



Subject card

Subject name and code	Applications of geographic information systems, PG_00045324						
Field of study	Data Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
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_U03] demonstrates professional and effective teamwork, both as a leader and as a team member		As part of group work, the student is able to construct simple data visualizations using GIS libraries.		[SU1] Assessment of task fulfilment		
	[K6_W02] demonstrates advanced preparation in methods and techniques for formulating and solving problems		Student knows the basics of constructing GIS applications.		[SW3] Assessment of knowledge contained in written work and projects		
	[K6_K03] demonstrates the ability to think critically and analytically and integrates knowledge from many disciplines in order to make effective decisions		Student can analyse spatial data obtained from various sources.		[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	1. Advanced methods of obtaining geospatial data from active and passive sensors. 2. Advanced geospatial data formats and models (data from laser sensors, data from acoustic sensors, data from GPS; GML, KML, GeoJSON, LAS, Shapefile, 3DTiles). 3. Open sources of data acquisition (satellite, aerial, publicly available vector databases).4. Advanced methods of geospatial data processing and analysis (correlation, regression, IDW, Kriging, Minimum Curvature, trend analysis, modeling and simulation of physical phenomena in GIS) 5. Programming of Web-GIS 6. Programming of multidimensional simulations in the context of Spatial Information Systems (3D and 4D modeling and visualization using popular GIS libraries)						
Prerequisites and co-requisites	knowledge of the Java, Javascript, C++ and python languages, ability to use Unix/Linux and Windows operating systems,						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	project		60.0%		33.0%		
	written test		60.0%		34.0%		
	laboratory		60.0%		33.0%		

Recommended reading	Basic literature	Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). <i>Geographic information science and systems</i> . John Wiley & Sons.
	Supplementary literature	Cressie, N., 1990. The origins of kriging. <i>Mathematical geology</i> , 22(3), pp.239-252.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Methods of raster spatial data acquisition 2. Methods of spatial data analysis	
Work placement	Not applicable	

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