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 2027	Academic year of realisation of subject	2027/2028
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_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 related sciences, including statistical methods, spatial analyses, and geoinformation methods applied in the interpretation of spatial phenomena. Course content: 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 issues related to the theory of geographic information systems, the organization and functioning of spatial information infrastructure, and the application of geoinformation tools and spatial analyses in physical geography. Course content: 1–13.	[SW2] presentation/project/paper/ report
[GFGMU2_W05] knows and understands to a deepened extent 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 the acquisition, processing, and analysis of digital geographic information, as well as the basic principles of safety and work organization during field and laboratory research. Course content: 1–13.	[SW2] presentation/project/paper/ report
[GFGMU2_K01] is able to behave appropriately in the workplace and in everyday life by critically evaluating information received in the light of their existing knowledge, recognising the importance of knowledge in solving cognitive and practical problems, and, when faced with difficulties, drawing on expert knowledge	The student is prepared for critical self-assessment of their knowledge and skills in geoinformation, recognizes the need for continuous learning and verification of information through the analysis of subject literature and consultation of expert sources. Course content: 1–13.	[SK2] presentation/project/paper/ report
[GFGMU2_U04] is able, either independently or as part of a group, to formulate and test hypotheses regarding the causes and progression of physical-geographical processes and phenomena; selects and applies advanced research methods and tools, including statistical and geoinformatics methods, adapting them to the context where necessary; skilfully visualises the results of spatial data analysis, critically interprets the findings, and formulates conclusions and their own position based on these, which they justify in debate	The student is able to identify, analyze, and interpret the causes and course of physical-geographical processes and phenomena using advanced geoinformation methods, statistical tools, and spatial analyses. Can visualize the results of spatial data analyses, critically interpret research findings, and formulate justified conclusions and opinions. Course content: 1–13.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 prepared to fulfil professional responsibilities in both independent and team-based work by advancing the field of geography, upholding the profession's ethos, adhering to and developing the principles of professional ethics, and ensuring compliance with these principles	The student is prepared to responsibly perform various roles in individual and team work, participates in the preparation of scientific projects, and undertakes activities aimed at developing professional competences in the field of geoinformation. Complies with the principles of professional ethics, including the protection of intellectual property and copyright in scientific and practical activities. Course content: 1–13.	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work
[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 correctly use terminology related to physical geography, geoinformation, and geographic information systems in oral presentations and written works. Course content: 1–13.	[SU2] 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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