University of Gdańsk

Subject card

Subject name and code	GIS - Thematic applications (Laboratory classes), PG_00201203		
Field of study	Physical geography and geoinformation		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Master's studies	Subject group	Obligatory subject group in the field of study 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	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	academic	Assessment form	credit
Conducting unit	Geographic Information System (GIS) Laboratory -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	mgr Marlena Pawłowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	60.0	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	8.0	57.0	125

Subject objectives

Practical familiarization of participants with the methodology of spatial analysis using GIS tools in selected branches of physical geography: meteorology and climatology, hydrology and limnology, and geomorphology.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GFGMU2_U04] is able to describe and analyze the causes and course of physical and geographical processes and phenomena, selecting and applying advanced techniques and research tools in the field of statistical and geoinformation methods, interpreting the results, using theoretical knowledge to formulate own opinions and conclusions	The student is able to describe and analyze the causes and course of physical geographical processes and phenomena, skillfully selecting and applying advanced research techniques and tools from the field of geoinformatics methods, interpreting the results obtained, and then using theoretical knowledge to formulate their own opinions and conclusions. Contents: 1-13.	[SU2] presentation/project/paper/ report
	[GFGMU2_K03] is ready to accepting responsibility for group work assuming various roles in it, participating in preparation of scientific projects, taking responsibility for the equipment and safety rules, active developing of professional competences and knowledge in Earth and environmental sciences and geoinformation, including interdisciplinarity, as well as developing the principles of professional ethics, respecting copyright rules	The student is ready to take responsibility for group work, assuming various roles within the group, participating in the preparation of scientific projects, actively expanding professional competencies, and updating knowledge in the field of geoinformation. Is ready to adhere to and promote professional ethics, including respecting copyright in their own and others' activities. Contents: 1-13.	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work
	[GFGMU2_K01] is ready to critically assess the knowledge obtained in the field of Earth and environmental sciences, particularly physical geography and geoinformation, its completion and verification through further critical analysis of scientific literature	The student is ready to critically assess their knowledge of geoinformation, supplement and verify it by critically reviewing relevant literature. Contents: 1-13.	[SK2] presentation/project/paper/ report
	[GFGMU2_U02] is able to precisely and appropriately use terminology in the field of physical geography and geoinformation in oral statements and written works	The student is able to fluently and accurately apply geoinformation terminology in written work. Contents: 1-13.	[SU2] presentation/project/paper/ report
	[GFGMU2_W04] knows and understands theoretical foundations of research methods used in physical geography and closely related sciences, descriptive and mathematical statistics, as well as in a deepened extent methods of analyzing spatial phenomena	The student knows and understands the theoretical foundations of research methods used in physical geography and closely related sciences, as well as advanced methods of analyzing spatial phenomena. Contents: 1-13.	[SW2] presentation/project/paper/ report
	[GFGMU2_W03] knows and understands in a deepened extent issues in the theory of geographic information systems, basics of organization and operation of spatial information infrastructures and possibilities of using geoinformatics tools in physical geography	The student knows and understands advanced topics in the theory of geographic information systems, the fundamentals of organizing and operating spatial information infrastructures, and the possibilities of applying geoinformatics tools in physical geography. Contents: 1-13.	[SW2] presentation/project/paper/ report
	[GFGMU2_W05] knows and understands principles of planning field and laboratory research using techniques and research tools used in geomorphology, hydrology and climatology, as well as principles of operating equipment and devices used to obtain and process digital geographic information in accordance with health and safety principles	The student knows and understands the principles of operating equipment and devices used for acquiring and processing digital geographic information. Contents: 1-13.	[SW2] presentation/project/paper/ report

Subject contents	1. Interpolation methods. 2. Use of GIS in creating digital climate maps. 3. Cokriging and residual kriging - spatial analysis in climatological studies. 4. Preparing input data for modeling and thematic analyses in areas such as bioclimatology, spatial planning, transportation and communication, heating, and agroclimatology. 5. Digital Elevation Model (DEM) and Digital Surface Model (DSM) in hydrological analyses. 6. Water resources of catchments - raster and vector analyses, methods of assessing precipitation amounts. 7. Simulation and modeling of surface runoff directions. 8. Determining flood-prone areas based on DEM. 9. Editing geological and geomorphological maps. 10. Visualization of terrain and seabed topography (2D and 3D). 11. Data processing methods in applied geomorphology and scientific research. 12. Estimating the volume of soil masses undergoing relocation in landslides. 13. Data integration and management of data formats.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
work terms	51.0%	100.0%

Recommended reading	Basic literature	Davis D., 2004, GIS dla każdego, Wydawnictwo Mikom, Warszawa. Urbański J., 2012, GIS w badaniach przyrodniczych (ebook), Centrum GIS, UG, Gdańsk. Ustrnul Z., Czekierda D., 2006, Metody Analizy Przestrzenno-Czasowej w Badaniach Klimatologicznych (Na Przykładzie Polski), Roczniki Geomatyki, IV.2, 147160.
	Supplementary literature	Lyon J.G., 2003, GIS for water resources and watershed management, CRC Press. 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. Tomlinson R., Thinking about GIS, 2013, Esri Press. Szczepanek R., 2017, Systemy informacji przestrzenne z QGIS Część 1 i 2, Politechnika Krakowska im. Tadeusza Kościuszki - Wydział Inżynierii Środowiska - Instytut Inżynierii i Gospodarki Wodnej.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Applying co-kriging and residual kriging interpolation methods to selected spatial analyses in climatology. Creating a spatial model of the seabed - 2D and 3D. Calculating earth masses in landslides based on LiDAR data.	
Work placement	Not applicable	

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