GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Digital Photogrammetry, PG_00053253						
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	5		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. Paweł Burdziakowski					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	15.0	30.0	0.0	0.0	90
	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	90		10.0	100.0		200
Subject objectives	The goal of the course is for the student to learn and master basic and advanced methods, tools and algorithms of digital photogrammetry and computer vision.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Know and can describe elements of analytical photogrammetry (elements of internal, external, mutual orientation) Knows and can make a model using elements of single and dual image digital photogrammetry. Knows the characteristics of typical short range (terrestrial) digital studies.	[SW3] Assessment of knowledge contained in written work and projects
[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 and understands the physics of image formation. Knows and understands the effect of a camera lens on an image. Knows and understands the effect of the resolving power of a digital image on an image. Be able to describe the structure of a digital camera using a selected example. Be able to operate a digital camera.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U08] can use modern measurement technologies to solve common tasks in 3D modeling	Knows and can perform basic operations on digital images. Can describe and present elements of the process of developing photogrammetric terrestrial model. Knows and can indicate directions of development of digital photogrammetry. Recognize differences between aerial and satellite photogrammetry.	[SU1] Assessment of task fulfilment

Subject contents

During the lecture course the student will learn the knowledge of digital photogrammetry.The main topics include description of a digital image, basic operations on digital images, including geometric transformations, point transformations (context free), contextual transformations (convolution, logical and median filters), spectral transformations (using Fourier transforms) and morphological transformations.In the next stage the student will learn how image correlation is implemented, what is disparity. Elements of internal and external orientation is the stage of learning the analytical part of photogrammetry. During theoretical classes the student will learn aberrations of digital cameras, and during laboratories the student will learn to perform camera calibration.During lectures, features relevant to photogrammetric issues arising from the construction, metric and non-metric camera designs are described.Laboratory classes are conducted on Matlab, Agisoft, Bentley Context Capture, and PIX4D software. The labs are preceded by a basic Matlab course, so the student will learn to program in this environment. Translated with www.DeepL.com/Translator (free version)

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	50.0%	50.0%
Laboratory	50.0%	25.0%
Laboratory	50.0%	25.0%

Recommended reading

Basic literature

1. Kurczyński Z., Preuss R.: "Podstawy Fotogrametrii", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2002
2. Bernasik J.: Fotogrametria. Wykład dla II roku Geoinformacji i Geodezji Górniczej, http://oen.dydaktyka.agh.edu.pl/dydaktyka/obliczenia_inzynierskie/a_fotogrametria/fotogr ametria.pdf
3. Zygmunt Wróbel, Robert Koprowski. Praktyka przetwarzania obrazów z zadaniami w programie Matlab - EXIT Warszaw 2012
4. Cyfrowe przetwarzanie obrazów W. Malina, M.Siatacz . EXIT, 2008
5. Obraz cyforwy M.Domański , WKŁ Warszawa 2010
6. Komputerowe przetwarzanie obrazów trójwymiarowych. Bogusław Cyganek. EXIT, 2002.
7. Hartley R., Zisserman A. Multiple View Geometry in Computer Vision (2ed,OUP)

	Supplementary literature	1. Thomas Luhmann, Stuart Robson, Stephen Kyle, Jan Boehm, Close-Range Photogrammetry and 3D Imaging De Gruyter; 3rd revised and expanded edition (18 listopada 2019) 2. Wilfried Linder, Digital Photogrammetry A Practical Course, Springer, Berlin, Heidelberg 2016 3. Francesco Mancini and Riccardo Salvini (Eds.), Applications of Photogrammetry for Environmental Research, ISBN 978-3-03928-180-0 (Pbk); ISBN 978-3-03928-181-7 (PDF)
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Perform basic operations on digital images in Matlab 2. Detect elements in a digital image (edges, lines, feature points) 3. Create a 3D model using SFM algorithm in Matlab 4. Calibrate digital camera 5. Take calibration pictures 6. Perform a basic Matlab course	
Work placement	Not applicable	