GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Environmental remediation technologies, PG_00057694		
Field of study	Green Technologies		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	mgr inż. Anna Grzegórska prof. dr hab. inż. Anna Zielińska-Jurek	

Lesson types and methods of instruction	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_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] Assessment of ability to solve problems that arise in practice
[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] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[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] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

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

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 (dwa kolokwia w trakcie semestru, obydwa muszą być zaliczone)	60.0%	60.0%
zaliczenie ćwiczeń (wszystkich)	60.0%	40.0%

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	Adresy na platformie eNauczanie: Technologie remediacji środowiska - Moodle ID: 45738 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=45738
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	
Work placement	Not applicable	

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