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_W01	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	*R*
AEP_W02	knows the relationships between populations in the biocenosis of an agricultural field		
AEP_W03	the main threats to the environment resulting from human economic and business activities,		
AEP_W04	the most important legal regulations concerning environmental protection		
SKILLS – student is able to			
AEP_U01	apply in practice autecological and synecological methods of habitat valuation using plants as bioindicators	RO1_U08 RO1_U07 RO1_U06	R
AEP_U02	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_U03	identify pollutions in the environment		
AEP_U04	integrate knowledge from different disciplines to understand the principles of environmental sustainability		
SOCIAL COMPETENCIES – student is ready to:			
AEP_K01	take responsibility for the state of the environment and understand the need to protect it,	RO1_K06 RO1_K07 RO1_K08 RO1_K02	*R*
AEP_K02	work in small teams to accomplish specific tasks		
AEP_K03	to continuously update their knowledge in relation to technological progress and legislative change		

Teaching contents

Lectures	**15 hours**

Topics	1. Basic concepts and the subject of research in ecology and agroecology 2. Abiotic factors of the habitat, their influence on organisms and possibilities of their regulation in the agroecosystem 3. Biotic factors and their influence on organisms in the agrocenosis 4. Ecosystem services 5. Introduction to some environmental issues; environmental regulations, global issues and challenges 6. Water pollution and waste water in the environment 7. Soil devastation and degradation, chemical contaminants in soil, types and sources of pollution
Accomplished learning outcomes	AEP_W01, AEP_W02, AEP_W03, AEP_W04, AEP_K01, AEP_K02
Means of verification, rules and criteria of assessment	*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:	**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_U01, AEP_U02, AEP_U03, AEP_U04, AEP_W02
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	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 Kliszcz A., Puła J. 2020. The change of pH value and *Octolasion cyaneum* Savigny earthworms' activity under stubble crops after spring triticale continuous cultivation. Soil Systems, 4(3), 39. https://doi.org/10.3390/soilsystems4030039

Structure of learning outcomes

Area of academic study	4	ECTS

Structure of student activity

Contact hours		45	hrs.	1.8	ECTS
Including:	lectures	15	hrs.		
	classes and seminars	30	hrs.		
	consultations		hrs.		
	participation in research		hrs.		
	obligatory traineeships		hrs.		
	participation in examination		hrs.		
e-learning			hrs.		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