

## Course Specification

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

**Section 1 General Information****1. Course Code and Title**

VSPA 719 Application of the Diagnostic Techniques in Veterinary Parasitology  
 สพปส ๗๑๙ การประยุกต์วิธีการตรวจวินิจฉัยปรสิตวิทยาทางการสัตวแพทย์

**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. Assoc. Prof. Dr. Tanasak Changbunjong (TC)  
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**4.2 Lecturers**

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9. Assoc. Prof. Dr. Urusa Thaenkham  
 Department of Helminthology      Faculty of Tropical Medicine  
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10. Asst. Prof. Dr. Tanawat Chaiphongpachara  
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 College of Allied Health Sciences, Suan Sunandha Rajabhat University  
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## 5. Semester/The training experience required in the curriculum

Semester 2 / 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**

25<sup>th</sup> December 2023

## **Section 2 Goals and Objectives**

**1. Course Goals**

The Course of Application of the Diagnostic Techniques in Veterinary Parasitology aims to achieve the following goals:

1. Advanced knowledge in diagnostic veterinary parasitology: The course intends to provide students with in-depth knowledge of diagnostic veterinary parasitology as it applies to veterinary biomedical science. This includes understanding the updated diagnostic parasitology techniques.
2. Stay updated with scientific advancements: The course ensures that students remain up-to-date with the latest scientific advancements in diagnostic veterinary parasitology. This includes learning about polymerase chain reaction (PCR), Quantitative PCR, Next generation sequencing, Loop mediate isothermal amplification, Phylogenetic analysis, Genetic diversity and Haplotype network analysis, DNA barcode, Geometric morphometrics, Basic recombinant antigen and cloning, Enzyme-linked immunosorbent assay (ELISA), Serological assay, Latex agglutination test, Biosensor, Immunohistochemistry, Immunofluorescence assay, Immunochromatography, and Animal models. Students will be equipped with knowledge of cutting-edge techniques and developments in the field.
3. Job market readiness and further studies: The course aims to prepare students for the job market by providing them with advanced knowledge and specialized skills in diagnostic veterinary parasitology. Additionally,

the course serves as a foundation for students who wish to pursue further studies, such as Ph.D. programs.

Overall, the Course of Application of the Diagnostic Techniques in Veterinary Parasitology aims to equip students with a comprehensive understanding of diagnostic veterinary parasitology and its diverse applications. By offering specialization options, the course allows students to develop expertise in specific areas, enhancing their readiness for their chosen career paths.

## 2. Objectives of Course Development/Revision Field Experience Course

The course of application of the diagnostic techniques in veterinary parasitology is designed to educate professionals who possess advanced knowledge in the field of diagnostic parasitology as it applies to diagnostic veterinary parasitology. The course covers a wide range of applications of diagnostic veterinary parasitology. Moreover, the course ensures that students stay up-to-date with the latest techniques.

## 3. Course-level Learning Outcomes: CLOs

This course aims to provide knowledge and abilities as follows:

1. To apply accurate and appropriate diagnostic techniques in veterinary parasitology.
2. To analyze accurate and appropriate diagnostic techniques in veterinary parasitology.
3. To discuss accurate and appropriate diagnostic techniques in veterinary parasitology.

## Section 3 Course Management

### 1. Course Description

(Thai)	สปปส ๗๑๙	การประยุกต์วิธีการตรวจวินิจฉัยปรสิตวิทยาทางการสัตวแพทย์
(English)	VSPA 719	Application of the Diagnostic Techniques in Veterinary Parasitology

## 2. Credit Hours per Semester

Lecture	2	Hour
Laboratory/Field Trip/Internship	0	Hour
Laboratory	3	Hour
Self Study	5	Hour

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

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

## 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:

CLO1 To apply accurate and appropriate diagnostic techniques in veterinary parasitology.

CLO2 To analyze accurate and appropriate diagnostic techniques in veterinary parasitology.

CLO3 To discuss accurate and appropriate diagnostic techniques in veterinary parasitology.

