



## Subject card

Subject name and code	Low-level aerial photogrammetry, PG_00053257						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
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		Polish		
Semester of study	6		ECTS credits		3.0		
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. Paweł Burdziakowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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		5.0		25.0	75
Subject objectives	The purpose of the course is to teach how to take photogrammetric measurements from unmanned aerial platforms, how to operate photogrammetric software, and how to interpret the results.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] can use contemporary geodetic instruments, including automation of measurements, data transmission and processing in a computer-instrument system with the use of computer networks		Able to carry out a photogrammetric study from a low ceiling, according to the process cycle.		[SU1] Assessment of task fulfilment		
	[K6_W01] has basic knowledge and understands the concepts of physics which allow to use optical and immersive instruments as well as positioning and satellite imaging		Knows the elements of a photogrammetric study, understands the study parameters and understands their impact on the result.		[SW3] Assessment of knowledge contained in written work and projects		
	[K6_W07] has a well-established knowledge and understands concepts in the field of engineering geodesy including the use of calculations and measurements methods carried out with the use of geodetic instruments and photogrammetric and remote sensing technologies related to geodetic support for investment, surveying and inventory measurements and photogrammetry with remote sensing		Has knowledge of the technological cycle of low-altitude photogrammetric development.		[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	The course content includes the following topics: <ul style="list-style-type: none"><li>• Introduction to low-altitude photogrammetry + history</li><li>• BSP in low-altitude photogrammetry (advantages, disadvantages, purpose)</li><li>• Functional load</li><li>• The technological cycle of photogrammetric development, including:</li><li>• Preparatory work</li><li>• Field work</li><li>• Development of images</li><li>• Products of NP photogrammetry.</li><li>• Assessment of the quality and accuracy of photogrammetric development</li><li>• Use of basic NP photogrammetric products.</li><li>• Other NP photogrammetric studies, including case studies:</li><li>• Current law on photogrammetric studies in Poland.</li></ul>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	UAV Technical Data	70.0%	20.0%
	Photogrammetric modeling	80.0%	40.0%
	Technical project	80.0%	40.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"><li>• Drony Wiktor Wyszywacz</li><li>• Fotogrametria - Zdzisław Kurczyński - PWN</li><li>• Opracowania fotogrametryczne z niskiego pułapu / Michał Kędzierski (red. nauk.), Anna Fryškowska, Damian Wierzbicki.</li><li>• <a href="https://www.agisoft.com/pdf/metashape-pro_1_8_en.pdf">https://www.agisoft.com/pdf/metashape-pro_1_8_en.pdf</a></li><li>• <a href="https://www.agisoft.com/support/tutorials/beginner-level/">https://www.agisoft.com/support/tutorials/beginner-level/</a></li><li>• <a href="https://www.bentley.com/pl/products/product-line/reality-modeling-software/contextcapture">https://www.bentley.com/pl/products/product-line/reality-modeling-software/contextcapture</a></li><li>• <a href="https://support.pix4d.com/hc/en-us/articles/360031682092-PIX4Dmapper-video-tutorials">https://support.pix4d.com/hc/en-us/articles/360031682092-PIX4Dmapper-video-tutorials</a></li></ul>	
	Supplementary literature	Richard Hartley and Andrew Zisserman. 2003. Multiple View Geometry in Computer Vision (2nd. ed.). Cambridge University Press, USA.	
	eResources addresses	Adresy na platformie eNauczanie: Fotogrametria Niskiego Pułapu (2023/2024) - Moodle ID: 38417 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38417">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38417</a>	
Example issues/ example questions/ tasks being completed	<p>Laboratory Block 1: Laboratory Issues (4h):</p> <ul style="list-style-type: none"><li>• Selecting a non-metric camera for a task</li><li>• Designing the flight altitude for a given GSD</li><li>• Designing the longitudinal and transverse coverage</li><li>• Designing a flight plan for the above data</li><li>• Making sketches and flight plan</li><li>• Characterization of the BSP for photogrammetric measurement</li></ul> <p>Laboratory block 2 - Development of preparatory documentation</p> <ul style="list-style-type: none"><li>• Laboratory topics (4h)</li><li>• Development of preparatory documentation:</li><li>• Analysis of terrain and adjacent space</li><li>• Location of photogrammetric matrix</li><li>• Objects affecting the implementation of the mission</li><li>• Characteristics of the measurement task and accuracy parameters</li><li>• BSP and camera characteristics</li><li>• Location and signaling method of photogrammetric matrix points</li><li>• The method of image processing</li><li>• Format of the resulting data</li><li>• Sketch</li></ul> <p>Laboratory block 3 - Software operation: Laboratory issues (7h)</p> <ul style="list-style-type: none"><li>• Software operation:</li><li>• Agisoft Photo Scan</li><li>• Pix 4D</li><li>• Bentley Context Capture</li><li>• Manual PIX4DPlik</li><li>• Bentley Context Capture Tutorial</li><li>• Photogrammetric development</li></ul>		
Work placement	Not applicable		