University of Gdańsk

Subject card

Subject name and code	GIS and Remote Sensing I - lecture, PG_00193794		
Field of study	Geography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor'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 polish
Semester of study	2	ECTS credits	1.0
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	dr Maciej Markowski	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15	1.0	9.0	25

Subject objectives	The aim of the lecture is to provide students with structured knowledge of Geographic Information Systems (GIS), including spatial data models, spatial databases, reference systems, and map projections. Students will become familiar with the principles of satellite systems and precise positioning methods used in spatial data acquisition. The course enables understanding of spatial analysis and modeling techniques in GIS, as well as the principles of visualization and presentation of results. As a result, students understand the theoretical foundations of working with spatial data and their application in solving research problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GEOGRL3-U04] can apply field and laboratory methods and research tools, spatial analysis methods, and methods of presenting research results in the field of geography, assess their usefulness for tasks in which the application goal of geography can be realized	The student understands the use of GIS tools for processing and analyzing spatial data and can assess the suitability of modeling and visualization methods in the context of research problems.	[SU4] test/exam - oral or written
[GEOGRL3-U03] can plan and conduct, independently and as part of a team, simple research in the field of geography under the supervision of a scientific advisor, based on the necessary information from professional literature and other sources	The student can plan and describe a simple spatial study using GIS, selecting data sources, analysis methods, and ways of presenting results based on professional literature and available data resources.	[SU4] test/exam - oral or written
[GEOGRL3-W06] knows advanced methods of acquiring, processing, and compiling geographic environmental data, as well as methods of analyzing and interpreting such data	The student knows and understands advanced methods of acquiring, organizing, processing, and analyzing spatial data in GIS, including the principles of spatial reference systems, satellite positioning, as well as modeling and visualization of environmental data.	[SW4] test/exam - oral or written
[GEOGRL3-K02] is prepared to bear full responsibility for the actions taken actions and adhere to the principles of professional ethics and principles of intellectual honesty, is aware of the importance of a professional approach in professional life professional life	The student is aware of the responsibility for the quality and reliability of spatial analyses, adheres to professional ethics, and maintains intellectual honesty in the acquisition, processing, and presentation of spatial data.	[SK4] test/exam - oral or written

Subject contents

1. Introduction to GIS the concept of the system, its components, historical development, and an overview of contemporary software and application areas.
2. Spatial data models and formats characteristics of vector and raster models, data structure, topology, geometry, and the main formats for storing spatial information.
3. Spatial databases fundamentals of relational databases, organization and structure of geodatabases, creation and management of spatial and attribute data.
4. Reference systems and map projections coordinate systems, map projections, global and European spatial reference systems (ITRS, ETRS, ITRF, ETRF), and their significance in GIS analyses.
5. Satellite systems and precise positioning principles of GNSS/GPS operation, the functioning of the ASG-EUPOS system, and RTK and RTN techniques in spatial data acquisition.
6. Spatial analysis and modeling in GIS operations on vector and raster data, spatial modeling methods, and the application of GIS analyses in solving research problems.
7. Visualization and presentation of spatial data principles of digital cartography, thematic map design, modeling of analytical results, and methods of data presentation.

Prerequisites and co-requisites

Assessment methods and criteria

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

Recommended reading

Basic literature

- Medyńska-Gulij B., 2024, Kartografia - geomatycznie i geomedialnie, PWN.
- Davis D., 2004, GIS dla każdego, Wydawnictwo Mikom, Warszawa
- Gotlib D., Iwaniak A., Olszewski R., 2007. GIS. Obszary zastosowań. PWN Warszawa
- Urbański J., 2012, GIS w badaniach przyrodniczych (ebook), Centrum GIS, Uniwersytet Gdański
- Sitek Z., 1997. Wprowadzenie do teledetekcji lotniczej i satelitarnej, Wydawnictwa AGH, Kraków.
- Adamczyk J., Będkowski K, 2007. Metody cyfrowe w teledetekcji. Wydawnictwo SGGW.
- Kurczyński Z., 2006. Lotnicze i satelitarne obrazowanie Ziemi, Oficyna wydawnicza Politechniki Warszawskiej, Warszawa.
- Kryza M., Szymanowski M., Wieczorek M., 2007, The Application of Selected Interpolation Methods for Modelling Extreme Air Temperature in South-Western Poland, Przegląd Geofizyczny, 52(1):61-82.

	Supplementary literature	• Richards J.A., Jia X., 2006. Remote sensing digital image analysis. Springer. • Butowtt J., Kaczyński R., 2003, Fotogrametria, Wojskowa Akademia Techniczna, Warszawa. • Lyon J.G., 2003, GIS for water resources and watershed management, CRC Press. • Tomlinson R., Thinking about GIS, 2013, Esri Press. • Zwoliński Z. (red.), 2010, GIS woda w środowisku. Bogucki Wydawnictwo Naukowe, Poznań. • 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 is GIS and what are its main components? • What are the basic differences between vector and raster data? • What is the purpose of coordinate systems and map projections in GIS analyses?	
Work placement	Not applicable	

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