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:	**Intake 2021/2022**	Catalogue number:	**FVM-JMSS-08S-B65_20**		

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: lek. wet. Urszula Latek, dr Łukasz Kiraga**
Objectives of the module:	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 poison labeling 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 resulting from pesticide exposure); Toxicological significance of insecticides. (3 hours) 8. Detailed characteristics of natural and synthetic insecticides (pyrethroids, rotenoids, nicotine-derivates, polychlorinated hydrocarbons). (2 hours) 9. Detailed characteristics of synthetic insecticides (organophosphate and carbamates); 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 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 diagnostics of poisonings (cont.); Rules of preparing laboratory accession sheet; Preparing forms for reporting samples for toxicological tests. Handling diagnostic material in the toxicology laboratory. Introduction of the methods of toxicants' isolation from biological material; 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 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 chronic poisoning; Specific and nonspecific methods of treatment aimed at eliminating the toxicant from the digestive system and 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 chronic poisoning; Identification of adsorbent activity of different preparations 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 (3 hours) 8. Acetylcholinesterase inhibitors poisoning (cont.) Mode of action, clinical symptoms, diagnosis, therapy. Determination of cholinesterase activity in blood, plasma and blood cells in the presence of an organophosphorus insecticide. (3 hours) 9. Selected topics in veterinary toxicology (seminar). Presentations of exemplary clinical cases. Poisoning with selected hepato-,nephro-,neuro- and cardiotoxic xenobiotics (sources and routes of exposure, animal species sensitivity, toxicokinetics, toxicodynamics, clinical symptoms, 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 27 c) Seminars; hours 3; d) Clinical laboratories; hours …; e) Field exercises; hours …;

Teaching methods:		Presentation of the selected topics in different forms, including student activity. Teaching methods involve analysis of original papers, finding solutions to presented problems during discussions based on information presented by a teacher, performing experiments corresponding to an introduced topic, group projects – and presenting seminars edited out by students. The course coordinator will define a detailed schedule at the beginning of the semester. At the beginning of the semester, the course coordinator will define the detailed organization of consultations.		
Formal prerequisites and initial requirements:		Animal physiology modules 1-2, Biochemistry modules 1-2, Veterinary pharmacology modules 1-2, Animal pathophysiology, Clinical and laboratory diagnostics modules 1-2 Students should know basic processes regarding animal physiology and biochemistry		
Learning effects		Course outcomes:	Learning outcomes relative to the course outcomes	Impact on the course outcomes*
Knowledge:	1	Student knows basic toxicological definitions and dependences	A.W.10, A.W.11 B.W.1	1 1 2
	2	Student knows and understands toxicokinetics and toxicodynamics principles	A.W.10, A.W.11 B.W.1, B.W.2, B.W.3	1 1 1 1
		Student knows and describes the most frequent poisonings in different animal species, including their causes, clinical signs, and pathomorphological manifestations	A.W.21, A.U.17 B.W.1, B.W.2, B.W.3	1 1 3
		Student knows and understands the principles of diagnostics and therapy of acute and chronic poisonings, including the knowledge of antidotes and rules of their applications	A.W.21 A.W.16, B.W.4	3 2
Skills:	1	Student is able to collect toxicological data, including environmental aspects	A.U.12, A.U.13 B.U.2	1 2
	2	Student is able to select biological material for toxicological analysis and prepare it for laboratory delivery	B.U.6, B.U.23	2
		Student is able to perform basic toxicological analysis and, based on their interpretation conduct risk assessment	A.U.2 A.U.17 B.U.6, B.U.22	1 3 2
		Student is able to design the most suitable therapeutical protocol for acute and chronic poisoning	B.U.13	2
		Student can elaborate on a problem related to chemical impact on animal health and discuss it	A.U.13, A.U.15	1
Competences:	1	Student is prepared to make up their minds 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 K.S.10	2 1
	2	Student is prepared to perform risk assessment resulting from exposure to chemicals (risk for an individual animal, group of animals, and human health) and prevent such exposure	K.S.1, K.S.5	2
		Student is prepared to analyze the original literature	K.S.4, K.S.5	2
		Student is ready to collaborate with other specialists to protect public health in regards to chemical risk	KS.9, KS.11	2
Objectives of the module required to obtain learning effects:		During the course, a student acquires basic information in the field of veterinary toxicology, including prevention, diagnostics, and treatment of animals' poisonings; risk assessment for animals, humans, and the environment that results from environmental contamination; and eventually, the knowledge of how to react quickly and suitably to the possible emergencies and how to prevent them.		
Assessment methods:		A written test will be given at the end of the course, and oral presentations will be assessed during seminars. In case of unforeseen, unusual circumstances, mandatory remote teaching and remote assessment methods might be adopted.		
Detail description of assessment methods; Formal documentation of learning outcome:		One written exam at the end of the semester – 15 multiple-choice questions (1 point per question) & 3 three open questions (3 x max. 5 points). To pass the exam, one must obtain at least 51% of the total points (at least 15.5 out of 30). Failed tests can be repeated once. The seminar is assessed during the presentation and generates 0-5 points. These additional points (0-5) are added to the score of the final assessment. No extra assessment methods are anticipated. Records collected in the course portfolio, i.e., individual records of student results, presence lists, database of oral and written questions, and written assessments of the students. Grade entry into the eHMS .		
Elements impelling final grade:		Final grade = result of the final assessment (max. 30 points) + result of the seminar presentation (max. 5 points) Grading scale: Score (points) – Grade 0 – 17.5 – 2 (failed) 18 – 21 – 3 (sufficient) 21.5 – 24.5 – 3.5 (sufficient +) 25 – 28 – 4 (good) 28.5 – 31.5 – 4.5 (very good) 32 – 35 – 5 (excellent)		

Teaching base:	Lecture hall of the Faculty of Veterinary Medicine, laboratories of the Division of Pharmacology and Toxicology
Mandatory and supportive materials : 1. Clinical Veterinary Toxicology, red. KH Plumlee, Mosby, 2004 2. Veterinary Toxicology, red. RC Gupta, Elsevier, 2018 (3rd Edition) 3. Blackwell's Five-Minute Veterinary Consult Clinical Companion: Small Animal Toxicology, 3rd Edition; red. Hovda et al., 2024 4. Small Animal Toxicology, ME Peterson, PA Talcott, W. B. Saunders Company 2012 (3rd Edition) Relevant scientific publications, including those of the module coordinator.	
ANNOTATIONS	

* 3 – complete and detailed, 2 – moderate, 1 – basic.

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:	**75 h**
Total ECTS points accumulated by students during contact learning:	**2 ECTS**