



## Subject card

Subject name and code	Advanced photogrammetry, PG_00045746						
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	8.0				
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. Jakub Szulwic					
	Teachers	dr inż. Jakub Szulwic dr inż. Paweł Tysiąc dr inż. Bożena Kotarska-Lewandowska					
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 course prepares for advanced photogrammetry works including mobile and terrestrial laser scanning, photogrammetric studies of unmanned aerial vehicles and ground short-range photogrammetry.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 prepare a photogrammetric study for the needs of geomatics engineering (engineering geodesy) and spatial analyzes.	[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 knows how to make and process the images during the photogrammetric process.	[SU4] Assessment of ability to use methods and tools
	[K7_W02] knows the of data acquisition using laser scanning, has the knowledge of the photogrammetric alignment (scan orientation)	The student has knowledge of obtaining data from laser scanning and knows how to make a study based on a set of data from laser scanning.	[SW3] Assessment of knowledge contained in written work and projects
	[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 is able to assess the quality of photogrammetric products - e.g. orthophotomap, aerial and ground photos as well as photographic material obtained with the use of unmanned aerial vehicles - for the needs of geodetic studies.	[SU4] Assessment of ability to use methods and tools
	[K7_W05] knows the basic regulations and implementation guidelines of the European Union directives referring 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 has knowledge of the current legal regulations in the field of photogrammetry.	[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 the basics of aerial and satellite photogrammetry and an extended knowledge of the use of photogrammetry in modern economy.	[SW1] Assessment of factual knowledge
	[K7_U02] can perform and elaborate 3D models based on laser scanning data	The student is able to use the software to build 3D models based on data from terrestrial, stationary laser scanning.	[SU1] Assessment of task fulfilment
Subject contents	Taking pictures with photogrammetric registration rules. Participation in photographic works using unmanned aerial vehicles. Performing photogrammetric tasks: terrestrial laser scanning, terrestrial photogrammetric registration.		
Prerequisites and co-requisites			

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Evaluation of a practical study in the form of a photogrammetric project.	50.0%	40.0%
	Assessment of factual knowledge in the form of written work and an interview.	60.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Kurczyński Z., Lotnicze i satelitarne obrazowanie Ziemi tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2006</li> <li>2. Kurczyński Z., Preuss R.: "Podstawy Fotogrametrii", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2002</li> <li>3. Butowtt J., Kaczyński R: "Fotogrametria", Wojskowa Akademia Techniczna, Warszawa, 2003</li> <li>4. Sitek Z.: "Zarys teledetekcji lotniczej i satelitarnej" Wydawnictwa AGH, Kraków, 1992</li> </ol>	
	Supplementary literature	Kraus K.: Photogrammetry: geometry from images and laser scans - fragments	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Performing photogrammetric registration. Development of image registration data and terrestrial laser scanning. Registration design using terrestrial laser scanning.		
Work placement	Not applicable		