University of Gdańsk

Subject card

Subject name and code	Geographical Information Systems - laboratory classes II, PG_00192609		
Field of study	Water Management and Protection of Water Resources		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Subject group related to practical vocational preparation
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish polish
Semester of study	3	ECTS credits	3.0
Learning profile	practical	Assessment form	credit
Conducting unit	Geographic Information System (GIS) Laboratory -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Maciej Markowski	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	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	30	2.0	43.0	75

Subject objectives	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-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-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-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	B.1 Discussion of basic functions (tools) of vector analysis. Introduction to vector modeling methods. B.2 Discussion of basic functions (tools) of raster analysis. Introduction to raster modeling methods. B.3 Digital Elevation Model - determining slope and aspect, creating contours. B.4 Methods for delineating watersheds and streams based on Digital Elevation Model - Hydrological modeling in GIS. B.5 Utilization of principles and methods for presenting work results in map form. Creating maps at different scales and using different projections. B.6 Application of learned GIS methods to solve tasks utilizing spatial issues and data.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	51.0%	40.0%
practical and theoretical exercises	51.0%	60.0%

Recommended reading

Basic literature	Urbański J., 2008. GIS w badaniach przyrodniczych, Wyd. Uniwersytetu Gdańskiego, Gdańsk. Longley P.A., Goodchild M.F., Rhind D.W., 2008. GIS. Teoria i praktyka, Wyd. Naukowe PWN, Warszawa. Jażdżewska I., Lechowski Ł., 2018, Wstęp do geoinformacji z ArcGIS, Wyd. Uniwersytety Łódzkiego. Zwoliński Z.(red.) , 2010, GIS woda w środowisku, Bogucki Wydawnictwo Naukowe.
Supplementary literature	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. 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.
eResources addresses	

Example issues/ example questions/ tasks being completed	What are the basic differences between vector and raster analysis in GIS? What is a Digital Terrain Model used for in spatial analysis? What is hydrological modelling in GIS?
Work placement	Not applicable

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