



Program: Doctor of Veterinary Medicine
Course title Veterinary Biochemistry
Course code VSPA 224

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 ๒๒๔ ชีวเคมีทางสัตวแพทย์
In English VSPA 224 Veterinary Biochemistry

2. Number of Credits 3 (3-0-6)

(Theory 3 hrs. Practice 0 hrs. Self-Study 6 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. Waraphan Toniti Department of Pre-clinic and Applied Animal Science

Telephone Number 081-487-6173 e-mail address: waraphan.ton@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. Waraphan Toniti Department of Pre-clinic and Applied Animal Science

Telephone Number 081-487-6173 e-mail address: waraphan.ton@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. Boonrat Chantong Department of Pre-clinic and Applied Animal Science

Telephone Number 081-684-8882 e-mail address: boonrat.cha@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 112 General Chemistry

SCCH 122 Organic Chemistry

SCBI 123 Process of Life

7. Co-requisites

VSPA 225 Laboratory of 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 the experienced learning that results in students having fundamental biochemistry knowledge to develop in veterinary diagnostic and therapeutic procedures.

2. Objectives of Course Development/Revision

2.1 Course Objectives

This course aims to provide knowledge and abilities as follows:

1. Understanding the structure and function of biomolecules such as carbohydrate, amino acid, protein, enzyme, lipid, and nucleic acid.
2. Understanding the physical and chemical characteristics of biomolecules such as carbohydrate, amino acid, protein, enzyme, lipid, and nucleic acid.
3. Understanding the abnormalities and diseases caused by biomolecules with impaired structures and functions such as carbohydrate, amino acid, protein, enzyme, lipid, and nucleic acid.
4. Understanding the biochemical characteristics of biomolecules such as carbohydrate, amino acid, protein, enzyme, lipid, and nucleic acid in veterinary analysis and diagnosis

2.2 Course-level Learning Outcomes: CLOs

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

1. CLO1 Describe the structure of biomolecules and illustrate their chemical characteristics and functions.
2. CLO2 Describe the characteristics and functions of major biomolecules which including lipids, carbohydrates, proteins, amino acids, enzymes, and nucleic acids.
3. CLO3 Describe the principles of molecular biology techniques and apply them in veterinary sciences.
4. CLO4 Explain the role of biomolecules and minerals in disease pathogenesis.

5. CLO5 Explain the function of enzymes, including the rate of catalysis and enzyme kinetics, as well as the procedure of enzyme extraction and purification.

Section 3 Course Description and Implementation

1. Course Description

โครงสร้าง หน้าที่ คุณสมบัติทางกายภาพและเคมี ความผิดปกติและโรคที่เกี่ยวข้องกับ น้ำ อิเล็กโทรไลต์ คาร์โบไฮเดรต กรดอะมิโน และโปรตีน เอนไซม์ ไขมัน กรดนิวคลีอิก วิตามินและแร่ธาตุ เทคนิคทางอณูชีววิทยา และชีวเคมีคลินิก

Structures, functions, physical and chemical properties; abnormality and related diseases of water, electrolyte, carbohydrate, amino acid and protein, enzymes, lipid, nucleic acids, vitamins and minerals; molecular biology techniques, and clinical biochemistry

2. Number of hours per semester

Theory (hours)	Practice (hours)	Self-study (hours)
45	0	90

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 Describe the structure of biomolecules and illustrate their chemical characteristics and functions.
2. CLO2 Describe the characteristics and functions of major biomolecules which including lipids, carbohydrates, proteins, amino acids, enzymes, and nucleic acids.
3. CLO3 Describe the principles of molecular biology techniques and apply them in veterinary sciences.
4. CLO4 Explain the role of biomolecules and minerals in disease pathogenesis.

5. CLO5 Explain the function of enzymes, including the rate of catalysis and enzyme kinetics, as well as the procedure of enzyme extraction and purification.

