Module code	M_WE_SEM8 PW 1F/2F LAB TOKS
Field of study	Veterinary medicine
Module name, also the name in English	Toxicological Laboratory Analysis
	Laboratoryjna Analiza Toksykologiczna
Language of instruction	English
Module type	elective
Level of studies	Long-cycle master's degree studies
Form of study	Full-time
Year of study in the field of study	IV
Semester of study in the field of study	8
ECTS credits, divided into contact/non-contact hours	1 (0.52/0.48)
Academic title/degree, name of the person responsible for the module	Dr. Agnieszka Chałabis-Mazurek
Unit teaching the module	Department of Pharmacology, Toxicology and Environmental Protection
Module objective	The aim of the course is to master the basic knowledge and skills of the student with regard to the specifics and methodology of toxicological studies using modern methods and techniques for qualitative and quantitative identification of poisons in biological and environmental materials, selection of materials for toxicological testing, safety of work with the material sent to the toxicological laboratory, operations and processes related to the collection of test samples and samples for analyses, as well as preparation of samples for appropriate analysis, performance of toxicological analyses and assessment of the confidence in results and their interpretation.
The learning outcomes for the module include a description of the knowledge, skills and social competences that the student will gain after completing the module.	Knowledge:
	K1. The student knows the types and characteristics of materials for toxicological studies and the principles of storage and preparation of biological and environmental samples for analysis
	K2. The student knows the theoretical and methodological basis and applications of spectroscopic, electroanalytical, chromatographic and mass spectrometric techniques in the identification of toxic agents
	K3. The student knows both tools for monitoring and evaluation of analytical methods and principles of analytical method validation
	Skills:
	S1. The student is able to select and apply laboratory techniques related to the collection, preservation and preparation of specimens for toxicological analysis
	S2. The student can analyse and evaluate the usefulness and applicability of recent scientific advances in methods used for identification of toxic substances in biological and environmental materials

	S3. The student is able to apply instrumental analytical methods in toxicological diagnostics, use modern measuring devices and elaborate analysis results
	Social competences:
	C1. The student works both individually and in a team, adapting to perform various functions
	C2. The student assumes shared responsibility in the process of performing laboratory activities that affect co-workers
	C3. The student can formulate their own opinions, assumes responsibility for decisions taken, is aware of their consequences, especially those that affect human and animal health status
Prerequisites and additional requirements	
Module program content	Toxicological analysis and assessment: goals, directions, tasks, developments. Division of poisons. Types of test materials. Proceedings for toxicological analysis. Analytical division of poisons into groups. Analytical methods in toxicological analysis. Principles of selection of test materials. Collection, stabilisation and preservation of specimens for toxicological analysis. Analysis of volatile, gaseous, extractive, metallic and dialysis poisons. Methods used in the diagnostics of acute poisoning. Analysis of autopsy materials. Diagnostic utility of biological and environmental materials in clinical and forensic toxicology. Criteria for assessing the confidence in results.

List of core and supplementary literature	1. Robert J. Flanagan, Eva Cuypers, Hans H. Maurer, Robin Whelpton: Fundamentals of Analytical Toxicology: Clinical and Forensic. John Wiley & Sons, 2020. 2. G. Venkatesh Iyengar, K. S. Subramanian, Joost R.W. Woittiez: Element Analysis of Biological Samples: Principles and Practices, Volume II. CRC Press, 2020. 3. Sue Jickells, Adam Negrusz: Clarke's Analytical Forensic Toxicology. Pharmaceutical Press, 2008. 4. Claudio Minoia, Sergio Caroli: Applications of Zeeman Graphite Furnace Atomic Absorption Spectrometry in the Chemical Laboratory and in Toxicology. Elsevier, 2013. 5. John R. Dean: Environmental Trace Analysis: Techniques and Applications. John Wiley & Sons, 2013. 6. Roger Bertholf, Ruth Winecker: Chromatographic Methods in Clinical Chemistry and Toxicology. John Wiley & Sons, 2007. 7. Irena Baranowska: Handbook of Trace Analysis: Fundamentals and Applications. Springer, 2015. Supplementary literature: 1. Ramesh C. Gupta: Veterinary Toxicology: Basic and Clinical Principles. Academic Press, 2018. 2. Pascal Kintz, Alberto Salomone, Marco Vincenti: Hair Analysis in Clinical and Forensic Toxicology. Academic Press, 2015. 3. C. Kostakis, P. Harpas, P. Stockham: Liquid Chromatography: Chapter 10. Forensic Toxicology. Elsevier Inc. Chapters, 2013. 4. Barbara H. Stuart. Forensic Analytical Techniques. John Wiley & Sons, 2012. 5. John R. Dean: Extraction Techniques in Analytical Sciences. John Wiley & Sons, 2010. 6. Robert J. Flanagan, Andrew Taylor, Ian D. Watson, Robin Whelpton: Fundamentals of Analytical Toxicology. John Wiley & Sons, 2008.
Planned forms/activities/teaching methods	Teaching methods: lecture, multimedia presentations, demonstration, laboratory exercises, discussion

Verification methods and ways of documenting the achieved learning outcomes.	K - answers to questions at the beginning of all thematic laboratory classes, final written assessment in the form of an examination - grading scale according to the Book for Education Quality S - stand-alone performance of analyses, preparation of a report on the analyses performed, answers to questions at the beginning of all laboratory classes, C - answers to questions at the beginning of all laboratory classes.

ECTS credits	Number of contact hours ECTS
	• - participation in auditory - 2 hours, 0.06
	• - participation in laboratory classes - 13 hours. 0.43
	• - attendance for examination - 1 hour, 0.03
	
	Number of non-contact hours ECTS
	• - preparation for recitation section
	    and laboratory exercises – 6.5 hours, 0.22
	• drawing up a report on
	    laboratory exercises 7 hours. 0.23
	• preparation for examination -1 hour. 0.03

The workload of activities that requires direct participation of an academic teacher	- participation in recitation section and laboratory classes - 15 hours, - attendance for examination - 1 hour,
Relation of module learning outcomes to course learning outcomes.	K - A.W1, A.W11, AW12 ++ A.W6, A.W21+++ S – A.U2, A.U6, A.U21, A.U23+++ A.U22++ C – K1, K5 +++ K8, K9++
Elements and values affecting the final grade	Written examination - 80% Performance of analyses - 20%