

Subject card

Subject name and code	Underground waters protection - lecture, PG_00159342						
Field of study	Geology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group 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	5		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Hydrology -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Izabela Chlost				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	0.0	0.0	0.0	20
	E-learning hours included: 0.0						
	Additional information: Possibility of conducting some classes online						
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	20		0.0		0.0	20
Subject objectives	Gain knowledge of the conditions for the formation of groundwater communities and the underground water cycle, as well as potential sources of pollution and ways to protect these waters.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GEOLL3_U01] is able to apply basic measurement and analytical techniques in the field and in the laboratory, plans to conduct research and measurements	The student knows and is able to use methods for measuring changes in groundwater levels, as well as to determine organoleptic and physico-chemical indicators of water quality indicating their contamination.	[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written
	[GEOLL3_U02] has the skill of analytical and synthetic way of reasoning leading to correct inference based on the results obtained or the facts presented	The student is able to identify natural and anthropogenic threats to groundwater and indicate methods of their protection. Is able to determine the status of resources and quality, the method of using groundwater, including in relation to applicable legal standards.	[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written
	[GEOLL3_W07] knows the anthropogenic transformation of the natural environment, including the effects of the exploitation of mineral resources	The student knows and understands the importance of groundwater for the natural environment, humans and the economy and is aware of the need to protect it due to the effects of their excessive exploitation.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[GEOLL3_W02] knows and understands the terminology appropriate in science and natural sciences	The student knows and uses professional terminology in the field of water circulation conditions in nature, with particular emphasis on resources, quality, threats and protection of groundwater.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[GEOLL3_U06] is able to identify geological objects and combine them with geological processes and anthropogenic environmental transformations	The student has the skills to identify the geological environment and characterize its influence on the circulation and quality of groundwater, including changes and pressures caused by human activities.	[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written
Subject contents	• Legal basis for groundwater protection, taking into account the Water Framework Directive, Water Law, Geological and Mining Law and others that affect the development of groundwater resources and quality. • Potential anthropogenic and geogenic threats to groundwater resources and quality. • Groundwater pollution foci, taking into account their spatial distribution (point, strip, scattered, large-area). • Classification of factors and conditions of groundwater quality degradation. • Groundwater protection zones. • Types and methods of groundwater protection, divided into technical and non-technical methods. • Main Groundwater Reservoirs (GZWP); GZWP protection areas as a basic element of groundwater protection on a regional scale. • Importance and protection of wetlands. • Organization of the groundwater monitoring network in Poland. • Management, threats and protection of groundwater in the Tri-City area and in the coastal zone.		
Prerequisites and co-requisites	Basics of general hydrogeology. Understanding the cause-and-effect stages of the water cycle in nature.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Problem questions, participation in discussion	51.0%	40.0%
	Colloquium/Test with open and closed questions	51.0%	60.0%

Recommended reading	Basic literature	• Chelmicki W., 2002, Water. Resources, degradation, protection. PWN Scientific Publishing House, Warsaw. • Górski, J. 2022, Groundwater protection in Poland. UAM Scientific Publishing House, Poznań. • Kleczkowski S. (ed.), 1984, Groundwater protection. Geological Publishing House, Warsaw. • Kleczkowski S., 1994, Methodological basis of groundwater protection, AGH, Kraków. • Lidzbarski M. (ed.), 2022, Groundwater intake protection zones - risk analysis and design. Methodological guide. Part 1.: Risk analysis for establishing groundwater intake protection zones. PIG-PIB, Warsaw. • Macioszczyk A., Dobrzyński D., 2007, Hydrogeochemistry of the groundwater active exchange zone. PWN Scientific Publishing House, Warsaw. • Makles M., Pawlaczyk P., Stańsko R., 2014, Best practices guide of wetland protection. Environmental Projects Coordination Center. www.cpk.s.lasy.gov.pl • Paczyński B., Sadurski A., (eds.), 2007, Regional hydrogeology of Poland, PIG, Warsaw.
	Supplementary literature	• Herbich P. et al. (eds.), 2008, Methodology for designating protected areas of the Main Groundwater Reservoirs for the purposes of planning and managing water in river basins. PIG, Warsaw. • Kordalski Z., 2019, Optimal groundwater management in the coastal zone. PIG, PSH Forum. • Kozierowski B. (ed.) 2007, Gdańsk Water-bearing System. Gdańsk University of Technology Publishing House, Gdańsk. • Lidzbarski M., 2016, Integrated groundwater monitoring system in Gdańsk and Sopot, Przegląd Geologiczny, vol. 64, no. 6, pp. 375-381. • Pleczyński J., 1981. Renewability of groundwater resources, Ed. Geological, Warsaw.
	eResources addresses	
Example issues/ example questions/ tasks being completed	• List and describe shortly technical forms of groundwater protection. • Discuss the threats to groundwater associated with mining of coal and other minerals. • Give regulations governing the protection of thermal and spa waters. • Determine the importance of wetlands for groundwater protection. • What does the abbreviation GZWP stand for, what are the criteria for their separation and basic forms of protection. • Is groundwater monitoring necessary? Justify your answer.	
Work placement	Not applicable	

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