



Subject card

Subject name and code	Satellite Observation Sensors, PG_00050022						
Field of study	Space and Satellite Technologies, Space and Satellite Technologies						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study 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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Tomasz Berezowski					
	Teachers	dr inż. Tomasz Berezowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	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	8.0		22.0		75
Subject objectives	<b>Acquisition of knowledge and practical skills in the field of sensors used in satellite remote sensing and Earth observation: physical basis of phenomena used in remote sensing, principles of operation of individual sensors, data obtained from sensors, data processing methods, applications</b>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_U08	The student knows the limitations of various satellite sensors and the resulting limitations in the processing of data from these sensors	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	K7_W13	The student is able to describe the construction of various modern satellite sensors	[SW1] Assessment of factual knowledge
	K7_W05	The student can describe the operation of various modern satellite sensors	[SW1] Assessment of factual knowledge
	K7_W12	The student is able to use IT tools for processing data from satellite sensors and is able to use these tools to analyze the operation of sensors.	[SW1] Assessment of factual knowledge
K7_U09	The student is able to process data from satellite sensors and analyze the operation of satellite sensors	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject	
Subject contents	Sensor bands and types. Visible and infrared scanners, types of detectors. Passive thermal and microwave sensors. Radar range, imaging radars. Processing and use of radar images. Synthetic aperture radar (SAR) - principle and basic properties. Synthesis and processing of SAR images. SAR interferometry and polarimetry. Implementation of software for processing satellite data from specific sensors. SRF calculation, radiation transfer models.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratories	50.0%	50.0%
	Written egzam	50.0%	50.0%
Recommended reading	Basic literature	1. Elachi C., Van Zyl J. J., Introduction to the Physics and Techniques of Remote Sensing, 2nd Edition, Wiley, 2006  2. Hein A., Processing of SAR Data: Fundamentals, Signal Processing, Interferometry, Springer-Verlag, 2004  3. Richards J., Remote Sensing Digital Image Analysis, Springer-Verlag Berlin Heidelberg 1986 and 1993	
	Supplementary literature	1. Chuvieco E., Fundamentals of Satellite Remote Sensing: An environmental approach, CRC Press, Taylor & Francis Group, 2016  2. Jaehne B., Digital Image Processing. Concepts, Algorithms, and Scientific Applications, Springer, 1995  3. Longley P., Goodchild M., Maguire D., Rhind D., Geographic Information Systems and Science, John Wiley & Sons Ltd., West Sussex 2005  4. Maini A. K., Agrawal V., Satellite Technology: Principles and Applications, Second Edition, John Wiley & Sons, 2011	
	eResources addresses	Adresy na platformie eNauczanie: Sensory obserwacji satelitarnej (Satellite Observation Sensors) 23/24 - Moodle ID: 33701 <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=33701">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=33701</a>	

Example issues/ example questions/ tasks being completed	Develop a digital terrain model based on data from the Sentinel-1 sensor  What materials are used in FPA thermal sensors?
Work placement	Not applicable