching Methods / Media	Topic	Lecturers
1	10/8/2566	10:00-12:00	Lecture	Cell membrane, organelles and nucleus	SR, WC
		13:00-16:00	Lab		
2	17/8/2566	10:00-12:00	Lecture	Central Dogma: from gene to protein	SR, WC
		13:00-16:00	Lab		
3	24/8/2566	10:00-12:00	Lecture	Cell immunology	SR, WC
		13:00-16:00	Lab		
4	31/8/2566	10:00-12:00	Lecture	Programmed cell death	SR, WC
		13:00-16:00	Lab		
5	4/9/2566	10:00-12:00	Lecture	Pathways of intracellular signal transduction	BC, SB
		13:00-16:00	Lab		
6	11/9/2566	10:00-12:00	Lecture	Bioenergetics and Metabolism	BC, SB
		13:00-16:00	Lab		
7	21/9/2566	10:00-12:00	Lecture	Cancer	SR, WC
		13:00-16:00	Lab		
8	28/9/2566	10:00-12:00	Lecture	Cancer stem cells	SR, WC
		13:00-16:00	Lab		
9	5/10/2566	10:00-12:00	Lecture	Stem cells: Adult stem cells	SR, WC, PS
		13:00-16:00	Lab		
10	12/10/2566	10:00-12:00	Lecture	Stem cells: Pluripotent stem cells and other induced pluripotent stem cells	SR, WC
		13:00-16:00	Lab		
11	19/10/2566	10:00-12:00	Lecture	Application of stem cells	SR, WC
		13:00-16:00	Lab		
12	26/10/2566	10:00-12:00	Lecture	Stem cells detection and proteomics	SR, WC, SP
		13:00-16:00	Lab		
13	6/11/2566	10:00-12:00	Lecture	Cell division and cell cycle	BC, SB
		13:00-16:00	Lab		
14	9/11/2566	10:00-12:00	Lecture	Organoids and bioreactor	SR, WC
		13:00-16:00	Lab		
15	16/11/2566	10:00-12:00	Lecture	3D bioprinting	SR, WC

		13:00-16:00	Lab	
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