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	Discussion	Essay	Report	Presentation
CLO1	X	X	X	X	X
CLO2	X	X	X	X	X
CLO3	X	X	X	X	X

## Section 5 Teaching and Evaluation Plans

## 1. Teaching Plan

Week or No.	Topic	Hours			Teaching Methods / Media	CLOs	Lecturers
		Lecture	Laboratory	Self Study			
1	Polymerase chain reaction (PCR)	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	SS, LS
2	Next generation sequencing	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	SS
3	Quantitative polymerase chain reaction (QPCR)	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	LS
4	Loop mediated isothermal amplification (LAMP)	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	AM
5	Phylogenetic tree I	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	TC
6	Phylogenetic tree II	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	TC
7	Genetic diversity and Haplotype network analysis	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	TCH
8	DNA barcode, Geometric morphometrics	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	TC
9	Basic recombinant antigen and cloning for parasite	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	CJ
10	Enzyme-linked immunosorbent assay (ELISA)	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	CJ
11	Serological assay, Latex agglutination test	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	CJ

Week or No.	Topic	Hours			Teaching Methods / Media	CLOs	Lecturers
		Lecture	Laboratory	Self Study			
12	Biosensor	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	CP
13	Immunohistochemistry, Immunofluorescence assay, Immunochromatography	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	TI, RP
14	Animal models in parasitology	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	UT
15	Seminar	2	3	5	<ul style="list-style-type: none"> <li>● Discussion</li> <li>● Assignment</li> <li>● Practice</li> </ul>	1, 2, 3	SS, TC, CJ

## 2. Evaluation Plan

Learning Outcomes	Evaluation Method					Weight (Percentage)
	Seminar	In class presentation	Answering and discussion	Class attention	Essay	
CLO1 To apply accurate and appropriate diagnostic techniques in veterinary parasitology.	3.0	9.34	9.34	3.4	7.94	33.33
CLO2 To analyze accurate and appropriate diagnostic techniques in veterinary parasitology.	3.5	9.33	9.33	3.4	7.93	33.33
CLO3 To discuss accurate and appropriate diagnostic techniques in veterinary parasitology	3.5	9.33	9.33	3.4	7.93	33.33
<b>Total</b>	<b>10</b>	<b>28</b>	<b>28</b>	<b>10.2</b>	<b>23.8</b>	<b>100</b>

### 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.

The rubric score will be used in the class of seminar. The evaluation information regarding presentation skill, slide arrangement, clarity of content time management, time management, and question handling are described below.



Criteria	Unsatisfactory 1	Fair 2	Good 3	Very good 4	Excellent 5
<b>Presentation Skill: Confidence, articulation, Body language and eye contact (10%)</b>	The presenter appears very nervous or unprepared, leading to a presentation that is difficult to understand. Articulation is unclear, and body language is inappropriate or distracting. Continuous hesitations hinder the delivery, and there is no meaningful eye contact with the audience.	The presenter demonstrates limited confidence, resulting in unclear articulation and minimal engagement with the audience. Body language and gestures are lacking or inappropriate for the presentation. Frequent hesitations disrupt the flow and understanding of the message. Little to no eye contact is made with the audience.	The presenter's confidence may waver at times, affecting the clarity of the message. Body language and gestures may be limited or not consistently engaging. Occasional hesitations are noticeable but do not derail the presentation. Eye contact could be improved to connect better with the audience.	The presenter shows good confidence and clear articulation, with mostly engaging body language. Eye contact is mostly maintained, and gestures are used effectively to support the message. Some moments of hesitation may be observed, but they do not significantly impact the presentation's overall flow.	The presenter demonstrates exceptional confidence, clear articulation, and maintains engaging body language throughout the presentation. Eye contact is consistent, creating a strong connection with listeners. The presentation is delivered fluently, with no hesitations or distractions.

Criteria	Unsatisfactory 1	Fair 2	Good 3	Very good 4	Excellent 5
<b>Slide Arrangement: Logical flow, makes audiences understand easily, Visual and text are relevant (5%)</b>	The slide arrangement is chaotic and haphazard, rendering the presentation incomprehensible. Visuals and text are irrelevant or counterproductive. The layout is messy and unprofessional.	The slide arrangement lacks clear structure, making it challenging for the audience to follow the presentation. Visuals and text do not adequately support the content, causing confusion. The layout appears disorganized and unprofessional.	The slide organization is somewhat confusing, affecting the overall flow of the presentation. Visuals and text may not always directly relate to the content or may distract the audience. The layout could be improved to enhance clarity and consistency.	The slides are well-organized, with a logical flow that supports the presentation's content. Visuals and text are mostly relevant and contribute to the audience's understanding. The layout is generally pleasing and professional, with consistent formatting.	The slides are exceptionally well-organized, with a logical and intuitive flow that complements the presentation's content. Visuals and text are highly relevant and enhance the audience's understanding. The layout is aesthetically pleasing and professional. Information is presented in a clear hierarchy with consistent formatting.

