

**Subject card**

<b>Subject name and code</b>	Surface and groundwater protection, PG_00091480						
<b>Field of study</b>	Water Management and Protection of Water Resources						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>				2025/2026	
<b>Education level</b>	undergraduate studies	<b>Subject group</b>				Obligatory subject group in the field of study Subject group related to scientific research in the field of study Subject group related to practical vocational preparation	
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>				at the university	
<b>Year of study</b>	2	<b>Language of instruction</b>				Polish Polish	
<b>Semester of study</b>	3	<b>ECTS credits</b>				2.0	
<b>Learning profile</b>	practical	<b>Assessment form</b>					
<b>Conducting unit</b>	Pracownia Hydrologii -> Katedra Hydrologii -> Faculty of Oceanography and Geography						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Joanna Fac-Beneda				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Additional information:  <ul style="list-style-type: none"> <li>• Lecture with multimedia presentation</li> <li>• Discussion</li> <li>• Group work</li> <li>• Mind map</li> </ul>						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		5.0		25.0	60
<b>Subject objectives</b>	<ul style="list-style-type: none"> <li>• Assessment of the magnitude, distribution of surface and groundwater threats and their resources</li> <li>• Diagnosis of surface and groundwater threats and their resources;</li> <li>• Analysis of the quality of water resources;</li> <li>• Planning and forecasting of surface and groundwater hazards and their resources</li> </ul>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GWOZWL3-W09] potential threats and sources of pollution of surface and groundwater resulting from the development of civilization, in particular strong anthropoppression	knows the potential threats and sources of surface and groundwater pollution resulting from strong anthropoppression	[SW4] test/exam - oral or written
	[GWOZWL3-U03] observe and describe the changes taking place in water management and predict further directions of its development as well as conduct a critical analysis of: case studies of problems of water management and protection of water resources in terms of impact on ecological, social and economic systems natural valorization and assessment of quality of the environment	is able to observe and describe changes in the aquatic environment and carry out a critical analysis of water conservation problems	[SU1] oral statement/conversation/discussion
	[GWOZWL3-K05] take responsibility for the safety of their own work and that of others, dealing with emergencies, exercising caution in the laboratory and in the field, responsibility for entrusted equipment and apparatus	is willing to take responsibility for the safety of his own work and that of others, to deal with emergencies, to take care in the laboratory and in the field, to be responsible for the equipment and apparatus entrusted to him	[SK8] observation of student's independent or team work
	[GWOZWL3-U07] use literature and other available sources of information, including information technology, multimedia, Internet, databases, and select and critically evaluate information	be able to use literature, reference materials and databases, as well as information technology and multimedia, and to select and critically evaluate hydrological information	[SU5] implementation of a problem task
	[GWOZWL3-W05] assumptions of the ecosystem approach to management of the environment and human activities in the environment as well as the development directions in the field of applied solutions and scientific research for the protection and restoration of water resources in selected divisions of the national economy	knows and understands the assumptions of the ecosystem approach to water resources management as well as the developments in applied solutions and research for the protection of surface and groundwater	[SW4] test/exam - oral or written
	[GWOZWL3-W03] organization and legal basis of environment protection, nature protection and water management, as well as the principles of organization and operation of hydrological and meteorological services and the basics of Integrated Environmental Monitoring	is familiar with the organisation and legal basis of surface water and groundwater protection, as well as with the organisation and functioning of hydrological and meteorological services and the basics of Integrated Environmental Monitoring	[SW4] test/exam - oral or written
	[GWOZWL3-W02] the importance of knowledge in the sciences allowing to understand the processes and phenomena occurring in the hydrosphere, as well as knowledge of the social sciences and of the Earth's geographic environment - as a system of interrelated and interacting components	knows and understands the importance of scientific knowledge for understanding processes and phenomena in the hydrosphere and knowledge of water relations in a changing geographical environment	[SW4] test/exam - oral or written
	[GWOZWL3-W06] basic problems of water construction water construction and the processes of water and wastewater treatment	knows and understands wastewater treatment processes	[SW4] test/exam - oral or written

