



## Subject card

Subject name and code	Satellite Technologies, E:41023W0						
Field of study	Space and Satellite Technologies						
Date of commencement of studies	February 2024		Academic year of realisation of subject		2023/2024		
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		English		
Semester of study	1		ECTS credits		2.0		
Learning profile			Assessment form		assessment		
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Zbigniew Łubniewski				
	Teachers		dr hab. inż. Zbigniew Łubniewski  dr inż. Jerzy Demkowicz  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	15.0	0.0	0.0	30
	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	30		0.0		0.0	30
Subject objectives	To familiarise students with the approach to artificial satellite as a system, including satellite subsystems and their roles and interdependencies, as well as to familiarise with such domains of satellite technology applications as satellite navigation and satellite remote sensing.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_W04	Student has knowledge on satellite mission design.	[SW1] Assessment of factual knowledge
	K7_W05	He has the knowledge on methods and applications of satellite remote sensing.	[SW1] Assessment of factual knowledge
	K7_W12	He has knowledge of IT tools for processing and analyzing satellite images.	[SW1] Assessment of factual knowledge
	K7_W13	He has knowledge on the construction of particular segments, on the principles of operation as well as of applications of satellite navigation systems, as well as on the design of individual elements of satellite navigation systems.	[SW1] Assessment of factual knowledge
	K7_U10	He takes into account security aspects when solving tasks in the field of satellite technologies.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	K7_U12	He implements tasks in the field of satellite technologies with the selection of appropriate IT tools for this purpose.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	K7_U14	He is able to define security requirements when implementing tasks in the field of satellite technologies.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_K02] Understands the non-technical aspects of activities in the field of space and satellite technologies, including their social consequences and impact on the state of the environment. Expresses opinions on the development of technology and related risks.	Understands non-technical aspects of activities in the field of satellite technologies.	[SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness
K7_W09	He knows marine applications of satellite navigation and satellite remote sensing.	[SW1] Assessment of factual knowledge	
Subject contents	Artificial Earth satellite as a system. Satellite subsystems and their roles and interdependencies: mechanical subsystem, power supply subsystem, avionics subsystem, orbit control and stabilization subsystem, thermal control subsystem, telecommunication subsystem, software and data handling subsystem, other subsystems. Satellite ground segment. Main applications of satellite technology. Satellite telecommunications. Satellite navigation: architecture, elements, functions and services of global navigation satellite system (GNSS); the essence of determining position coordinates in GNSS code measurements; pseudo range measurement, pseudo range measurement errors: tropospheric and ionospheric refractions, ephemeris data errors, clock errors, multi-path, errors introduced by the receiver, other errors; DOP coefficients and their influence on positioning accuracy; operational characteristics of navigation positioning systems. Satellite remote sensing: Earth observation satellites (EOS) and their instrumentation components; electromagnetic waves and their use in satellite imaging; technical features of satellite EO system; sample applications of satellite remote sensing in land, sea and atmosphere observation; short review of present EO systems and programs		
Prerequisites and co-requisites	-		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	50.0%	50.0%
	exam	50.0%	50.0%
Recommended reading	Basic literature	Students will receive a reading list at the beginning of the semester.	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie: [EMSS] Satellite Technologies: Satellite as a System, Satellite Remote Sensing 2023/24 - Moodle ID: 38716 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38716">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38716</a>	
Example issues/ example questions/ tasks being completed	-		
Work placement	Not applicable		