UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
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Division of Veterinary Public Health and Food Safety
Department of Pharmacology and Toxicology
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Register no.:
File no.:
Zagreb, February 1, 2021

COURSE SYLLABUS

TOXICOLOGY

Academic year 2020-21

Course leader:
Prof Andreja Prevendar Crnić, DVM PhD

Teachers:
Prof Andreja Prevendar Crnić, DVM PhD
Assistant
Associate teachers:
Dr Maja Lang Balija, DVM PhD
Dr Marijana Sokolović, DVM PhD
First day of classes:
April 27, 2021
Last day of classes: June 8, 2021

Timetable for LECTURES academic year 2020-2021

LECTURES				
Date	**Methodological unit**	**Teacher**	**Location / time**	**Literature**
27/4/2021	Introduction to veterinary toxicology; Definitions and professional terminology in toxicology; Classification and labeling of poisons; Basic mechanisms of action of toxins; Introduction to procedures with poisoned animals	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 15-17 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
28/4/2021	Pesticides: organophosphorus compounds, carbamates	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 13-15 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
30/4/2021	Pyrethrin and pyrethroids, macrocyclic lactones, fipronil, neonicotinoids, strychnine	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 12-14 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
4/5/2021	Anticoagulants, vitamin D, phosphides, metaldehyde, dipyridyls	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 10-12 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.

5/5/2021	Heavy metals - Introduction Mercury poisoning of domestic animals	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 14-16 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
7/5/2021	Poisoning of domestic animals with copper, iron, zinc	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 12-14 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
13/5/2021	Poisoning of domestic animals with lead and cadmium	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 15-16,30 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
14/5/2021	Domestic animals poisoning with arsenic and selenium	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 15-16,30 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
17/5/2021	Poisoning of domestic animals with fluorine, cyanides and cyanogen plants	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 12-14 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
24/5/2021	Ammonium salts, nitrates, nitrites, nitroso compounds Poisoning of domestic animals	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012.

	with urea		8-10 h	Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999.
31/5/2021	Poisoning of domestic animals with sodium chloride, ethylene glycol, fruit, chocolate and coffee	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 12-14 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology,1999. Poppenga, R.H., S. Gwaltney-Brant: Small Animal Toxicology Essential. Wiley-Blackwell, 2011. Peterson, M.E., P.A. Talcott: Small Animal Toxicology. Elsevier, 2013
7/6/2021	Pet poisoning with food and substances from the immediate environment	Prof Andreja Prevendar Crnić	Lecture room Pharmacology and Toxicology 8-10 h	Poppenga, R.H., S. Gwaltney-Brant: Small Animal Toxicology Essential. Wiley-Blackwell, 2011. Peterson, M.E., P.A. Talcott: Small Animal Toxicology. Elsevier, 2013

Timetable for SEMINARS academic year 2020-2021

SEMINARS					
Date	**Methodological unit**	**Teacher**	**Group**	**Location / time**	**Literature**
6/5/ 2021	Clinical toxicology of snake bites Clinical toxicology of stings and bites of some ticks and spiders	Prof Andreja Prevendar Crnić		Lecture room Pharmacology and Toxicology 12-14 h	Work material
17/5/ 2021	Clinical Toxicology of Hymenoptera Bites Nanoparticle toxicology	Prof Andreja Prevendar Crnić		Lecture room Pharmacology and Toxicology 8-10 h	Work material
26/5/ 2021	Polychlorinated biphenyls Dioxins Polycyclic aromatic hydrocarbons (PAHs), brominated flame retardants and perfluorinated substances	Prof Andreja Prevendar Crnić		Lecture room Pharmacology and Toxicology 8-10 h	Work material

Timetable for PRACTICALS academic year 2020-2021

PRACTICALS						
Date	**Methodological unit**	**Teacher**	**Type of practical**	**Group**	**Location / time**	**Literature**
30/4/ 2021	Introduction Treatment of poisoned animals Diagnosis of poisoning	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 10-12 h	Work material
5/5/ 2021	Fundamentals of instrumental quantitative laboratory analytics in toxicology Qualitative tests for pesticides determination in biological samples	Assistant, Prof Andreja Prevendar Crnić	Practicum / Laboratory practicals		Lecture room Pharmacology and Toxicology Student Laboratory Department of Pharmacology and Toxicology 12-14 h	Work material
7/5/ 2021	Toxicodynamics Treatment of poisoned animals Therapy for the most common pet poisoning	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 14-16 h	Work material
12/5/ 2021	Qualitative tests for determination of heavy metals, industrial pollutants and nitrogen compounds in	Assistant, Prof Andreja Prevendar Crnić	Practicum / Laboratory practicals		Lecture room Pharmacology and Toxicology Student Laboratory Department of	Work material

	biological samples				Pharmacology and Toxicology 13-15 h	
18/5/ 2021	Ecotoxicology	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 14-16 h	Work material
19/5/ 2021	Chemical and biological weapons in the context of veterinary toxicology	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 14-16 h	Work material
25/5/ 2021	Organotoxicology I colloquium	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 8-10 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. http://www.ivis.org/library.asp , V. Baesley: Veterinary toxicology,1999.
27/5/ 2021	Antitoxin production - presentation by Dr. Maja Lang Balija	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 10-12 h	Work material
31/5/ 2021	Mycotoxicoses Introduction hepatotoxins nephrotoxins	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 8-10 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. http://www.ivis.org/library.asp , V. Baesley: Veterinary toxicology,1999.
7/6/ 2021	Mycotoxicoses trichothecenes fumonisins	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012.

