GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Low-level aerial remote sensing, PG_00053258						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2020		Academic year of realisation of subject	2022/2023			
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. Krystyna Michałowska					
	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	Getting acquainted with methods of acquiring remote sensing data from the UAV ceiling, techniques of digital processing of multispectral low-altitude imagery and creation of selected remote sensing studies						

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	The student has knowledge of the physical basics of remote sensing. He knows selected methods of acquiring UAV, aerial and satellite ceiling data. Has basic knowledge of digital processing and analysis of low ceiling images (multispectral, thermal). Has knowledge of methods of creating basic remote sensing products.	[SW1] Assessment of factual knowledge
[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 rules applicable to the acquisition, processing and analysis of low-level remote sensing data.	[SW1] Assessment of factual knowledge
[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	Can use methods of digital remote sensing image processing to create orthophotos, filter, calibrate, classify, calculate indices and create thematic maps	[SU4] Assessment of ability to use methods and tools
[K6_U14] can apply the necessary skills to conduct independent work in the field of topographic surveys along with the elaborating of results, geodetic investment service, surveying and inventory measurement, photogrammetry and remote sensing, and making the maps and elaborations for legal purposes including delimitation and subdivision of real estate	The student has basic skills in digital processing of remote sensing data. He can use the methods of image classification, calculation of indices, color compositions to create thematic maps.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents

Basics from: electromagnetic radiation, digital image, multispectral image, thermal image, spatial, spectral and radiometric resolution.

Types of remote sensing data. Data sources and methods of acquisition and processing of remote sensing data of UAV ceiling. Passive and active methods.

Operations on spectral bands. Spectral (color) compositions. Types and application of vegetation/soil/water indices. Development of thematic maps: calculation of vegetation/soil index maps.

Creation of NMT, development of slope,exposure, insolation maps.

Development of thermal data - generation of temperature maps.

Prerequisites and co-requisites

Knowledge of basic optics and physics is required

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	60.0%	40.0%
report	60.0%	25.0%
project	60.0%	35.0%

Recommended reading

Basic literature

Adamczyk J., Będkowski K.: Digital methods in remote sensing. SGGW Publishing House, Warsaw 2005

Kurczyński Z.: Aerial and satellite imaging of the Earth; Oficyna Wydawnicza Politechniki Warszawskiej, Warsaw 2006

Bernasik J.: Lectures in photogrammetry and remote sensing, Cracow 2008

Sanecki J. (ed): Remote sensing: Data acquisition. WNT, 2006

	Supplementary literature	Noor, N. M., Abdullah, A., & Hashim, M. (2018, June). Remote sensing UAV/drones and its applications for urban areas: A review. In *IOP conference series: Earth and environmental science* (Vol. 169, No. 1, p. 012003). IOP Publishing. Mazur, P., & Chojnacki, J. (2017). Use of drones for multispectral remote sensing in precision agriculture. Agricultural horticultural forestry technology (1) Tang, L., & Shao, G. (2015). Drone remote sensing for forestry research and practices. *Journal of Forestry Research*, *26*, 791-797.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Processing a collection of multispectral UAV images to develop a thermal map and moisture map of the selected area. Determination of zones at risk of flooding based on NMT data and land cover map.	
Work placement	Not applicable	