Criteria	Unsatisfactory 1	Fair 2	Good 3	Very good 4	Excellent 5
<b>Clarity of Content: Clear, well-structured and comprehension (10%)</b>	The presentation content is entirely unclear and incomprehensible. Concepts are not explained, and there are no relevant examples or evidence provided. The message is entirely confusing and incoherent. Complex information is not addressed at all.	The presentation content lacks clarity, making it difficult to understand the key points. Concepts are poorly explained, and relevant examples or evidence are missing. The message is often confusing or convoluted. Complex information is not properly addressed.	The presentation content is somewhat clear, but the structure and delivery could be improved for better understanding. Concepts may lack sufficient examples or evidence. The message is occasionally unclear or disjointed. Some complex information is not adequately simplified.	The presentation content is clear and mostly well-structured, allowing for easy comprehension. Concepts are explained with relevant examples and evidence. The message is generally coherent and effectively conveyed. Some complex information may need further clarification.	The presentation content is exceptionally clear, well-structured, and easy to follow. Concepts are thoroughly explained with relevant examples and evidence. The message is coherent and effectively communicated. Complex information is simplified without losing its substance.

Criteria	Unsatisfactory 1	Fair 2	Good 3	Very good 4	Excellent 5
Time Management: Timed, not feeling rushed or too slow (5%)	The presentation significantly exceeds or falls short of the allocated time, making it impossible to cover essential points effectively. The presenter demonstrates a lack of time management, negatively impacting the overall delivery. No time is available for questions and interactions.	The presentation exceeds or falls short of the allocated time significantly. The presenter struggles with time management, leading to incomplete coverage of key points or unnecessary rushing. The delivery may be severely affected. There is little to no time for questions and interactions.	The presentation is adequately timed but may have noticeable deviations from the allocated time. The presenter's time management could be improved to cover all key points adequately. The delivery may feel rushed or too slow in certain parts. Limited time is available for questions and interactions.	The presentation is well-timed, with only minor deviations from the allocated time. The presenter manages time effectively, ensuring that all essential points are covered. The delivery feels mostly smooth, with slight rushes in some sections. There is some time for questions and interactions.	The presentation is flawlessly timed, precisely fitting the allocated time. The presenter effectively manages time, allowing for a smooth and natural delivery without feeling rushed. All key points are covered thoroughly, and there is ample time for questions and interactions.

Criteria	Unsatisfactory 1	Fair 2	Good 3	Very good 4	Excellent 5
Questions Handling (10%)	Poor understanding, vague or irrelevant answers. Minimal engagement, disorganized responses.	Unclear, lacking depth. Limited evidence or examples. Needs improvement in engagement.	Reasonable clarity, satisfactory explanations. Adequate engagement, somewhat structured.	Clear understanding, good insights, supported responses. Effective engagement, mostly concise.	Clear, insightful answers with solid evidence. Engages well, structured responses, no ambiguity.

#### 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. เจษฎา เต็นตวงบริพันธ์. คู่มืออบรมเชิงปฏิบัติการ Phylogenetics Tree Reconstruction. ๒๕๕๘.

1.2 Bowman DD. Georgis' parasitology for veterinarians. 11<sup>th</sup> ed. St. Louis, Missouri: Elsevier, Saunders; 2019.

1.3 Zajac AM, Conboy GA. Veterinary Clinical Parasitology, 9<sup>th</sup> ed. Black well publishing: Iowa. 2021.

1.4 Kuo PC. Next-Generation Sequencing and Sequence Data Analysis. 1st ed. Sharjah, U.A.E.: Bentham Science; 2018.

1.5 Domingues L. PCR Methods and Protocols: Methods and Molecular in Molecular Biology 1620. New York, U.S.A.: Humana Press 2017.

1.6 Biassoni R and Raso A. Quantitative Real-Time PCR Methods and Protocols: Methods and Molecular in Molecular Biology 1160. New York, U.S.A.: Humana Press 2014.