	Course outcome	Subject outcome	Method of verification
	[GWOZWL3-K03] systematic further education and professional development, updating and expand their knowledge and skills, understands the limitations of his own knowledge in the context of civilization progress and recognizes authorities in the professional and scientific environment	is willing to undergo systematic retraining and professional development, to update and expand his/her knowledge and skills, understands the limits of his/her own knowledge in the context of the progress of civilisation and recognises authority in the professional and scientific community	[SK8] observation of student's independent or team work
	[GWOZWL3-K06] an informed and reliable assessment of the impact of humans on the aquatic environment	is prepared to make an informed and honest assessment of the impact of human activities on the aquatic environment	[SK2] presentation/project/paper/report
	[GWOZWL3-U04] distinguish between objectives, analyze and evaluate modern strategies for managing environment especially in the context of ecosystem approach to managing human activities in the environment with taking into account relevant law regulations and the indication of administrative bodies responsible for the management of waters and the protection of water resources	is able to distinguish between the objectives, analysis and evaluation of modern water resources management strategies, taking into account the relevant legislation and the indication of the administrative bodies responsible for water resources protection	[SU1] oral statement/conversation/discussion
	[GWOZWL3-U06] assess the impact of planned investments on value and quality of water resources and propose options for solutions to protect and restore water resources, recognize their weaknesses and strengths as well as opportunities and threats	is able to assess the impact of human activity on the quality of water resources and to propose options for solutions to protect and restore water resources	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU8] observation of student's independent or team work
Subject contents	<ol style="list-style-type: none"> <li>1. Chemical composition of surface and groundwater and their pollution.</li> <li>2. Outbreaks of pollution: point, area, linear.</li> <li>3. Water degradation, self-purification, purification.</li> <li>4. Monitoring of surface and groundwater quality.</li> <li>5. Systems and methods of assessing surface and groundwater quality.</li> <li>6. Classification of factors and conditions of groundwater quality degradation.</li> <li>7. Types and methods of groundwater protection.</li> <li>8. Basic hydrotechnical facilities and their impact on the water environment.</li> <li>9. Elements of water law. The Water Framework Directive and the directions of water policy in the European Union.</li> </ol>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written/oral exam	51.0%	100.0%

Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>• Chelmicki W., 2002, Water. Zasoby, degradacja, ochrona. Wyd. Nauk PWN, Warszawa</li> <li>• Kleczkowski, A. S., (ed.), 1984, Ochrona wód podziemnych, Wyd. Geol., Warszawa</li> <li>• Macioszyk A., 1987, Hydrogeochemistry, Wyd. Geologiczne, Warszawa</li> <li>• Macioszczyk A., Dobrzyński, 2003. Hydrogeochemia wód podziemnych strefy aktywnej wymiany, Wyd. Naukowe PWN, Warszawa</li> <li>• Pazdro Z., Kozerski B., 1989. General Hydrogeology, Wyd. Geologiczne, Warszawa</li> <li>• Mikulski Z., 1998, Gospodarka wodna. Wyd. Nauk. PWN, Warszawa</li> <li>• Towards efficient use of water resources in Europe, EEA Report No 1/2012, Copenhagen, <a href="http://www.eea.europa.eu">http://www.eea.europa.eu</a>.</li> <li>• Environment of Europe 2010 - State and Outlook. Synthesis, EEA, Copenhagen, <a href="http://www.eea.europa.eu">http://www.eea.europa.eu</a></li> <li>• Allen J. D., 1998, Ecology of flowing waters, Wyd. Nauk. PWN, Warsaw.</li> <li>• Ciepielowski A., 1999, Podstawy gospodarowania wodą. Wyd. SGGW, Warszawa.</li> <li>• Dojlido J., 1995, Chemistry of surface waters, Wyd. Ekonomia i Środowisko, Warsaw.</li> <li>• Kajak Z., 1998, Hydrobiology-Limnology, Wyd. Nauk. PWN, Warsaw.</li> <li>• Lwowicz M. I., 1979, Water resources of the world, PWN, Warsaw.</li> <li>• Macioszczyk, 1987, Hydrogeochemistry, Wyd. Geol., Warsaw.</li> </ul>
	Supplementary literature	<ul style="list-style-type: none"> <li>• Kajak Z., 1979, Eutrophication of waters, PWN, Warsaw.</li> <li>• Lambor J., 1971, Hydrologia inżynierska, Arkady, Warsaw.</li> <li>• Tomiałojć L., Drabiński A. (ed), 2005, Środowiskowe aspekty gospodarki wodnej, KOP PAN, Wrocław.</li> </ul>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Discuss the operation of a comprehensive wastewater treatment plant.</li> <li>2. Discuss the problem of drought.</li> <li>3. Discuss the problem of flash floods.</li> <li>4. What is self-purification of water?</li> <li>5. What is virtual water and water footprint?</li> </ol>	
Work placement	Not applicable	

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