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	MCQ
CLO1	x	x
CLO2	x	x
CLO3	x	x
CLO4	x	x
CLO5	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	Water and electrolyte	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
	Carbohydrate I	1			Assist. Prof. Waraphan
2	Carbohydrate II	3	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
3	Carbohydrate III	1	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
	Amino acid I	2			Assist. Prof. Waraphan
4	Amino acid II	1	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
	Protein I	2			Assist. Prof. Boonrat
5	Protein II	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Boonrat
	Enzyme I	1			Assoc. Prof. Shutipen
6	Enzyme II	3	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
7	Enzyme III	2	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
	Vitamin and mineral I	1			Assoc. Prof. Shutipen

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
8	Vitamin and mineral II	3	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
9	Nucleic acid I	3	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
10	Nucleic acid II	3	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
11	Lipid I	3	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
12	Lipid II	3	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
13	Blood biochemistry, liver and renal enzyme function	3	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Shutipen
14	Urinary biochemistry and acid-base balance	3	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Waraphan
15	Molecular Techniques	3	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Boonrat
	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	Group work	Individual work presentation	..xx..	
CLO1 Describe the structure of biomolecules and illustrate their chemical characteristics and functions.	22	3			25
CLO2 Describe the characteristics and functions of major biomolecules which including lipids, carbohydrates, proteins, amino acids, enzymes, and nucleic acids.	37	3			40
CLO3 Describe the principles of molecular biology techniques and apply them in veterinary sciences.	5	-			5
CLO4 Explain the role of biomolecules and minerals in disease pathogenesis.	18	2			20
CLO5 Explain the function of enzymes, including the rate of catalysis and enzyme kinetics, as well as the procedure of enzyme extraction and purification.	8	2			10
รวม	90	10			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) Kaneko JJ, Harvey JW, Bruss ML, editors. Clinical biochemistry of domestic animals. Academic press; 2008 Sep 4.
- 2) Kerr MG. Veterinary laboratory medicine: clinical biochemistry and haematology. John Wiley & Sons; 2008 Apr 15.

- 3) Nelson DL and Cox MM. Lehninger Principles of biochemistry 7th ed. New York: W.H. Free man and company; 2017.
- 4) Rodwell V, Bender D, Botham KM, Kennelly PJ, Weil PA. Harpers illustrated biochemistry 30th edition. McGraw Hill Professional; 2015 Mar 22.
- 5) Boyer RF. Concepts in biochemistry. Wiley; 2006.

2. Suggested Materials

2.1 ประดิษฐ์ สุคนธวารินทร์. เอนไซม์. ใน: พิชรี บุญศิริ, เปรมใจ อารีจิตรานุสรณ์, อุบล ชำอ่อน และ ปิติ ฐวจิตต์ (บรรณาธิการ) ตำราชีวเคมี. พิมพ์ครั้งที่ 5. ขอนแก่น: โรงพิมพ์คลังน่านวิทยา; 2551. หน้า 115-31.

2.2 อากัสสรา ชูเทศะ. เอนไซม์. ใน: อากัสสรา ชูเทศะ (บรรณาธิการ) ชีวเคมี ชีวโมเลกุล. พิมพ์ครั้งที่ 4. กรุงเทพมหานคร: โครงการตำราคณะสัตวแพทยศาสตร์ มหาวิทยาลัยเกษตรศาสตร์; 2551. หน้า 52-81.

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							
Veterinary Bio-chemistry	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
(Course Code) VSPA 224	R							

Table 2 Relations between CLOs and PLOs

VSPA224	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1 Describe the structure of biomolecules and illustrate their chemical characteristics and functions.	1.2							
CLO2 Describe the characteristics and functions of major biomolecules which including lipids, carbohydrates, proteins, amino acids, enzymes, and nucleic acids.	1.2							
CLO3 Describe the principles of molecular biology techniques and apply them in veterinary sciences.	1.2							

CLO4 Explain the role of biomolecules and minerals in disease pathogenesis.	1.2							
CLO5 Explain the function of enzymes, including the rate of catalysis and enzyme kinetics, as well as the procedure of enzyme extraction and purification.	1.2							