Syllabus

Module title:	Toxicology		ECTS	3
Polish translation:	Toksykologia			
Course:	**Veterinary Medicine**			

Module language:	English			Stage:	JM-FVM	
Form of studies:	☑ intramural ☐ extramural	Type of module:	☑ basic ☐ directional	☑ mandatory ☐ elective	Semester: 8	☐ winter semester ☑ summer semester
				Academic year:	**2023/2024**	Catalogue number:	FVM-V-JMSS-08S-B65_23

Module coordinator:	**dr hab. Marta Mendel prof. SGGW**
Teachers responsible for the module:	**Academic teachers of the Institute of Veterinary Medicine; Department of Preclinical Sciences. PhD students in accordance to the internal legal acts; visiting professors; other specialists in the field of study**
Unit responsible for the module:	**Institute of Veterinary Medicine; Department of Preclinical Sciences**
Faculty in charge:	**Faculty of Veterinary Medicine**
Objectives of the module:	During the course student acquires basic information in the field of veterinary toxicology, including prevention, diagnostics and treatment of animals' poisonings; risk assessment for animals, human and environment which results from environmental contamination, and eventually the knowledge how to react quickly and suitably to the possible emergencies and how to prevent them. Lecture content 1. General principles of toxicology: History and scope of toxicology; Basic definitions of toxicology (2 hours) 2. Poison definition. Poisons' classification. Legal regulations of poisons labelling and handling. (2 hours) 3. The relation between poison concentration, duration of exposure to z poison and the effect of its toxicity. Characterization of basic factors affecting the toxicity of xenobiotics (dependent on the chemical compound, affected organism & environmental conditions). (5 hours) 4. Toxicokinetics. ADME (absorption, distribution, metabolism & excretion of xenobiotics). Biotransformation processes vs. xenobiotics toxicity (6 hours) 5. Toxicodynamics. (2 hours) 6. Genotoxicity: mutagenicity, teratogenicity, cancerogenicity. Toxicometrics. Basic principles of the quantitative assessment of toxicity and the hazards of potentially toxic substances. Toxicometric parameters: NOAEL, LOAEL, ADI, TDI, TADI, MCL, MRL. (2 hours) 7. Toxicological significance of pesticides. General characteristics and classification of pesticides (toxicity classes, persistence in the environment, the assessment of the risk resulted from the exposure to pesticides); Toxicological significance of insecticides. (3 hours) 8. Detailed characteristics of natural and synthetic insecticides (pyrethroids, rotenoids, nicotin-derivates, polychlorinated hydrocarbons). (2 hours) 9. Detailed characteristics of synthetic insecticides (organophosphate and carbaminate); Toxicology of fungicides & herbicides. (2 hours) 10. General characteristics of mycotoxins. Antidotes applied in metals' and metalloids' intoxications. (2 hours) 11. Current challenges in toxicology. Course review. (2 hours) Laboratory classes and seminars content: 1.Introduction of the security principles valid in the toxicological laboratory; Basics of chemical diagnostics of poisonings, using the tissues of dead animals, drinking water and feed; Basics of toxicological information collection (anamnesis); Principles of collecting and sending samples for toxicological examination. (3 hours) 2. Basics of chemical diagnostics of poisonings (cont.); Rules of preparing laboratory accession sheet; Introduction of the methods of toxicants' isolation from biological material; Identification of isolated toxicants; Basics of intra vital laboratory diagnostic of acute and chronic poisonings in animals; Evaluation of toxic effect dependent on the intensity and duration of the exposure to a xenobiotic (3 hours) 3. Basics of chemical diagnostics of poisonings (cont.); Significance of enzymatic profile of the blood plasma in toxicological diagnostics; Estimation of the activity of aminotransferases (AST and ALT) in different tissues and in the blood plasma; Interpretation of the obtained results. (3 hours) 4. General principles of therapy of acute and chronical poisoning; Specific and nonspecific methods of treatment aimed at eliminating the toxicant from the digestive system and form the body; Methods of increasing the threshold of toxic effect and reducing the time of toxicant's acting. (3 hours) 5. General principles of therapy of acute and chronical poisoning; Identification of adsorbent activity of different preparation of activated charcoal and other adsorbents; Comparison of adsorbent effectiveness of different xenobiotics; Introduction of drugs and therapeutical methods applied as first aid in case of poisoning (3 hours) 6. Toxicity of nitrogen and its derivatives; Nitrate, nitrite and ammonium; Identification of nitrate and nitrite in the water and food (3 hours) 7. Toxicological significance of nitrosamines. Poisonings caused by organophosphate insecticides (sources, circumstances of exposure, species dependent sensitivity, toxicokinetics, toxicodynamics, mode of action, clinical signs, diagnostics, therapy) (3 hours) 8. Identification of cholinesterase activity in the blood plasma and erythrocytes in the presence of organophosphate insecticide. (3 hours) 9. Poisonings caused by metals and metalloids (seminar); Toxicity of cadmium, lead, mercury, chromium and arsenic (sources, circumstances of exposure, species dependent sensitivity, toxicokinetics, toxicodynamics, mode of action, clinical signs, diagnostics, therapy) – seminar prepared by students (3 hours)

	10. Detailed characterization of toxic gasses poisonings in animals. (3 hours). The content of the lectures supplements the content of the laboratory classes.
Teaching forms, number of hours:	a) Lectures; hours 30; b) Laboratory classes; hours 15; c) Seminars; hours 15;
Teaching methods:	• Original multimedia presentations prepared by academic teachers which link theoretical knowledge with practical aspects of veterinary profession • Disscusions initiated by the teachers • Students activities in the laboratory. Student joint small groups of 2-3 people to conduct toxicological analysis and interpretate the results. • Voloneers prepare oral presentation on one topic selected from a range of topics provided by theteacher. • Consultations (10 h in semester) Detailed schedule will be defined by the coordinator of the course at the beginning of semester. Detailed organization of consultations will be defined by the coordinator of the course at the beginning of semester.
Formal prerequisites and initial requirements:	Passing the courses: Animal Physiology, Biochemistry, Veterinary Pharmacology, Pathophysiology, Clinical and laboratory diagnostics.

