

**Subject card**

<b>Subject name and code</b>	Geographical Information Systems - laboratory classes II, PG_00192609						
<b>Field of study</b>	Water Management and Protection of Water Resources						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2027/2028		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Obligatory subject group 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		
<b>Semester of study</b>	3	<b>ECTS credits</b>			3.0		
<b>Learning profile</b>	practical	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Geographic Information System (GIS) Laboratory -> Faculty of Oceanography and Geography -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr Maciej Markowski				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	<b>Participation in didactic classes included in study plan</b>		<b>Participation in consultation hours</b>		<b>Self-study</b>	<b>SUM</b>
	<b>Number of study hours</b>	30		2.0		43.0	75
<b>Subject objectives</b>	Introduction to GIS as a computer system and its tasks (using ArcGIS Pro as an example). Understanding geospatial technology, the specifics of spatial data, and methods for modeling and visualizing them. Acquiring theoretical foundations and skills in describing data locations on Earth's surface. Acquisition of primary and secondary data for GIS and their initial processing. Introduction to basic vector and raster functions. Understanding principles and methods of presenting work results in the form of maps. Introduction to the basics of hydrological modeling in GIS.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GWOZWL3-K04] The student is able to maintain a critical attitude in accepting information from various sources relating to issues in the field of water management.	The student demonstrates a critical approach to receiving information from various sources and can assess the quality of acquired data related to water management issues. Contents: B1-B6.	[SK2] presentation/project/paper/report
	[GWOZWL3-W07] The student has advanced knowledge of data sources and the theoretical foundations of data collection, compilation and evaluation for a dissertation.	The student knows and understands the sources of spatial data as well as the theoretical foundations of techniques for acquiring such data. Contents: B1-B6.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[GWOZWL3-W04] The student is familiar with advanced research techniques, methods and tools currently used in water management and the protection of water resources, in both the natural and social sciences, including advanced statistical and IT tools enabling the description, modelling and interpretation of data concerning phenomena and processes occurring in the aquatic environment, as well as tools for describing relationships within socio-ecological systems.	The student knows and understands the research techniques and methods, as well as tools (geographic information system) currently used in water management and water resources protection, in both natural and social sciences contexts. This includes basic statistical and IT tools enabling the description, presentation, modeling, and interpretation of spatial data concerning phenomena and processes occurring in the water environment. Contents: B1-B6.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[GWOZWL3-U02] The student can select and independently apply basic research techniques and tools, with adhering to established analytical procedures in the field of environmental research in water management, adequately to the considered research problem.	The student is able to select and independently apply basic techniques and tools of spatial analysis (vector and raster) in environmental research in water management, appropriately addressing the research problem at hand. Contents: B1-B6.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[GWOZWL3-U07] The student can use literature and other available sources of information, including information technology, multimedia, Internet, databases, and select and critically evaluate information.	The student is able to use specialist literature and other available sources of information, including information technology, multimedia, Internet resources, databases, and mapping services, and to select and critically evaluate information. Contents: B1-B6.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[GWOZWL3-U08] The student can use basic mathematical and statistical methods to analyze data and describe phenomena and processes occurring in the environment, as well as methods of information technology to assess the risk of threats to the of the environment, especially the hydrosphere.	The student can use basic methods of spatial data analysis and present phenomena and processes occurring in the environment on a map. He can also use GIS computational methods to assess environmental hazard risks, especially in the hydrosphere. Contents: B1-B6.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written

Subject contents	<p>B.1 Discussion of basic functions (tools) of vector analysis. Introduction to vector modeling methods.</p> <p>B.2 Discussion of basic functions (tools) of raster analysis. Introduction to raster modeling methods.</p> <p>B.3 Digital Elevation Model - determining slope and aspect, creating contours.</p> <p>B.4 Methods for delineating watersheds and streams based on Digital Elevation Model - Hydrological modeling in GIS.</p> <p>B.5 Utilization of principles and methods for presenting work results in map form. Creating maps at different scales and using different projections.</p> <p>B.6 Application of learned GIS methods to solve tasks utilizing spatial issues and data.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 674 794 703">Subject passing criteria</th> <th data-bbox="799 674 1137 703">Passing threshold</th> <th data-bbox="1142 674 1481 703">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 710 794 739">test</td> <td data-bbox="799 710 1137 739">51.0%</td> <td data-bbox="1142 710 1481 739">40.0%</td> </tr> <tr> <td data-bbox="456 745 794 775">practical and theoretical exercises</td> <td data-bbox="799 745 1137 775">51.0%</td> <td data-bbox="1142 745 1481 775">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	test	51.0%	40.0%	practical and theoretical exercises	51.0%	60.0%
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Recommended reading	Basic literature	<p>Urbański J., 2008. GIS w badaniach przyrodniczych, Wyd. Uniwersytetu Gdańskiego, Gdańsk.</p> <p>Longley P.A., Goodchild M.F., Rhind D.W., 2008. GIS. Teoria i praktyka, Wyd. Naukowe PWN, Warszawa.</p> <p>Jażdżewska I., Lechowski Ł., 2018, Wstęp do geoinformacji z ArcGIS, Wyd. Uniwersytetu Łódzkiego.</p> <p>Zwoliński Z.(red.) , 2010, GIS woda w środowisku, Bogucki Wydawnictwo Naukowe.</p>										
	Supplementary literature	<p>Markowski M., Golus W., Kwidzińska M., 2015, Aplikacyjność metod oceny wielkości opadów zasilających oczka Pomorza Gdańskiego [w:] D. Absalon, M. Matysik, M. Ruman [red.] Nowoczesne metody i rozwiązania w hydrologii i gospodarce wodnej, Komisja Hydrologiczna Polskiego Towarzystwa Geograficznego, Sosnowiec, s. 287-298.</p> <p>Bajkiewicz-Grabowska E., Markowski M., Lemańczyk K., 2016, Application of geoinformation techniques to determine zones of sediment resuspension induced by wind waves in lakes (using two lakes from Northern Poland as examples) , Limnological Review 1/2016.</p>										
	eResources addresses											
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											

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