1.7 Dujardin S, Dujardin JP. Geometric morphometrics in the cloud. Infect Genet Evol. 2019;70:189-96.

#### 2. Documents and Important Information

None

#### 3. Documents and Recommended Information

None

## 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
VSPA 719 Application of the Diagnostic Techniques in Veterinary Parasitology 3 (2-3-5)	-	P	P	-	P	-

#### 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 To apply accurate and appropriate diagnostic techniques in veterinary parasitology.		P	P		P	
CLO2 To analyze accurate and appropriate diagnostic techniques in veterinary parasitology.		P	P		P	
CLO3 To discuss accurate and appropriate diagnostic techniques in veterinary parasitology		P	P		P	

## Course schedule

Week or No.	Date	Topic	Hours			Teaching Methods / Media	Lecturers
			Lecture	Laboratory	Self Study		
1	8/1/2024 (10.00-12.00) (13.00-16.00)	Lecture: Polymerase chain reaction (PCR) Lab: Polymerase chain reaction (PCR)	2	3	5	Lecture, ppt, discussion, lab practice	SS, LS
2	15/1/2024 (10.00-12.00) (13.00-16.00)	Lecture: Next generation sequencing Lab: Next generation sequencing	2	3	5	Lecture, ppt, discussion, lab practice	SS
3	22/1/2024 (10.00-12.00) (13.00-16.00)	Lecture: Quantitative polymerase chain reaction (QPCR) Lab: Quantitative polymerase chain reaction (QPCR)	2	3	5	Lecture, ppt, discussion, lab practice	LS
4	29/1/2024 (10.00-12.00) (13.00-16.00)	Lecture: Loop mediated isothermal amplification (LAMP) Lab: Loop mediated isothermal amplification (LAMP)	2	3	5	Lecture, ppt, discussion, lab practice	AM
5	5/2/2024 (10.00-12.00) (13.00-16.00)	Lecture: Phylogenetic tree I Lab: Phylogenetic tree I	2	3	5	Lecture, ppt, discussion, lab practice	TC
6	12/2/2024 (10.00-12.00) (13.00-16.00)	Lecture: Phylogenetic tree II Lab: Phylogenetic tree II	2	3	5	Lecture, ppt, discussion, lab practice	TC
7	19/2/2024 (10.00-12.00) (13.00-16.00)	Lecture: Genetic diversity and Haplotype network analysis Lab: Genetic diversity and Haplotype network analysis	2	3	5	Lecture, ppt, discussion, lab practice	TCH
8	4/3/2024 (10.00-12.00) (13.00-16.00)	Lecture: DNA barcode, Geometric morphometrics Lab: DNA barcode, Geometric morphometrics	2	3	5	Lecture, ppt, discussion, lab practice	TC
9	18/3/2024 (10.00-12.00) (13.00-16.00)	Lecture: Basic recombinant antigen and cloning for parasite Lab: Basic recombinant antigen and cloning for parasite	2	3	5	Lecture, ppt, discussion, lab practice	CJ
10	25/3/2024 (13.00-16.00)	Lecture: Enzyme-linked immunosorbent assay (ELISA) Lab: Enzyme-linked immunosorbent assay (ELISA)	2	3	5	Lecture, ppt, discussion, lab practice	CJ



Week or No.	Date	Topic	Hours			Teaching Methods / Media	Lecturers
			Lecture	Laboratory	Self Study		
11	1/4/2024 (10.00-12.00) (13.00-16.00)	Lecture: Serological assay, Latex agglutination test Lab: Serological assay, Latex agglutination test	2	3	5	Lecture, ppt, discussion, lab practice	CJ
12	22/4/2024 (10.00-12.00) (13.00-16.00)	Lecture: Biosensor Lab: Biosensor	2	3	5	Lecture, ppt, discussion, lab practice	CP
13	29/4/2024 (10.00-12.00) (13.00-16.00)	Lecture: Immunohistochemistry, Immunofluorescence assay, Immunochromatography Lab: Immunohistochemistry, Immunofluorescence assay, Immunochromatography	2	3	5	Lecture, ppt, discussion, lab practice	TI, RP
14	13/5/2024 (10.00-12.00) (13.00-16.00)	Lecture: Animal models in parasitology Lab: Animal models in parasitology	2	3	5	Lecture, ppt, discussion, lab practice	UT
15	20/5/2024 (10.00-12.00) (13.00-16.00)	Seminar	2	3	5	Lecture, ppt, discussion, lab practice	TC, SS, CJ
		รวม	30	45	75		

### Venue

1. Lecture: Library (seminar room no.1 and 2), 3<sup>rd</sup> floor, Faculty of Veterinary Science, Salaya campus
2. Practice: Laboratory of MoZWE, 9<sup>th</sup> floor, Faculty of Veterinary Science, Salaya campus
3. Faculty of Tropical Medicine, Phayathai campus
4. Faculty of Engineering, Salaya campus