GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Digital photogrammetry with elements of computer vision, PG_00045750						
Field of study	Geodesy and Cartography						
Date of commencement of studies	February 2024		Academic year of realisation of subject	2024/2025			
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	2		ECTS credits	8.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Tysiąc				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	45.0	15.0	0.0	0.0	120
	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	120		12.0	68.0	200	
Subject objectives	The aim of the course is to prepare the student for the implementation of advanced technical and development works with the use of terrestrial and aerial photogrammetry techniques as well as satellite remote sensing.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W02] knows the of data acquisition using laser scanning, has the knowledge of the photogrametric alignment (scan orientation)	The student is able to use the software to align laser scanning series / scans. He can obtain numerical data from laser scanners.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_U01] can use in the practice photogrammetric techniques and technologies, and in particular creates graphic and vector maps, elevation models and knows how to perform photogrammetric engineering measurements	The student is able to independently perform a photogrammetric measurement in a geodetic task and to develop vector maps and height models in the appropriate software.	[SU4] Assessment of ability to use methods and tools
	[K7_U05] can choose, depending on the nature of the study, methods for assessing the quality of photogrammetric and remote sensing products and elaborations.	The student has the skills necessary to assess the quality of photogrammetric data (e.g. satellite images) and has the ability to select photogrammetric products for the implementation of geodetic tasks.	[SU4] Assessment of ability to use methods and tools
	[K7_U04] can use the techniques of digital image processing in digital photogrammetry and remote sensing	The student has the ability to digitally process images in digital photogrammetry and remote sensing using appropriate software.	[SU4] Assessment of ability to use methods and tools
	[K7_W05] knows the basic regulations and implementation guidelines of the European Union directives refering to spatial information infrastructure and principles of exchange, harmonization and integration of spatial data; has basic knowledge of georeferencing databases, spatial metadata, geospatial information, spatial information and conceptual models	The student knows the legal basis when performing projects in the field of photogrammetry and remote sensing.	[SW1] Assessment of factual knowledge
	[K7_W01] has the knowledge of basic aerial and satellite photogrammetry and extensive knowledge of the application of photogrammetry, including knowledge of the usage of photogrammetric methods and technologies of data acquisition for the construction of topographic and thematic databases,has the knowledge of numerical terrain models (NMT) and numerical models of land cover (NMPT), as well as building models; knows and is able to apply in practice photogrammetric techniques and technologies, and in particular knows the principles of image mapping, vector maps and altitudinal models, has knowledge of existing sensors and their calibration, terratriangulation of models and 3D visualization	The student has knowledge of photogrammetry and remote sensing to build topographic and thematic databases. Has the knowledge necessary to build numerical terrain models (DTM) and numerical land cover models (DMPT), as well as building models. Has the knowledge necessary to create vector and image maps, and elevation models.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_U02] can perform and elaborate 3D models based on laser scaninng data	The student has the ability to use the software to develop numerical 3D models based on data from laser scanning.	[SU4] Assessment of ability to use methods and tools
Subject contents	1. Performing photogrammetric measurements with the use of digital cameras and a laser scanner.2. Creation of databases from satellite remote sensing sensors.3. Performing photogrammetric tasks: creating height models, building models, vector maps, image maps in accordance with applicable law.4. Extended scope of digital image processing in photogrammetric applications.		

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<tr><td>Prerequisites and co-requisites</td><td>1. Basic knowledge of the conditions for taking terrestrial / aerial / satellite imagery.
2. Knowledge of orthophotomap development.
3. Knowledge of digital photo processing methods.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Reports</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Presentation</td><td>60.0%</td><td>10.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Z. Kurczyński, Fotogrametria, Wyd. PWN, Warszawa

2. W. Malina, M. Smiatacz, Cyfrowe Przetwarzanie Obrazów, Wyd. EXIT, ISBN 978-83-60434-54-3

3. https://mostwiedzy.pl/pl/ przegląd artykułów.

4. https://www.mdpi.com/ przegląd artykułów.</td></tr>
<tr><td>Supplementary literature</td><td>The list of readings will be supplemented with a bibliography for each scientific article analyzed during the semester, presenting the current state of knowledge of photogrammetry and remote sensing.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Characterize the autonomous mobile system.
2. Characterize the deformation measurement using the InSAR technique.
3. Please describe the ICP algorithm.
4. Please describe methods of building the Digital Terrain Model using LiDAR technique.
5. Characterize the phenomenon of light scattering in the atmosphere.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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