

Subject card

Subject name and code	Chemicals in Agriculture, PG_00051354						
Field of study	Chemistry						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	Bachelor's studies	Subject group			Obligatory subject group in the field of study		
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			2.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Department of Environmental Analysis -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Łukasz Haliński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		5.0		15.0	50
Subject objectives	<ol style="list-style-type: none"> To provide students with the information on the use of artificial and natural fertilizers. To familiarize students with the basic veterinary drugs used in animal husbandry and their effects on the environment and human health. To familiarize students with the basic knowledge of the physicochemical properties of pesticides, their mechanisms of action, toxicity and detoxification in organisms. To introduce students to the basics of analytics of soils, fertilizers and plant protection products. To develop the ability to independently evaluate the effects of chemical compounds in agriculture. 						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	Students understand the need for further education in the chemistry and analytics of substances used in agriculture.	[SK4] test/exam - oral or written
	[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	Students are able to identify the main threats to humans and the environment, associated with the chemization of agriculture, and suggest ways to reduce them.	[SU4] test/exam - oral or written
	[CHEML3_W10] Enumerates and describes the basic aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences.	Students know the basic principles of soil analysis and the analytics of pesticides and veterinary drugs in food, and demonstrates the ability to propose simple procedures for the analyst of soils and plant protection products.	[SW4] test/exam - oral or written
	[CHEML3_W07] Understands and describes physicochemical patterns, phenomena and processes using the language of mathematics.	Students know the basic chemical processes occurring in the soil, understand the basic mechanisms of action of pesticides and know their physicochemical properties, and can indicate the possible toxic effects of pesticides and veterinary drugs.	[SW4] test/exam - oral or written
	[CHEML3_K06] Raises her/his professional and personal competences by using information provided in various sources.	Students demonstrate the ability to independently find the necessary data in the scientific and popular literature.	[SK1] oral statement/conversation/discussion
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	Students know the basic principles of soil analysis and the analytics of pesticides and veterinary drugs in food, and demonstrates the ability to propose simple procedures for the analyst of soils and plant protection products.	[SW4] test/exam - oral or written
	[CHEML3_K08] Formulates opinions in the field of science with caution and criticism in their expression.	Students demonstrate a critical approach to the information contained in the professional and popular literature.	[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written
	[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Student is able to evaluate the environmental fate of the chemicals used commonly in the agriculture and their impact on organisms in an unassisted way.	[SU4] test/exam - oral or written
Subject contents	Chemical compounds used in a modern agriculture. Principles of soil science and soil analysis. Basic physicochemical processes in soils. Introduction to toxicology and ecotoxicology. Usage and environmental effects of organic and mineral fertilizers. Veterinary pharmaceuticals in animal husbandry: groups of compounds and their impact on the environment and human health. Classification of pesticides basing on their function, chemical structure and physicochemical properties. Pesticide usage in Poland and worldwide. Pesticide toxicity to humans and other organisms. Plant resistance to pesticides. Environmental fate of pesticides. Natural pesticides and integrated pest management (IPM). Pesticides in food and their effects on human health. Chemical analysis of pesticides, fertilizers and veterinary pharmaceuticals in natural matrices.		
Prerequisites and co-requisites	Completed or ongoing courses: general biology, general chemistry, organic chemistry. Knowledge of the basics of general biology, general chemistry, organic chemistry, as well as knowledge of the basics of chemical analysis methods.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written test (120 min)	51.0%	100.0%
Recommended reading	<p>Basic literature</p> <p>Stenersen, J. Chemical Pesticides: Mode of Action and Toxicology, CRC Press, Boca Raton, 2004.</p> <p>Biziuk M. (red.) Pestycydy-występowanie, oznaczanie i unieszkodliwianie, WNT, Warszawa, 2001.</p> <p>Witkiewicz Z. Podstawy chromatografii, Wydawnictwa Naukowo-Techniczne, Warszawa, 2005.</p> <p>Krzywy-Gawrońska E. Analiza chemiczna gleb, nawozów i roślin, Wydawnictwo Naukowe Akademii Rolniczej, Szczecin, 2007.</p>		

	Supplementary literature	<p>Andrews J.E., Brimblecombe P., Jickells T.D., Liss P.S. Wprowadzenie do chemii środowiska, WNT, Warszawa, 2000.</p> <p>Van Loon G.W., Duffy S.J. Chemia środowiska, PWN, Warszawa, 2008.</p> <p>Namieśnik i in. Przygotowanie próbek środowiskowych do analizy, WNT, W-wa, 2000.</p> <p>White-Stevens R. (red.) Pestycydy w środowisku, PWRiL, Warszawa, 1977.</p> <p>Harborne L.B. Ekologia biochemiczna, Wydawnictwo Naukowe PWN, Warszawa, 1997.</p> <p>Myślińska E. Grunty organiczne i laboratoryjne metody ich badania, Wydawnictwo Naukowe PWN, Warszawa, 2001.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Compare the toxicity of chemical compounds based on the LD50 values given. 2. Indicate the advantages and disadvantages of using selected pesticides. 3. Briefly describe the forms of nitrogen that are bioavailable to plants. 	
Work placement	Not applicable	

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