Course name: Ecotoxicology

ECTS	4
Course status	*optional, obligatory*
Course final assessment /evaluation of outcomes	*exam*
Prerequisite	-

Main field of study:

Educational profile	General academic
Code of studies and education level	Bacheler
Semester of studies	winter
Language of instruction	English

Course offered by:

Name of faculty offering the course	Faculty of Agriculture and Economics
Name of department offering the course	Department of Agriculture and Environmental Chemistry
Course coordinator	Agnieszka Baran

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands			
ECO_W1	Identify toxic substances in the environment and their fate in the environment	OŚ1_WO1, OŚ1_WO2	RR
ECO_W2	Integrate knowledge from different disciplines in order to understand the toxicity of chemicals	OŚ1_WO5, OŚ1_WO6 OŚ1_WO7, OŚ1_WO8 OŚ1_WO11	TZ
SKILLS – student is able to			
ECO_U1	Identify toxic substances in the environment and their fate in the environment	OŚ1_UO3, OŚ1_UO11	RR
ECO_U2	Integrate knowledge from different disciplines in order to understand the toxicity of chemicals	OŚ1_UO4, OŚ1_UO5, OŚ1_UO6	TZ
ECO_U3	Estimate the health risks associated with exposure to xenobiotics in the environment	OŚ1_UO6, OŚ1_UO11	TZ
SOCIAL COMPETENCIES – student is ready to:			
ECO_K1	Organize the work in a small team in order to perform exercises	OŚ1_KO3 OŚ2_KO4	RR

Teaching contents

	Lectures	15 hours
Topics	1. Ecotoxicology as an interdisciplinary science. The basic terms of ecotoxicology: xenobiotic, harmful chemical, pollutant, poison, toxicology, bioassays, biomarkers and biosensors. 2. Fate of toxic substances in the ecosystem (toxic substances and their division, toxic substances routes, bioaccumulation and biomagnifications coefficients). 3. The effect of physicochemical factors in the environment on the interactions between toxic substances (synergism, addictiveness, compensation). 4. Fate of toxic substances in living organism. Methods of detoxication.	

	5. Health and Ecological Risk Assessment
Accomplished learning outcomes	ECO_W1, ECO-W2
Means of verification, rules and criteria of assessment	*Written exam (50% of the final evaluation)* *A percentage scale for the assessment of learning outcomes has been adopted, defined as follows:* *1. unsatisfactory grade (2.0): it is given if, in the scope of at least one of the three components (W, U or K) of the subject learning outcomes, the student achieves less than 50% of the applicable outcomes for the given component.* *A satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K). 3.* *3) Above satisfactory grade (3.5): awarded on the basis of the arithmetic mean of the three component learning outcomes (W, U or K) (average 61- 70%).* *4 A similar way of calculating grades as presented in para. 3 is adopted for grades of good (4.0 - average 71-80%), above good (4.5 - average 81-90%) and very good (5.0 - average >90%).* *NOTE: The course tutor, based on the student's mastery of the applicable curriculum content of a given subject and based on his/her own teaching experience, formulates the grade using the formal criteria given above.*
Classes:	35 hours
Topics	1. Dose-response relationships. Quantitative indices of toxic effects assessment. Computing of LD50 on the basis of experimental data 2. Assessment of toxicity of soil and bottom sediment contaminated with heavy metals for plants – Phytotoxkit test 3. Assessment of concentration of heavy metal in soil and plants – calculation of Bioaccumulation Coefficient 4. Assessment of toxicity of freshwater using the crustacean Daphnia magna 5. Toxicity of natural substance – Assessment of oxalates concentration in selected stimulants (coffee, tea) 6. Toxicity of salt – Assessment of chloride concentration in food (bread). 7. Toxicity of mercury – Assessment of mercury concentration in fish.
Accomplished learning outcomes	ECO_U1, ECO_U2, ECO_U3, ECO_K1
Means of verification, rules and criteria of assessment	*The calculations performed and activities undertaken during the class will be assessed based on:* *- the correctness of the analyses and calculations, the ability to use source materials and the way in which the results are interpreted).* *The percentage scale of learning outcomes is adopted as for lectures.* *NOTE: The lecturer, on the basis of the degree of mastering by the student of the binding programme contents of the given subject, based on his/her own teaching experience, formulates the evaluation using the formal criteria given above.*

References:

Basic	1. Baran A., Kołton A. 2015. Ecotoxicology. w: Agroecology, Ropek D. (red.), 2014, Publishing House of the University of Agriculture, ISBN 978-83-64758-06-5, 117-130. 2. Walker C.H, Hopkin P., Silby R.M., Peakall D.B. Principles of Ecotoxicology. Taylor&Francis, 2000. 3. Begom G.(red). Ecotoxicology. InTech, 20121.

	4. Williams P.L, James R.C, Roberts SM. Principles of Toxicology. Environmental and Industrial Application. John Wiley & Sons, 2000
Supplementary	1. Baran A., Tarnawski M. 2013, Phytotoxkit/Phytotestkit and Microtox® as tools for toxicity assessment of sediments, Ecotoxicology and Environmental Safety, 98, 19-27 2. Baran A. et al. 2020. An assessment of the concentrations of PCDDs/Fs in contaminated bottom sediments and their sources and ecological risk, Journal of Soils and Sediments, 20, 6, 2588-2597. 3. Skic K., Boguta P., Klimkowicz-Pawlas A., Ukalska-Jaruga A., Baran A. 2023, Effect of sorption properties on the content, ecotoxicity, and bioaccumulation of polycyclic aromatic hydrocarbons (PAHs) in bottom sediments, Journal of Hazardous Materials, 442, 130073.

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	3 ECTS **
Area of academic study: T – technological sciences	1 ECTS**

Structure of student activity

Contact hours		45	hrs.	4	ECTS**
Including:	lectures	15	hrs.		
	classes and seminars	35	hrs.		
	consultations	…	hrs.		
	participation in research	…	hrs.		
	obligatory traineeships	…	hrs.		
	participation in examination	…	hrs.		
e-learning		…	hrs.	1.8	ECTS**
student own work		55	hrs.	2.2	ECTS**

*Areas of academic study in the fields of: H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport and health sciences; R – Agricultural, forestry and veterinary sciences; A – the arts ** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes