



Program: Doctor of Veterinary Medicine
Course title Laboratory of Veterinary Biochemistry
Course code VSPA 225

Academic degree level ☒ Bachelor ☐ Graduate Diploma ☐ Master

☐ Higher Graduate Diploma ☐ Doctor

Faculty / College / Institute: Faculty of Veterinary Science
Department of Pre-clinic and Applied Animal Science

TQF 3 Course Specification

Section 1 General Information

1. Course Code and Title

In Thai สพปส ๒๒๕ ปฏิบัติการชีวเคมีทางสัตวแพทย์
In English VSPA 225 Laboratory of Veterinary Biochemistry

2. Number of Credits 1 (0-3-1)

(Theory 0 hrs. Practice 3 hrs. Self-Study 1 hrs./week)

3. Curriculum and Course Type

3.1 Curriculum Bachelor Degree Program (Thai)

3.2 Course Type Specific Course ☒ Compulsory Course ☐ Electives

4. Course Coordinator and Lecturer

4.1 Course Responsible Lecturers

4.11 Assist. Prof. Boonrat Chantong	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-684-8882	e-mail address: boonrat.cha@mahidol.edu
4.12 Assoc. Prof. Shutipen Buranasinsup	Department of Pre-clinic and Applied Animal Science
Telephone Number 089-6104954	e-mail address: shutipen.bur@mahidol.edu

4.2 Lecturers

4.21 Assist. Prof. Boonrat Chantong	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-684-8882	e-mail address: boonrat.cha@mahidol.edu
4.22 Assoc. Prof. Shutipen Buranasinsup	Department of Pre-clinic and Applied Animal Science
Telephone Number 089-6104954	e-mail address: shutipen.bur@mahidol.edu
4.23 Assist. Prof. Waraphan Toniti	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-487-6173	e-mail address: waraphan.ton@mahidol.edu
4.24 Assist. Prof. Paranee Yatmark	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-856-7181	e-mail address: paranee.yat@mahidol.edu
4.25 Miss Arunee Jangsangthong	Department of Pre-clinic and Applied Animal Science
Telephone Number 083-553-8189	e-mail address: arunee.jan@mahidol.edu
4.26 Miss Anchana Chansawhang	Veterinary Center of Diagnosis
Telephone Number 089-912-3321	e-mail address: anchana.chn@mahidol.edu

5. Semester/Class Level

5.1 Semester 1 / Class Level 2

5.2 Number of Students Allowed Approximately 80 Students

6. Pre-requisite

SCCH 119 Chemistry Laboratory

SCBI 123 Process of Life

7. Co-requisites

VSPA 224 Veterinary Biochemistry

8. Study Site Location Faculty of Veterinary Science, Mahidol University

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

Day 15 Month June Year 2022

Section 2 Aims and Objectives

1. Course Goals

Organize experiential learning as students can use equipment and glassware in a biochemical laboratory. Explain the equipment principles in a biochemistry laboratory. Separate and extract the cellular components. Measure and interpret the clinical biochemistry parameters.

2. Objectives of Course Development/Revision

2.1 Course Objectives

This course aims to provide knowledge and abilities as follows:

1. Understanding the basis of biochemical laboratory instruments and equipment
2. Capable of appropriately using biochemical laboratory instruments and equipment
3. Able of analyzing biomolecules from obtained samples
4. Capable of selecting suitable samples, determining methods, and interpreting clinical veterinary biochemical parameters

2.2 Course-level Learning Outcomes: CLOs

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

1. CLO1 Use biochemical laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter
2. CLO2 Describe biochemical techniques and the principles of laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter.
3. CLO3 Separate and extract the cellular components
4. CLO4 Identify appropriate samples that are relevant to the organ dysfunction.
5. CLO5 Analyze clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.
6. CLO6 Interpret clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.

Section 3 Course Description and Implementation

1. Course Description

ฝึกใช้เครื่องมือปฏิบัติการชีวเคมี พีเอช บัฟเฟอร์ การไตเตรท ทดสอบคุณสมบัติและวัดปริมาณของคาร์โบไฮเดรต โปรตีน ดีเอ็นเอ ไขมัน ครีเอตินีน ยูเรีย ฮีโมโกลบิน บิลิรูบิน และเอนไซม์ที่เกี่ยวข้องกับการทำงานของตับ การทำงานของเอนไซม์ การสกัดแยกและวัดปริมาณดีเอ็นเอ และองค์ประกอบทางชีวเคมีของเซลล์

Biochemical equipment practical handlings, pH, buffer, titration, qualitative and quantitative determination of carbohydrate, protein; DNA, lipid, creatinine, urea, hemoglobin, bilirubin, and hepatic enzymes; functions of enzyme, DNA extraction and measurement, and cell biochemical components

2. Number of hours per semester

Theory (hours)	Practice (hours)	Self-study (hours)
-	45	15

3. Number of Hours per Week for Individual Advice

1 hour/week (only on Wednesday)

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)

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

1. CLO1 Use biochemical laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter
2. CLO2 Describe biochemical techniques and the principles of laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter.
3. CLO3 Separate and extract the cellular components
4. CLO4 Identify appropriate samples that are relevant to the organ dysfunction.
5. CLO5 Analyze clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.
6. CLO6 Interpret clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.

