

Course title Chemia w rolnictwie / Chemistry in agriculture		ECTS code 13.3.0530	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	
Teaching staff Łukasz Haliński, PhD			
Forms of classes, the realization and number of hours		ECTS credits 2	
A. Forms of classes, in accordance with the UG Rector’s regulations lecture		classes - 30 h tutorial classes – 5 h student’s own work – 15 h Total: 50 h - 2 ECTS	
B. The realization of activities in-class learning			
C. Number of hours 30 h lecture			
The academic cycle Second year, winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lecture with multimedia presentation		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations course completion (with a grade)	
		B. Assessment methods Exam with open and closed questions	
		C. The basic criteria for evaluation or exam requirements • pass the exam with open and closed questions 91-100%: 5.0 81-90%: 4.5 71-80%: 4.0 61-70%: 3.5 51-60%: 3.0 Less than 51% 2.0	
Required courses and introductory requirements General biology, basic chemistry, organic chemistry Knowledge on principles of general biology, basic chemistry and organic chemistry; basic skills in chemical analysis.			
Aims of education • To familiarize students with all topics given in section “Course contents” • To provide them information on the use of organic and mineral fertilizers • To familiarize students with the most important groups of pharmaceuticals used in animal husbandry and their effects on the environment and human health • To make students familiar with physiochemical properties of pesticides, their modes of action, toxicity and detoxification in organisms • To introduce students to the principles of the soil, fertilizer and pesticide analysis • To prepare students for unassisted evaluation of effects associated with using chemicals in agriculture			

Course contents

Chemical compounds used in a modern agriculture. Principles of soil science and soil analysis. Basic physiochemical 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 physiochemical 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.

Bibliography of literature

A. Literature required to pass the course

Stenersen, J. Chemical Pesticides: Mode of Action and Toxicology, CRC Press, Boca Raton, 2004.

Biziuk M. (red.) Pestycydy-występowanie, oznaczanie i unieszkodliwianie, WNT, Warszawa, 2001.

Witkiewicz Z. Podstawy chromatografii, Wydawnictwa Naukowo-Techniczne, Warszawa, 2005.

Krzywy-Gawrońska E. Analiza chemiczna gleb, nawozów i roślin, Wydawnictwo Naukowe Akademii Rolniczej, Szczecin, 2007.

B. Extracurricular readings

Szczepaniak W. Metody instrumentalne w analizie chemicznej, Wydawnictwo Naukowe PWN, Warszawa, 2002.

Biziuk M. (red.) Pestycydy-występowanie, oznaczanie i unieszkodliwianie, WNT, Warszawa, 2001.

Andrews J.E., Brimblecombe P., Jickells T.D., Liss P.S. Wprowadzenie do chemii środowiska, WNT, Warszawa, 2000.

Van Loon G.W., Duffy S.J. Chemia środowiska, PWN, Warszawa, 2008.

Namieśnik i in. Przygotowanie próbek środowiskowych do analizy, WNT, W-wa, 2000.

White-Stevens R. (red.) Pestycydy w środowisku, PWRiL, Warszawa, 1977.

Harborne L.B. Ekologia biochemiczna, Wydawnictwo Naukowe PWN, Warszawa, 1997.

Myślińska E. Grunty organiczne i laboratoryjne metody ich badania, Wydawnictwo Naukowe PWN, Warszawa, 2001.

Knowledge

1. Student knows basic chemical processes in soils and recognizes the most important classes of chemicals used in agriculture.
2. Student is able to identify basic hazards associated with the use of chemical substances in agriculture.
3. Student understands main modes of action of pesticides and knows their physiochemical properties.
4. Student has knowledge on toxicity of pesticides and veterinary pharmaceuticals and is able to identify the danger associated with their usage for humans and other organisms.
5. Student knows the principles of the soil analysis and the chemical analysis of pesticides and veterinary pharmaceuticals in food.

Skills

1. 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.
2. Student has basic skills in searching data in literature.
3. Student is able to identify main advantages and disadvantages of using pesticides, veterinary pharmaceuticals and fertilizers.
4. Student is able to plan and perform simple analytical experiments in the field of soil analysis and pesticide analysis..

Social competence

1. Student understands the need to acquire knowledge on chemistry and the analysis of chemicals used in agriculture.
2. Student is able to critically evaluate the data given in popular and scientific literature.
3. Student can knowingly assess the effects of human activity on the environment and food security.
4. Student is able to form an opinion on advantages and disadvantages of pesticide, fertilizer and veterinary pharmaceutical usage in agriculture, basing on the knowledge gained and the data found in literature.