



Subject card

Subject name and code	Geographical information systems, PG_00061753						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-cycle 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Adam Ingłot				
	Teachers		dr inż. Adam Ingłot mgr inż. Kornelia Grzelka dr inż. Anna Sobieraj-Żłobińska				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	15.0	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		9.0		56.0	125
Subject objectives	Understanding of the origins, evolution and development forecasts of GIS. Understanding the function and essence of GIS in the decision-making process. Understanding the significance of data standardization and data conversion in GIS.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] is able to develop a simple algorithm and prepare a simple program in object-oriented language taking into account the geodetic specifics and the specificity of spatial information systems		The student is able to use the output of other programs to power or extend the capabilities of GIS.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W09] has knowledge and understands the concepts of marine hydrography, sea maps and coastal regions maps, as well as topographic and bathymetric surveys and spatial information systems including their supply with geodetic and hydrographic data		The student is able to use data exchange standards, understands the concepts of topology and uses cartographic projections.		[SW3] Assessment of knowledge contained in written work and projects		
	[K6_U07] can use reference systems and coordinate frames according to the character of cartographic studies, create a thematic map and apply in practice cartographic generalization		The student is able to use data exchange standards, understands the concepts of topology and uses cartographic projections.		[SU4] Assessment of ability to use methods and tools		

Subject contents	Course content – lecture		
	The lecture introduces the origins, evolution, and future development of Geographic Information Systems (GIS) and Spatial Information Systems (SIS), emphasizing their role in modern decision-making processes. Students become familiar with the fundamental concepts, structure, and functions of spatial information systems, as well as their relationship to other types of systems such as GIS, SIT, LIS, LBS, and CAD/CAM. Various data models used in GIS are discussed, including hierarchical, network, relational, object-oriented, and object-relational models, together with their advantages, limitations, and applications. The lectures also cover metadata, data harmonization, and standardization, as well as key data exchange standards and formats such as XML, GML, SGML, and DXF. Attention is given to coordinate reference systems, map projections, and data topology, along with visualization and cartographic generalization principles. A particular focus is placed on understanding the importance of data quality and interoperability in spatial analyses, as well as the practical relevance of data exchange standards in the work of surveyors and cartographers.		
	Course content – laboratory		
	The laboratory classes have a practical character and involve working with GIS software (e.g., ArcGIS Pro, QGIS). Students learn how to create, edit, and analyze spatial data in various formats such as SHP, GDB, GML, and CSV. Exercises include coordinate system transformations, geometric corrections of vector data, and basic spatial analyses such as buffering, overlay operations, table joins, and spatial relationships. Participants become familiar with the construction of relational spatial databases and the use of SQL for query design and optimization. Laboratory work also covers raster data processing transformations, raster algebra, and histogram analysis as well as vector and raster data visualization using thematic mapping techniques. The aim of the laboratory is to develop practical skills in spatial data analysis, processing, and visualization with the use of contemporary GIS tools.		
	Course content – project		
	The project component enables students to apply theoretical and practical knowledge in developing an independent spatial information project. Each student designs a conceptual data model for a selected application area, builds a relational database, and implements it in a GIS environment. The project includes integrating spatial and attribute data from multiple sources, designing SQL queries, and conducting spatial analyses that address a defined research or practical problem. The results are presented as thematic maps, visualizations, and analytical reports. The final stage of the project involves preparing complete documentation with data descriptions, methodologies, and tools used, followed by a presentation of project outcomes.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	80.0%	25.0%
	test	60.0%	75.0%
Recommended reading	Basic literature	1. David E. Davis „Gis for everyone"	
		2. P. Longley, M. Goodchild, D. Maguire, D. Rhind "New Developments in Geographical Information Systems: Principles, Techniques, Management and Applications"	
	Supplementary literature	1. Paul DuBois „MySQL"	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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