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	practice	demonstration	presentation	MCQ	assignment	Practice	Practice examination
CLO1	x	x	x		x	x	x	x
CLO2	x	x			x	x	x	
CLO3	x	x			x	x	x	x
CLO4	x			x	x	x	x	
CLO5	x	x	x		x	x	x	x
CLO6	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	Study and practice of using biochemical laboratory equipment I	-	3	practice	Assist. Prof. Boonrat Assoc. Prof. Shutipen Assist. Prof. Waraphan Assist. Prof. Paranee Miss Arunee Miss Anchana
2	Study and practice of using biochemical laboratory equipment II	-	3	practice	
3	pH and buffer	-	3	practice	
4	Titration	-	3	practice	
5	Study of carbohydrate properties	-	3	practice	
6	Study of protein properties and quantification of proteins	-	3	practice	
7	Study of enzyme kinetic	-	3	practice	
8	Study of lipid properties and free fatty acid	-	3	practice	
9	Study of DNA and RNA properties DNA and RNA extraction	-	3	practice	
10	Study of the chemical composition of cells	-	3	practice	
11	Quantification of Hemoglobin and bilirubin	-	3	practice	
12	Liver enzymes function tests	-	3	practice	
13	Quantification of creatinine and ketone body	-	3	practice	
14	Quantification of vitamin C	-	3	practice	
15	Demonstration of PCR and gel electrophoresis	-	3	practice	
	Total hours of the entire semester	-	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

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	MCQ	assignment	Practice	presentation	
CLO1 Use biochemical laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter	10	5	5		20
CLO2 Describe biochemical techniques and the principles of laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter	16	4			20
CLO3 Separate and extract the cellular components	6	2	2		10
CLO4 Identify appropriate samples that are relevant to the organ dysfunction	6	2		2	10
CLO5 Analyze clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.	10	5	5		20
CLO6 Interpret clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients	10	5		5	20
รวม	58	23	12	7	100

(2) Measurement and evaluation

The measurement and evaluation use either the criteria-based or group-based system, according to the conditions and methods for academic results evaluation of the Faculty of Veterinary Science, Mahidol University. 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) Re-examination (if the course allows any.)

In case that students received an 'F' grade, the course coordinator and the program's Teaching and Learning Development 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.

For the course with the mean score is higher than 75.00 and the minimum score is not less than 45.00. Students must receive the score higher than 47.50 to take to re-examination or extra-course work.

For the course with the mean score between 60.00 – 74.99, students must receive the score higher than 40.00. However, when the mean score is less than 60.00, students, then, should receive the score higher than 40.00 in order to take the 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'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 Resources

1. Required Texts

- 1) หลักการชีวเคมีทางสัตวแพทย์
- 2) Kerr MG. Veterinary laboratory medicine: clinical biochemistry and haematology. John Wiley & Sons; 2008 Apr

- 3) Latimer KS, editor. Duncan and Prasse's veterinary laboratory medicine: clinical pathology. John Wiley & Sons; 2011 Jul 26.
- 4) Vaden SL, Knoll JS, Smith Jr FW, Tilley LP, editors. Blackwell's Five-Minute Veterinary Consult: Laboratory Tests and Diagnostic Procedures: Canine and Feline. John Wiley & Sons; 2011 Jun 20

2. Suggested Materials

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3. Other Resources (if any)

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Section 7 Evaluation and Improvement of Course Implementation

1. Strategy for Course Effectiveness Evaluation 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. Strategy for Teaching Evaluation

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. Teaching Improvement

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 Standard of Learning Outcome for the Course

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.

Appendix

Relations between the course and the program

Table 1 Relations between the course and the PLOs

Course Name	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
Laboratory of Veterinary Bio-chemistry								
(Course Code) VSPA 225	I/R				P			

Table 2 Relations between CLOs and PLOs

VSPA225	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1 Use biochemical laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter	1.1							
CLO2 Describe biochemical techniques and the principles of laboratory instruments and equipment such as a pipette, spectrophotometer, centrifuge, and pH meter	1.1				5.2			
CLO3 Separate and extract the cellular components	1.1				5.2			
CLO4 Identify appropriate samples that are relevant to the organ dysfunction	1.2							
CLO5 Analyze clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients.	1.1				5.2			

CLO6 Interpret clinical biochemical parameters from blood and urine, as well as food and pharmaceutical ingredients	1.1				5.2			
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