



Subject card

Subject name and code	, PG_00066184						
Field of study	Geodesy and Cartography						
Date of commencement of studies	February 2026	Academic year of realisation of subject			2025/2026		
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor						
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		0.0		0.0	30
Subject objectives	The objective of the course is to familiarize students with selected methods and tools used in geographic information systems (GIS). The main goal of this part of the course is to develop the ability to appropriately apply 3D visualization technologies (AR, VR, MR) and the Microsoft Office suite to solve specific tasks and problems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W05] has a well-established knowledge of analytical methods and surveying techniques necessary for creating and solving a variety of problems in geodesy and cartography		The student possesses well-established knowledge of analytical methods and techniques for processing and visualizing spatial data, including 3D modeling and AR/VR technologies, which can be applied to solving geodetic and cartographic problems.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U06] creates solutions to complex and unstructured problems taking into account the variability of the environment by synthesising information from different sources, using analytical and simulation methods		The student is able to design solutions to complex and unstructured problems in the field of spatial data analysis and visualization by applying 3D technologies (AR, VR, MR), modeling tools, and analytical and simulation software. They can integrate information from various sources and apply it in dynamic spatial and technological contexts.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		

Subject contents	<p>Course content – lecture</p> <p>The course covers topics related to the use of modern information technologies, including 3D modeling technologies, spatial analysis, and office productivity tools. The classes aim to familiarize students with tools for spatial data analysis and visualization, the use of augmented and virtual reality, and the implementation of cloud technologies.</p> <ul style="list-style-type: none"> • Information and its importance definition, types of information, the role of information in the economy. • Cloud work and Microsoft technologies using OneDrive, Microsoft Word, Excel, and PowerPoint for data analysis. • Use of 3D modeling in visualization technologies basic modeling techniques, file formats, and interoperability. • Spatial data visualization application of software for creating dynamic and interactive presentations. • Modern visualization technologies AR, VR, MR and their applications in spatial analysis. • Holographic and anaglyph technologies in 3D visualization. • Virtual tours and interactive visualizations techniques for creating tours similar to Google Street View. • Potential use of AI in spatial data analysis. <p>Practical exercises focus on the hands-on application of tools and technologies discussed in the lectures. Students will work with office software, cloud technologies, augmented reality (AR), virtual reality (VR), and 3D modeling.</p> <ul style="list-style-type: none"> • Creating and publishing video materials recording and editing educational and analytical content, online publishing. • Creating AR applications designing a mobile application for visualizing land development with a single-family house using AR markers. • VR environments and their applications exploring different types of VR goggles, creating virtual tours and interactive environments. • Mixed reality applications using HoloLens goggles for spatial data analysis and visualization. • Designing virtual tours developing interactive visualizations similar to Google Street View. • Creating 3D visualizations using holographic and anaglyph technologies in spatial presentations. • Basics of 3D modeling creating simple models of spatial objects using available tools. 								
Prerequisites and co-requisites	Basic proficiency in creating 3D models.								
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 927 794 965">Subject passing criteria</th> <th data-bbox="794 927 1141 965">Passing threshold</th> <th data-bbox="1141 927 1477 965">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 965 794 994">Practical tasks</td> <td data-bbox="794 965 1141 994">60.0%</td> <td data-bbox="1141 965 1477 994">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Practical tasks	60.0%	100.0%
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Practical tasks	60.0%	100.0%							
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Badotra, S., Tanwar, S., Rana, A., Sindhwani, N., Kannan, R., Handbook of augmented and virtual reality, Wyd. De Gruyter., R. 2023 2. Doerner, R., Broll, W., Grimm, P., Jung, B., Virtual and augmented reality (VR/AR): Foundations and methods of extended realities (XR), Wyd. Springer Nature., R. 2022 3. Walkenbach, J., Excel 2013 PL. Biblija. Helion., Wyd. Helion, R. 2013 							
	Supplementary literature	<ol style="list-style-type: none"> 1. Gotlib D., Iwaniak A., Olszewski R., GIS obszary zastosowań, Wyd. PWN, R. 2007 2. Litwin L., Myrda G., Systemy Informacji Geograficznej. Zarządzanie danymi przestrzennymi w GIS, SIP, SIT, Wyd. Helion, R. 2008 							
	eResources addresses								
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • Creating a virtual tour of a building based on 360-degree photographs. • Developing an application that visualizes a selected 3D model in augmented reality. • Launching a section of a spatial development plan using VR goggles. 								
Practical activities within the subject	Not applicable								

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