

Course code:

Plan position:

A. INFORMATION ABOUT THE COURSE

B. Basic information

Name of course	Soil protection and remediation
Field of studies	
Level of studies	First degree
Profile of studies	Academic
Form of studies	Stationary
Specialty	All
Unit responsible for the field of studies	Faculty of Agriculture and Biotechnology
Name and academic degree of teacher(s)	prof. dr hab. inż. Mirosław Kobierski dr inż. Piotr Wojewódzki
Introductory courses	
Introductory requirements	basic knowledge of soil science and chemistry

C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
	13	2	20				7

2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
KNOWLEDGE			
W1	Student knows and understands the mechanisms and processes of soil formation and their physical, chemical properties. He knows the environmental factors influencing the protection of soils, their agrotechnical usefulness and the basic methods and tools used in their determination.	K_W04	P6S_WK
W2	Student has an extensive knowledge in the field of soil protection and remediation methods in connection with the requirements of agricultural crops. He knows the sources of soil pollution. He knows the tools and materials used in soil analysis.	K_W08	P6S_WG
SKILLS			

U1	He can use the measurement techniques used in the protection and reclamation of soils. He has the ability to design elements and all technologies in the field of environmental protection, especially agricultural. He can apply the basic methods of analysis of physical, physico-chemical and chemical properties of soils and carry out the interpretation of the determined results (texture, pH, content of humus, carbonates, sorption properties, density). He can mark and understand the importance of humus and clay minerals in the soil.	K_U07	P6S_UW P6S_UW
U2	He knows and is able to identify waste generated in agricultural and industrial production and is able to identify techniques to minimize their environmental impact. Students knows soil reclamation methods.	K_U08	P6S_UW
SOCIAL COMPETENCES			
K1	Students knows the problem of the degradation of the natural environment, including soils and methods of its reclamation, related to the diversity of factors affecting the environment. Student is aware of the complexity and multifactor of the soil environment, is aware of the risk of changes introduced in it. At the same time, he is convinced of the necessity to run agricultural activity and its optimization taking into account both care for the production volume and the condition of the environment. He is persistent and diligent; he can work independently and be part of a team or organize it. Is prepared to carry out work related to the assessment of the condition of the soil environment and solving problems limiting the rate and size of plant production caused by disturbances in this environment.	K_K01	P6S_KK

3. TEACHING METHODS

A. Traditional methods used ***

multimedia lecture, laboratory exercises

B. Distance learning methods used ***

Synchronous method (classes conducted in a way that ensures direct interaction between the student and the teacher in real time, enabling immediate flow of information, the method can be used only if it is provided for in the study plan for a given cycle of education):

e.g. remote lecture in the form of videoconference, remote discussion, etc.

Asynchronous method used as an auxiliary (a method that does not ensure direct interaction between the student and the teacher in real time, used only as an auxiliary / complementary method):

e.g. online educational videos, online multimedia presentations, etc.

4. METHODS OF EXAMINATION

Written examination of the knowledge – test

5. SCOPE

Lectures	Soil vulnerability to degradation, natural and anthropogenic changes in soil cover; erosion; biological degradation; physical degradation of soils; chemical pollution; behavior of inorganic contaminants in soils; heavy metals; soil salinity, radionuclides in soils, soils as organic waste disposal sites, physicochemical and chemical methods of soil remediation, microorganisms involved in soil decontamination, phytoextraction, soil quality indicators, monitoring of changes in the soil environment. Soil structure and its compaction. Sewage sludge management.
Laboratories	Laboratory equipment. Determination of pH and electric conductivity. Soil vulnerability to contamination with heavy metals – determination of zinc and copper sorption and desorption. Determination of the content of metals available to plants. Salinity of soils. Organic matter in soils. Sorption phenomena in soils. Basic physical and chemical soil properties in contaminated and noncontaminated soils. Buffer properties of soils. Recultivation of chemical contaminated soils using zeolite and peat. Recultivation of acid soils – assessment of lime application effectiveness. Recultivation of saline soils. Relationship between contaminated soil and plant in the aspect of food and feeding stuff production. Soil vulnerability on degradation and contamination in aspect of its composition. Bulk density and packing density (compactness). Degradation of soil structure compaction and erosion. Legal regulations on sewage sludge recovery – R10 (agricultural use).

6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Form of assessment					
	Oral examination	Written exam	Colloquium	Project	Presentation	Test Written
W1					x	x
W2					x	x
U1						x
U2						x
K1						x
K2						x

7. LITERATURE

Basic literature	<ol style="list-style-type: none"> 1. Auerwald K., Stanjek H., Bigham J.M., 1997. 2. Soils and environment. Catena Verlag GMBH. Alloway B.J., 1998. Chemical principles of environmental pollution. Stanley Thores Publishers Ltd. 3. Marcel van der Perk 2006: Soil and water contamination. Taylor & Francis Group plc, London, UK 4. Luthy R.G. 2003. Bioavailability of contaminants in soils and sediments. The national academies press, Washington, D.C.
------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<p>5. Wet sieving apparatus. Manual. Eijkelkamp 2018-7</p> <p>6. Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture</p>
Supplementary literature	<p>1. Brevik E.C., Burges L.C., 2013: Soils and human health. Taylor & Francis Group, LLC</p> <p>2. Kabata-Pendias A., Pendias H., 2004. Biogeochemistry of trace elements. Boca Raton, USA</p>

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	35
	Supervision hours	10
Student's own work	Preparation for classes	60
	Reading assignments	20
	Other (preparation for exams, tests, carrying out a project etc)	30
Total student workload		155
Number of ECTS points		7