	II colloquium				14-16 h	http://www.ivis.org/library.asp , V. Baesley: Veterinary toxicology,1999.
8/6/ 2021	Mycotoxicoses Estrogen mycotoxins (zearelenone, ergot alkaloids) Tremorgenic mycotoxins Mycotoxin analytics	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 8-10 h	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. http://www.ivis.org/library.asp , V. Baesley: Veterinary toxicology,1999.
8/6/ 2021	Toxic effects of possible toxic substances in the immediate vicinity of pets (food supplements, over-the-counter medicines, addictive drugs, alcohol, garbage, etc.)	Assistant, Prof Andreja Prevendar Crnić	Practicum		Lecture room Pharmacology and Toxicology 10-12 h	Poppenga, R.H., S. Gwaltney-Brant: Small Animal Toxicology Essential. Wiley-Blackwell, 2011. Peterson, M.E., P.A. Talcott: Small Animal Toxicology. Elsevier, 2013.

STUDENT OBLIGATIONS

Lecture attendance	3-6 points; 1 hour = 0.25 points student must be present for at least 12 hours out of 24
Seminars attendance	4-6 points; 1 hour of seminar brings 1 point student must be present for at least 4 seminars hours out of 6
Practicals attendance	4-6 points; 1 hour = 0.25 points the student must be present for at least 16 hours of practicals out of 24
Active participation in seminars and practicals	**5-10 points** the highest number of points (5) for the activity on the practicals can be obtained by the student if he shows interest in the topics covered within the practical class and is active in the laboratory; the highest number of points (5) for the activity at the seminars can be obtained by studying the literature for a given topic and presenting the given topic well
Final exam	
Examination requirements	Student requirements are defined in the Regulations on the Integrated Undergraduate and Graduate Study of Veterinary Medicine. Given the above, the student must acquire a minimum number of points from all assessment elements in order to take the final exam. **Article 45:** a student can justifiably be absent from up to 50 % of the lectures; 30% of the seminars and 30 % of the exercises.

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	2 colloquia: I. Colloquium: Assessment of knowledge gained during practicals 25/5/2021 II. Colloquium: Assessment of knowledge gained during seminars 7/6/2021 REPAIR COLLOQ, by appointment
Final exams (dates)	15/6/2021; 24/62021; 8/7/2021; 6/9/2021; 21/9/2021
Form of final exam	Written and oral

LITERATURE

Obligatory literature	Gupta, R.C.: Veterinary Toxicology: Basic and Clinical Principles. Esevier, 2012. http://www.ivis.org/library.asp, V. Baesley: Veterinary toxicology, 1999. Osweiler, G.D.: Toxicology, Williams & Wilkins Philadelphia, Baltimor, 1996 Poppenga, R.H., S. Gwaltney-Brant: Small Animal Toxicology Essential. Wiley-Blackwell, 2011. Peterson, M.E., P.A. Talcott: Small Animal Toxicology. Elsevier, 2013
Optional literature	

OBJECTIVES AND LEARNING OUTCOMES

Course objectives	The aim of the course is to familiarize the student with the harmfulness that "a priori" poisons can have on the health of domestic and wild animals and, indirectly, on human health. Specific teaching goals are introduce the student with: 1. physicochemical characteristics that are important for understanding the kinetics and dynamics of poison in the body, 2. use, in the case of pesticides, 3. sources of poisoning, 4. toxicity, 5. metabolism that includes kinetics and mechanisms of toxic effect of poison, 6. clinical signs of poisoning, 7. pathological-morphological and pathological-histological changes, 8. diagnostics of poisoning, 9. treatment of poisoning, 10. residue of poisons in tissues and organs in poisoned or contaminated and forced slaughtered animals which may have a harmful effect on humans, 11. sublethal effects (Reproductive toxicity with endocrine disruption, Immunotoxicity, cancerogenicity).
Learning outcomes	After completing the course material and passing the Toxicology exam, the student should know: - to recognize poisoning in certain animals, - to treat a poisoned animal, - to evaluate the success of treatment, - to evaluate the possible wider adverse effects of poisoning and to know: - properly sample and forward the sample for toxicological analysis, - to evaluate the results of the chemical toxicological analysis in the case of residues (the "Regulations")

GRADING SCHEME

Points	*Grade*
Up to 59	1 (F)
60-68	2 (E)
69-76	2 (D)

77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Course leader:

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Head of Department/Clinic:

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Note: The course leader is required to submit a Course Syllabus to all teachers and associates pertaining to the Course.

GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES, SEMINARS and PRACTICALS

Type of activity	Minimum number of points	Maximum number of points
Lectures attendance	**3**	**6**
Seminar attendance	**4**	**6**
Practicals attendance	**4**	**6**
Active participation in seminars and practicals	**5**	**10**
Continuous knowledge checking (mid-terms)	**20**	**32**
Final exam	**24**	**40**
TOTAL	**60**	**100**

GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES and PRACTICALS

Type of activity	Minimum number of points	Maximum number of points
Lecture attendance	**3**	**6**
Practicals attendance	**8**	**12**
Active participation in practicals	**5**	**10**
Continuous knowledge checking (mid-terms)	**20**	**32**
Final exam	**24**	**40**
TOTAL	**60**	**100**

GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH SEMINARS and EXCERCISES

Type of activity	Minimum number of points	Maximum number of points
Seminar / practicals attendance	**11**	**18**
Active participation in seminars and practicals	**5**	**10**
Continuous knowledge checking (mid-terms)	**20**	**32**
Final exam	**24**	**40**
TOTAL	**60**	**100**