Course name: Agroecology and Environmental Protection

ECTS	4
Course status	*optional*
Course final assessment /evaluation of outcomes	credit for evaluation
Prerequisite	non

Main field of study:

Educational profile	general academic
Code of studies and education level	bachelor
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	Agroecology and Plant Production
Course coordinator	Agnieszka Synowiec, 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			
AEP_W1	knows inanimate elements and the consequences of their influence on the conditions of organisms and the possibilities of their regulation in agricultural production	RO1_W10 RO1_W18	*RR*
AEP_W2	knows the relationships between populations in the biocenosis of an agricultural field		
AEP_W3	the main threats to the environment resulting from human economic and business activities,		
AEP_W4	the most important legal regulations concerning environmental protection		
SKILLS – student is able to			
AEP_U1	apply in practice autecological and synecological methods of habitat valuation using plants as bioindicators	RO1_U08 RO1_U07 RO1_U06	RR
AEP_U2	Use basic methods in agricultural research to assess the number and density of plant, animal and microbiome populations and to assess the primary production of agrocenosis		
AEP_U3	identify pollutions in the environment		
AEP_U4	integrate knowledge from different disciplines to understand the principles of environmental sustainability		
SOCIAL COMPETENCIES – student is ready to:			
AEP_K1	take responsibility for the state of the environment and understand the need to protect it,	RO1_K06 RO1_K07 RO1_K08 RO1_K02	*RR*
AEP_K2	work in small teams to accomplish specific tasks		
AEP_K3	to continuously update their knowledge in relation to technological progress and legislative change		

Teaching contents

Lectures	**15 hours**

Topics	Basic concepts and some issues from agroecological research Abiotic factors, their influence on the components of agrocenoses and possible regulation Biotic factors, their influence on the components of agrocenoses and the habitat of crop plants; autotrophs and heterotrophs - their importance for the agroecosystem Biocenosis - structures ensuring the functioning of the system The most important difference between natural biocenoses and agrocenoses and the ecological and environmental consequences of human interference in the agroecosystem Introduction to some issues of environmental protection; legal regulations concerning environmental protection Physical, chemical and microbiological pollution of atmospheric air. Noise and vibrations Water pollution and sewage in the environment Waste disposal Devastation and degradation of soils, chemical pollutants in soil, types and sources of pollution.
Accomplished learning outcomes	AEP_W1, AEP_W2, AEP_W3, AEP_W4
Means of verification, rules and criteria of assessment	*Test (1st and 2nd semester) and descriptive study (3rd semester).* *Grade E (2.0) <60* *Grade D (3.0) 60-69* *Grade C (3.5) 70-79* *Grade B (4.0) 80-89* *Grade B + (4.5) 90-94* *Grade A (5.0)> 95* *NOTE: The teacher conducting the classes formulates the grade based on how well the student has mastered the curriculum of the subject based on his/her own teaching experience and using the above-mentioned formal criteria.*

Classes:	**30 hours (15 labs)**
Topics	1. Project of valuation of agricultural habitats using bioindication methods - methodological assumptions for individual valuation projects based on the use of ecological tolerance of species in bioindication - autecological and synecological methods 2. Methods for assessing the number and density of plant, animal and microbial populations and their application in agroecology - tasks based on the adopted assumptions. 3. Productivity (e.g. primary production) of natural ecosystems and agroecosystems – tasks based on the selected data. 4. Estimation of air quality index from air quality monitoring data, health risk analysis 5. Determination of nitrate (V) in foodstuffs 6. Determination of COD in water and wastewater by manganese method 7. Determination of heavy metals in soil, estimation of contamination rates. Calculation of remediation efficiency. 8. Analysis of acidification and salinisation of soils/water. 9. Determination of soil capacity for phosphate sorption
Accomplished learning outcomes	AEP_U1, AEP_U2, AEP_U3, AEP_U4, AEP_K1, AEP_K2, AEP_K3
Means of verification, rules and criteria of assessment	*Calculations performed and actions taken during classes will be assessed based on:* *correctness of performing analyses and calculations, ability to use source materials and the way of interpreting results).* *Final grade: arithmetic mean of grades from exercises and lectures.* *Grades:* *E (2.0): given if the student obtains less than 60% of the required effects for at least one of the three elements (knowledge, skills, competences)*

	D (3.0): given if the student obtains at least 60% of the required effects for each of the three elements (knowledge, skills, social competences) *C (3.5): given based on the arithmetic mean of the three components (knowledge, skills, social competences) of the subject educational effects* *B (4.0 - average 80-89%),* *B + (4.5 - average 90-95%)* *A (5.0 - average> 95%).*

References:

Basic	Gliesman 2007. Agroecology. The ecology of Sustainable Food Systems. VanLoon G.W., Duffy S. J. 2001. Environmental chemistry. A global perspective. Oxford University Press, Oxford. Current environmental protection statistical data for Poland and European Union (source: Central Statistical Office and Eurostat).
Supplementary	Sánchez-Moreiras, A. M., Vieites-Álvarez, Y., Calviño, D. F., Campillo, C., Gonzalez-de-Santos, P., Silva, T. R., Synowiec A., … & Piron, L. 2024. Estrategias agroecológicas para el manejo sostenible de malas hierbas en cultivos europeos de relevancia económica (AGROSUS). Revista de Ciências Agrárias, 47(1), 107-112. Wieczorek J., Baran A., Bubak A. 2023, Mobility, bioaccumulation in plants, and risk assessment of metals in soils. Science of the Total Environment, 882, 163574, Wieczorek J., Baran A. 2022. Pollution indices and biotests as useful tools for the evaluation of the degree of soil contamination by trace elements. Journal of Soils and Sediments 22, 559–576 Wieczorek J., Baran A., Pawlik E., Mądro I., Gąsienica A., Wojtaszek I., Antonkiewicz J. 2021, Assessment of the health risk associated with exposure to heavy metals present in particulate matter deposition in the Małopolska Province, Geology Geophysics and Environment, 47, 2, 95-107

Structure of learning outcomes

Area of academic study: RR	4	ECTS

Structure of student activity

Contact hours		48	hrs.	1.9	ECTS**
Including:	lectures	15	hrs.		
	classes and seminars	30	hrs.		
	consultations	2	hrs.		
	participation in research		hrs.		
	obligatory traineeships		hrs.		
	participation in examination	1	hrs.		
e-learning			hrs.		ECTS**
student own work		52	hrs.	2.1	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