Learning outcomes:	Knowledge Student: - knows basic toxicological definitions and dependences - knows and understands toxicokinetics and toxicodynamics principles - knows and describes the most frequent poisonings in different animal species, including their causes, clinical signs and pathomorhological manifestations - know and understands the principles of diagnostics and therapy of acute and chronic poisonings, including the knowledge on antidotes and rules of their applications	Skills Student: - is able to collect toxicological data, including environmental aspects - is able to select biological material for toxicological analysis and prepare it for laboratory delivery - is able to perform basic toxicological analysis and based on their interpretation conduct risk assessment - is able to design most suitable therapeutical protocol in acute and chronic poisoning - can elaborate a problem related to chemical impact on animal health and discuss it	Competences Studnet: - is prepared to make its mind in a situation of chemical hazard (decide about therapy protocols for affected animals and personal protective equipment for individuals involved) - is prepared to perform risk assessment resulting from exposure to chemical (risk for individual animal, group of animals and human health) and prevent such exposure - is prepared to analyze original literature - is ready to collaborate with other specialists to protect public health in regards to chemical risk

Assessment methods:	One written exam at the end of semester – 10 open questions (each for 5 points) To pass the exam one must obtain at least 51% of total number of points (at least 25.5 out of 50 points). Grading scale: | Number of points	Grade
0 – 25	2 (failed)
25.5 – 30	3 (sufficient)
30.5 – 35	3.5 (sufficient +)
35.5 – 40	4 (good)
40.5 – 45	4.5 (very good)
45.5 – 50	5 (excellent) | Failed test can be repeated once. No extra assessment methods are anticipated. In case of unforeseen, unusual circumstances mandatory remote teaching and remote assessment methods might be adopted.
Formal documentation of learning outcomes:	eHMS entry. Records collected in the course portfolio i.e. individual records of student results, presence lists, database of oral and written questions, written assessments of the students.
Elements impelling final grade:	Only student who were present in at least 80% of laboratory classes are allowed to take part in the final exam. Final grade is equal with the grade of the final exam. If the exam is passed the grade is raised by 0.5 for students who prepared the best seminar. The best seminar is selected by voting by all students of the group and the teacher.
Teaching base:	Lecture facilities and laboratories of the Institute of Veterinary Medicine

Mandatory and supportive materials :
1. Clinical Veterinary Toxicology, red. KH Plumlee, Mosby, 2003
2. Veterinary Toxicology, red. RC Gupta, Elsevier, 2007
3. Toxicology, red. GD Osweiler, Wiliams and Wilkins, 1996
4. Small Animal Toxicology, ME Peterson, PA Talcott,W. B. Saunders Company 2006
5. . Klaassen CD, Watkins JB III (red.). Casarett &Doull Podstawy Toksykologii, MedPharmPolska, 2014 (selected topics)
Relevant scientific publications, including those of the module coordinator.

ANNOTATIONS

Quantitative summary of the module:

Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module - base for quantifying ECTS:	**70 h**
Total ECTS points, accumulated by students during contact learning:	**2 ECTS**

Learning outcomes of the module relative to the learning outcomes of the subject:

Outcome category	Learning outcomes:	Learning outcomes relative to the course outcomes	Impact on the course of each outcomes
Knowledge -	knows basic toxicological definitions and dependences	A.W.10, A.W.11	1
		B.W.1	2
Knowledge -	knows and understands toxicokinetics and toxicodynamics principles	A.W.10, A.W.11	1
		B.W.1, B.W.2, B.W.3	1
Knowledge -	knows and describes the most frequent poisonings in different animal species, including their causes, clinical signs and pathomorhological manifestations	A.W.21, A.U.17	3
		B.W.1, B.W.2, B.W.3	1
Knowledge -	know and understands the principles of diagnostics and therapy of acute and chronic poisonings, including the knowledge on antidotes and rules of their applications	A.W.21	3
		A.W.16, B.W.4	2
Skills -	is able to collect toxicological data, including environmental aspects	A.U.12, A.U.13	1
		B.U.2	2
Skills -	is able to select biological material for toxicological analysis and prepare it for laboratory delivery	B.U.6, B.U.23	2
Skills -	is able to perform basic toxicological analysis and based on their interpretation conduct risk assessment	A.U.2	1
		A.U.17	3
		B.U.6, B.U.22	2
Skills -	is able to design most suitable therapeutical protocol in acute and chronic poisoning	B.U.13	2
Skills -	can elaborate a problem related to chemical impact on animal health and discuss it	A.U.13, A.U.15	1
Competences -	is prepared to make its mind in a situation of chemical hazard (decide about therapy protocols for affected animals and personal protective equipment for individuals involved)	K.S.1, K.S.5,	2
		K.S.10	1
Competences -	is prepared to perform risk assessment resulting from exposure to chemical (risk for individual animal, group of animals and human health) and prevent such exposure	K.S.1, K.S.5	2
Competences -	is prepared to analyze original literature	K.S.4, K.S.5	2
Competences -	is ready to collaborate with other specialists to protect public health in regards to chemical risk	KS.9, KS.11	2