



Subject card

Subject name and code	Advanced geoinformatics methods, PG_00054565						
Field of study	Geodesy and Cartography						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Adam Ingłot				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	10.0	0.0	15.0	0.0	55
	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	55		10.0		35.0	100
Subject objectives	The listener will get acquainted with advanced spatial analyzes. They receive basic knowledge of Python programming. As part of the exercises during the course, the student becomes familiar with the arcpy module, performs raster and vector analysis using Python scripts. Supports a point cloud with the laspa library.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W07] knows the structure of the geoinformatic system, the stages of the geoinformatic project development and operation, the legal, economic and ethical aspects of the geoinformatic projects, national and European conditions in the field of geoinformation	The student knows the scheme of conduct for creating geoinformatics projects.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_W09] has basic knowledge related to artificial intelligence	The student knows the most popular libraries for spatial analyzes. Performs advanced raster and vector data analysis. Calculating statistics. The student gets acquainted with the latest trends in deep learning programming and uses in GIS.	[SW2] Assessment of knowledge contained in presentation
	[K7_W08] knows spatial data models in the context of relational and object-oriented databases, principles of designing and building spatial databases, basics of databases in XML, development trends in spatial databases	The student knows how to handle various spatial data formats, knows how to convert vector data from text files to shapefiles, and how to handle this data in a programming language.	[SW2] Assessment of knowledge contained in presentation
	[K7_U06] can perform basic and complex spatial analysis, can create spatial metadata, and use these metadata	The student is able to transform vector data, analyze numerical data in Python. It supports LAS files along with metadata.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W12] knows methods of spatial analysis, geometric concepts, spatial statistics, knowledge extraction methods, network analysis, optimization methods, application of artificial intelligence methods in spatial analysis	The student knows the most popular libraries for spatial analyzes. Performs advanced raster and vector data analysis. Calculating statistics. The student gets acquainted with the latest trends in deep learning programming and uses in GIS.	[SW3] Assessment of knowledge contained in written work and projects	
Subject contents	<p>The lecture covers the following topics: basic information on programming in Python, arcpy and laspy library support, algorithms used in GIS.</p> <p>The exercises include: working in a development environment, creating your own scripts using the arcpy module</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Oral answer	50.0%	50.0%
	Project	50.0%	50.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Longley, Paul A., et al. <i>Geographic information systems and science</i>. John Wiley & Sons, 2005. 2. Sabins Jr, Floyd F. <i>Remote sensing--principles and interpretation</i>. WH Freeman and company, 1987. 3. Toms, Silas. <i>ArcPy and ArcGISGeospatial Analysis with Python</i>. Packt Publishing Ltd, 2015. 4. West, Douglas Brent. <i>Introduction to graph theory</i>. Vol. 2. Upper Saddle River, NJ: Prentice hall, 1996. 5. J. Smith, P. Smith - <i>Environmental modeling an introduction</i>, Oxford University Press, 2007 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Bonaccorso, Giuseppe. <i>Machine learning algorithms</i>. Packt Publishing Ltd, 2017. 2. Toms, Silas. <i>ArcPy and ArcGISGeospatial Analysis with Python</i>. Packt Publishing Ltd, 2015. 3. Beyeler, Michael. <i>Machine Learning for OpenCV</i>. Packt Publishing Ltd, 2017. 	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none">1. Difference between raster and vector data?2. Describe the raster analysis process using programming3. Describe the data stored in LAS format?4. How the algorithm works in the pansharpening process.5. Describe the vector data structure.
Work placement	Not applicable