



Program: Doctor of Veterinary Medicine
 Course title Veterinary Toxicology.
 Course code VSPA 329

Academic degree level ☒ Bachelor ☐ Graduate Diploma ☐ Master
☐ Higher Graduate Diploma ☐ Doctor
 Faculty / College / Institute: Faculty of Veterinary Science
 Department of Pre-Clinical and Applied Animal Science

TQF 3 Course Specification

Section 1 General Information

1. Course Code and Title

In Thai สพปส ๓๒๘ พิษวิทยาทางสัตวแพทย์
 In English VSPA 329 Veterinary Toxicology

2. Number of Credits 2 (2-0-4) (Theory 2 hrs. Practice 0 hrs. Self-Study 4 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

1. Assist. Prof. Dr. Boonrat Chantong	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-684-8882	e-mail address: boonrat.cha@mahidol.edu
2. Assist. Prof. Dr. Paranee Yatmark	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-856-7181	e-mail address: paranee.yat@mahidol.edu

4.2 Lecturers

1. Assist. Prof. Dr. Boonrat Chantong	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-684-8882	e-mail address: boonrat.cha@mahidol.edu
2. Assist. Prof. Dr. Paranee Yatmark	Department of Pre-clinic and Applied Animal Science
Telephone Number 081-856-7181	e-mail address: paranee.yat@mahidol.edu
3. Assoc. Prof. Dr. Sookruetai Boonmasawai	Department of Pre-clinic and Applied Animal Science
Telephone Number 02-441-5242 ext 1533	e-mail address: sookruetai.boon@mahidol.ac.th
4. Assist. Prof. Dr. Arpron Leesombun	Department of Pre-clinic and Applied Animal Science
Telephone Number 02-441-5242 ext 1535	e-mail address: arpron.lee@mahidol.ac.th

5. Semester/Class Level

5.1 Semester ..2... / Class Level ..3..
 5.2 Number of Students Allowed Approximately 80 Students



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6. Pre-requisite

VSPA 226 Integrated veterinary biochemistry

7. Co-requisites

-

8. Study Site Location

 Faculty of Veterinary Science, Mahidol University

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

Section 2 Aims and Objectives

1. Course Goals

Students will comprehend the essential principles and concepts of toxicology, including the mechanism and toxicology principles of carcinogens, mutagens, reproductive toxins, and teratogens, as well as toxicity assessment. The focus will be on the basic ideas of treating animal poisoning from neurological system, hematological system, cardiovascular system, reproductive system, liver, and kidney-affective toxicants, pesticides, heavy metals, industrial toxins, mycotoxins, as well as animal and plant toxins.

2. Objectives of Course Development/Revision

2.1 Course Objectives

This course aims to provide knowledge and abilities as follows:

1. Understand the principles and concepts of toxicology, including the mechanism of action and toxicokinetics in veterinary medicine.
2. Have an accurate understanding of the toxicity mechanism and toxicological principles of carcinogens, reproductive toxins, and teratogens.
3. Understand the mechanism of toxicity and toxicity assessment, as well as the basics of treating animal poisoning caused by neurotoxins, hematological toxins, cardiovascular toxins, reproductive toxins, liver toxins, and kidney toxins.
4. Understand toxicological concepts, and the principles of treating animal poisoning caused by pesticides, heavy metals, industrial toxins, mycotoxins, and animal and plant toxins.



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2.2 Course-level Learning Outcomes: CLOs

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

1. CLO1 Correctly explain toxicological principles and concepts such as mechanism of action and toxicokinetics.
2. CLO2 Explain the toxicity mechanisms and toxicological principles of carcinogens, reproductive toxins, and teratogens accurately.
3. CLO3 Comprehend the toxicity mechanism and assessment, as well as the basics of treating animal poisoning caused by neurotoxins, hematological toxins, cardiovascular toxins, reproductive toxins, liver toxins, and kidney toxins.
4. CLO4 Describe toxicological concepts and also the principles of treating animal poisoning caused by pesticides, heavy metals, industrial toxins, mycotoxins, and animal and plant toxins.

Section 3 Course Description and Implementation

1. Course Description

หลักการและแนวคิดทางพิษวิทยา กลไกพื้นฐานของการเกิดพิษ การประเมินความเป็นพิษของสารและการประเมินความเสี่ยง การตรวจวิเคราะห์หาสารพิษทางห้องปฏิบัติการ หลักเบื้องต้นของการรักษาอาการพิษในสัตว์ พิษวิทยาของสารกำจัดแมลง สารกำจัดศัตรูพืชและสัตว์ฟันแทะ สารพิษจากเชื้อรา พิษจากพืชและสัตว์ พิษจากโลหะหนัก และสารพิษจากอุตสาหกรรม

Principles and concepts in toxicology, mechanisms of toxic injuries, classification of toxic substances, toxic evaluation and risk assessment; laboratory analysis of toxic substances; principles of poison treatment; toxicology of insecticides, pesticides, rodenticides, plant and animal toxins, heavy metals, and industrial pollutants

2. Number of hours per semester

Theory (hours)	Practice (hours)	Self-study (hours)
30	0	60

3. Number of Hours per Week for Individual Advice

1 hour/week (only on Wednesday)



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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 Correctly explain toxicological principles and concepts such as mechanism of action and toxicokinetics.
2. CLO2 Explain the toxicity mechanisms and toxicological principles of carcinogens, reproductive toxins, and teratogens accurately.
3. CLO3 Comprehend the toxicity mechanism and assessment, as well as the basics of treating animal poisoning caused by neurotoxins, hematological toxins, cardiovascular toxins, reproductive toxins, liver toxins, and kidney toxins.
4. CLO4 Describe toxicological concepts and also the principles of treating animal poisoning caused by pesticides, heavy metals, industrial toxins, mycotoxins, and animal and plant toxins.

