GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced geoinformatics methods, PG_00054565						
Field of study	Geodesy and Cartography						
Date of commencement of studies	February 2023		Academic year of realisation of subject	2022/2023			
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 Inglot					
	Teachers	dr inż. Adam Inglot					
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_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
[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_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_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_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

Subject contents

The lecture covers the following topics: basic information on programming in Python, arcpy and laspy library support, algorithms used in GIS.

The exercises include: working in a development environment, creating your own scripts using the arcpy module

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	50.0%	50.0%
Oral answer	50.0%	50.0%

Recommended reading

Basic literature

1. Longley, Paul A., et al. *Geographic information systems and science*. John Wiley & Sons, 2005.
2. Sabins Jr, Floyd F. *Remote sensing--principles and interpretation*. WH Freeman and company, 1987.
3. Toms, Silas. *ArcPy and ArcGISGeospatial Analysis with Python*. Packt Publishing Ltd, 2015.
4. West, Douglas Brent. *Introduction to graph theory*. Vol. 2. Upper Saddle River, NJ: Prentice hall, 1996.
5. J. Smith, P. Smith - Environmental modeling an introduction, Oxford University Press, 2007

Supplementary literature

1. Bonaccorso, Giuseppe. *Machine learning algorithms*. Packt Publishing Ltd, 2017.

2. Toms, Silas. *ArcPy and ArcGISGeospatial Analysis with Python*. Packt Publishing Ltd, 2015.

3. Beyeler, Michael. *Machine Learning for OpenCV*. Packt Publishing Ltd, 2017.

eResources addresses

Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Difference between raster and vector data? 2. Describe the raster analysis process using programming 3. 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