



## Subject card

Subject name and code	Applications of geographic information systems, PG_00045324						
Field of study	Data Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Optional subject group 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	3	Language of instruction			English		
Semester of study	6	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marcin Kulawiak				
	Teachers		dr hab. inż. Marcin Kulawiak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	18.0	0.0	15.0	12.0	0.0	45
	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	45	4.0		26.0	75	
Subject objectives	The aim of the course is to familiarize students with advanced methods of spatial data acquisition, storage, processing, analysis and multidimensional visualization.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U06] Independently solves complex engineering tasks using literature, materials and devices, prepares extensive documentation of the developed solution using appropriate description techniques.	Student can expand the functionality of simple GIS solutions.			[SU4] Assessment of ability to use methods and tools		
	[K6_W03] Knows the applications of geoinformation systems, spatial data formats, methods of creating and analysing digital maps, architecture and services of satellite navigation systems.	Student knows the basics of constructing GIS applications.			[SW1] Assessment of factual knowledge		
	[K6_U03] analyses problems and creates appropriate models, data structures and algorithms (including heuristic and numerical ones), assesses their computational complexity, estimates errors of the received solutions	Student can analyse spatial data obtained from various sources.			[SU1] Assessment of task fulfilment		
Subject contents	<ol style="list-style-type: none"> <li>Advanced methods of obtaining geospatial data from active and passive sensors.</li> <li>Advanced geospatial data formats and models (data from laser sensors, data from acoustic sensors, data from GPS; GML, KML, GeoJSON, LAS, Shapefile, 3DTiles).</li> <li>Advanced methods of geospatial data processing and analysis (correlation, regression, IDW, Kriging, Minimum Curvature, trend analysis, modeling and simulation of physical phenomena in GIS)</li> <li>Programming of Web-GIS</li> <li>GIS in the context of mobile devices (including GIS programming for mobile devices, obtaining high-quality data using smartphones)</li> <li>Programming of multidimensional simulations in the context of Spatial Information Systems (3D and 4D modeling and visualization using popular GIS libraries)</li> </ol>						

Prerequisites and co-requisites	knowledge of the Java, C++ and python languages, ability to use Unix/Linux, Windows operating systems,		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written test	60.0%	34.0%
	laboratory	60.0%	33.0%
	project	60.0%	33.0%
Recommended reading	Basic literature	Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., 2005. <i>Geographic information systems and science</i> . John Wiley & Sons.	
	Supplementary literature	Cressie, N., 1990. The origins of kriging. <i>Mathematical geology</i> , 22(3), pp.239-252.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Methods of raster spatial data acquisition  2. Methods of spatial data analysis		
Work placement	Not applicable		