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



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SECTION 5 LESSON PLAN AND EVALUATION

1. Lesson Plan

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
1.	Introduction and basic principle in toxicology	2	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Dr. Sookruetai Boonmasawai
2.	Molecular and cellular mechanism of toxicity	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Boonrat Chantong
3.	Principle of toxicokinetics	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Paranee Yatmark.
4.	Carcinogen and mutagen	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Boonrat Chantong
5.	Reproductive system-affective toxicants and teratogen	2	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Dr. Sookruetai Boonmasawai
6.	Nervous system-affective toxicants	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Boonrat Chantong
7.	Immunotoxicants	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Arpron Leesombun
8.	Toxicant-induced liver toxicity	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Boonrat Chantong
9.	Toxicant-induced renal toxicity	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Arpron Leesombun
10	Hematological and cardiovascular system-affective toxicants	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Paranee Yatmark.
11	Toxicology of pesticides	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Arpron Leesombun
12	Toxicology of heavy metals	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Paranee Yatmark. and team



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Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
13.	Toxicology of solvents, pollutant and industrial toxins	2	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Dr. Sookruetai Boonmasawai
14	Toxicology of mycotoxins	2	-	Lecture: ppt, online lessons, group discussion	Assist. Prof. Dr. Boonrat Chantong
15	Toxicology of animal and plant toxins.	2	-	Lecture: ppt, online lessons, group discussion	Assoc. Prof. Dr. Sookruetai Boonmasawai
	Total hours of the entire semester	30	-		

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.

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	MCQ	Group work	Individual work presentation	..xx..	
1. CLO1 Correctly explain toxicological principles and concepts such as mechanism of action and toxicokinetics.	14	-	2	-	16
2. CLO2 Explain the toxicity mechanisms and toxicological principles of carcinogens, reproductive toxins, and teratogens accurately.	16	-	2	-	18



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3. CLO3 Comprehend the toxicity mechanism and assessment, as well as the basics of treating animal poisoning caused by neurotoxins, hematological toxins, cardiovascular toxins, reproductive toxins, liver toxins, and kidney toxins.	32	-	4	-	36
4. CLO4 Describe toxicological concepts and also the principles of treating animal poisoning caused by pesticides, heavy metals, industrial toxins, mycotoxins, and animal and plant toxins.	27		3		30
รวม	89	-	11	-	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 processed 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) Gupta R.C. Veterinary toxicology: basic and clinical principles. 3rd ed. New York, Elsevier/Academic Press, 2018
- 2) Klaassen C.D., Casarett L.J., Doull J. Casarett and Doull's toxicology : The basic science of poisons. 8th ed. New York, McGraw-Hill Education, 2013
- 3) Peterson M.E. Small animal toxicology. 3rd ed. St. Louis, Missouri, Saunders, 2013
- 4) Plumlee K.H. Clinical veterinary toxicology. 1st ed. St. Louis, Missouri, Mosby, 2004

2. Suggested Materials

- 1) Eaton DL, Groopman JD, editors. The toxicology of aflatoxins: human health, veterinary, and agricultural significance. Elsevier; 2013 Oct 22
- 2) Poppenga RH, Spoo W. Veterinary toxicology. In: Information Resources in Toxicology 2009 Jan 1 (pp. 515-522). Academic Press.
- 3) Gossel TA. Principles of clinical toxicology. CRC Press; 2018 Feb 6.
- 4) Wismer T, Means C. Toxicology of newer insecticides in small animals. Veterinary Clinics: Small Animal Practice. 2012 Mar 1;42(2):335-47.

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.



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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 Veterinary toxicology	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
(Course Code) VSPA 329	R							

Table 2 Relations between CLOs and PLOs

VSPA 329	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1. CLO1 Correctly explain toxicological principles and concepts such as mechanism of action and toxicokinetics.	1.2							
2. CLO2 Explain the toxicity mechanisms and toxicological principles of carcinogens, reproductive toxins, and teratogens accurately.	1.2							



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3. CLO3 Comprehend the toxicity mechanism and assessment, as well as the basics of treating animal poisoning caused by neurotoxins, hematological toxins, cardiovascular toxins, reproductive toxins, liver toxins, and kidney toxins.	1.2							
4. CLO4 Describe toxicological concepts and also the principles of treating animal poisoning caused by pesticides, heavy metals, industrial toxins, mycotoxins, and animal and plant toxins.	1.2							