



Subject card

Subject name and code	Groundwater and Soil Protection, PG_00038246						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Optional subject group 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	1	Language of instruction			English		
Semester of study	1	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Geotechnics, Geology and Marine Civil Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Adam Szymkiewicz					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	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		60.0	125
Subject objectives	To familiarize students with the main sources of contaminants in soil-groundwater environment, mechanisms of contaminant transport, methods of soil and groundwater protection and clean-up						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U14] can technically and economically analyze and evaluate the solutions and functioning of facilities and systems in the sanitary engineering or flood protection, water intakes and water infrastructure or water and wastewater treatment plants; can assess the suitability and potential of using new achievements in materials, fixtures, devices and methodologies for designing and modeling the analyzed technical infrastructure and industrial objects, including innovative solutions	student is able to evaluate the possibility of application of recently developed technologies for groundwater and soil remediation student is able to use computer modeling tools to simulate water flow and contaminant transport in soils	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K7_U08] is able to assess risks in the implementation of engineering projects and implement appropriate safety rules	student is able to identify the threats to quality and quantity of groundwater resources, related to engineering activity student is able to use computer modeling tools to estimate contamination threat to groundwater	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K7_W11] has knowledge to analyze, evaluate and optimize processes, objects and systems of environmental engineering and knows the principles of rational energy management and resources	student knows the principles of rational and sustainable management of groundwater resources	[SW1] Assessment of factual knowledge
	[K7_U12] can design: developed water and sewage system, complex heat source, pool water treatment technology, mechanical ventilation installation or underground water intake, drainage of urban water catchment, reservoir control system during flood seizure or water treatment technology, domestic waste water treatment plant	student is able to make a preliminary design of remediation process for contaminated soil	[SU1] Assessment of task fulfilment
[K7_W09] has deepened, ordered, theoretically developed knowledge related to: hydrology, drainage, water management, flood protection or resource and water intake or water and sewage management	student has an in-depth knowledge about processes of flow and transport of dissolved contaminants in groundwater	[SW1] Assessment of factual knowledge	
Subject contents	Flow in unsaturated and saturated zone, types of contaminants and their sources, mechanisms of contaminant transport, methods of groundwater protection, methods of soil and groundwater remediation		
Prerequisites and co-requisites	Basic knowledge of hydrology, geology and chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	individual or group assignments	50.0%	100.0%
Recommended reading	Basic literature	Bhandari, Alok Surampalli, Rao Y. Champagne, Pascale Ong, Say Kee Tyagi, R. D. Lo, Irene M. C.. (2007). Remediation Technologies for Soils and Groundwater. American Society of Civil Engineers (ASCE). Retrieved from https://app.knovel.com/hotlink/toc/id:kpRTSG0007/remediation-technologies/remediation-technologies	
		Domenico, Patrick A. Schwartz, Franklin W.. (1998). Physical and Chemical Hydrogeology (2nd Edition). John Wiley & Sons. Retrieved from https://app.knovel.com/hotlink/toc/id:kpPCHE0002/physical-chemical-hydrogeology/physical-chemical-hydrogeology	
	Supplementary literature	https://www.itrcweb.org/Guidance	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	distribution of organic contaminants between solid, liquid and gas phases, determination of well capture zone, solution of 1D advection-diffusion equation
Work placement	Not applicable