



Subject card

Subject name and code	Environmental remediation technologies, PG_00057694						
Field of study	Technologie remediacji środowiska						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Anna Zielińska-Jurek				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		5.0		35.0	100
Subject objectives	The soil remediation methods will be studied during the lectures and laboratories, depending on the type of contamination and the planned remediation technology. In detail, the students will become familiar with the main sources of soil contamination and the properties of three basic groups of soil pollutants, i.e., petroleum substances, pesticides, and heavy metals. During lectures and practical classes in the laboratory, they learn about physicochemical, biological and thermal methods used to remove contaminants from the soil matrice.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	the student can classify environmental pollutants, assess their impact on living organisms and take action to prevent the migration of pollutants into the environment. The student can select a method soil treatment to the type of contamination and assess the costs associated with the use of a given remediation method.	[SW1] Ocena wiedzy faktograficznej [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
	[K6_U02] is able to operate equipment and perform typical analyzes of studies of environmental pollution, is able to carry out an analysis of typical environmental pollution and simple devices according to specification	knowledge in the field of soil and land remediation technologies	[SU1] Ocena realizacji zadania [SU2] Ocena umiejętności analizy informacji [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU4] Ocena umiejętności korzystania z metod i narzędzi
	[K6_W04] is aware of the importance of environmental protection and has a basic knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors, has a basic knowledge of knowledge of the principles of sustainable development as well as national and European environmental management conditions.	knowledge of soil and land remediation methods using physicochemical, biological, thermal and chemical methods	[SW1] Ocena wiedzy faktograficznej [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
	[K6_K05] is ready to initiate actions for public interest, preparation of social projects (economic, civil, political).	When solving a given problem, student is aware of the non-technical (ethical, scientific and social) consequences of the proposed solutions	[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce

Subject contents	Course content – lecture Sources and types of soil contamination.		
	Characteristics of pollutants: pesticides, heavy metals, radionuclides, pharmaceuticals		
	The characteristics of the soil. Soil sorption: mechanical, physical, chemical and biological. Spreading harmful substances into the environment.		
	Soil reclamation - definitions and basic tasks of the process. Classification of soil remediation methods.		
	Physico-chemical methods of soil reclamation in ex-situ conditions		
	Physico-chemical methods of soil reclamation in in-situ conditions.		
	Advanced oxidation processes		
	Biological methods of soil reclamation used in ex-situ and in-situ conditions		
	Thermal methods of soil reclamation in in-situ and ex-situ conditions		
	Course content – laboratory Remediation of soils contaminated with heavy metals		
	Remediation of oil-contaminated soils		
	Surfactants in soil remediation		
Cation mobility in soil			
Photocatalytic reduction of chromium VI ions			
Area remediation after aggregate extraction			
Prerequisites and co-requisites	Knowledge of basic issues in inorganic, organic and analytical chemistry.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	zaliczenie ćwiczeń (wszystkich)	60.0%	40.0%
	zaliczenie (dwa kolokwia w trakcie semestru, obydwa muszą być zaliczone)	60.0%	60.0%
Recommended reading	Basic literature	1. Zaleska A., Zielińska-Jurek A., Technologie remediacji gruntów. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2013 2. Kowalik P., Ochrona środowiska glebowego, PWN, Warszawa, 2001. 3. Zadroga B., Olańczuk-Neyman K., Ochrona i rekultywacja podłoża gruntowego, Wydawnictwo Politechniki Gdańskiej, 2001.	
	Supplementary literature	publications from Elsevier database.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Classification of pollutants		
	Methods of soil remediation contaminated with heavy metals		
	Methods of soil remediation contaminated with petroleum substances		
	Methods of soil remediation contaminated with pesticides		
	Scheme of procedure for determining the scope of recultivation of contaminated soil		
Practical activities within the subject	Not applicable		

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