



Subject card

Subject name and code	Antenna Technique in Space Applications, E:41035W0						
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			Polish		
Semester of study	1	ECTS credits			3.0		
Learning profile		Assessment form			assessment		
Conducting unit	Department of Microwave and Antenna Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Włodzimierz Zieniutycz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	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		0.0		0.0	45
Subject objectives	The aim of the course is to give the students the knowledge of theory, construction and measurement technique of antenna parameters taking into account the specifics the resulting from the applications in space and satellite technologies.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_W12	Student has knowledge on the specificity of the wireless channel used in space applications.			[SW1] Assessment of factual knowledge		
	[K7_K03] Can analyse and implement assigned tasks while maintaining high technical standards. Is able to work and interact in a group, taking on different roles. Adheres to the principles of professional ethics and respects the diversity of views and cultures.	Student implements his tasks related to parametr analysis and design of antennas maintaining high technical standards.			[SK2] Assessment of progress of work		
K7_U12	Student is able to measure the electric parameters of selected antennas and arrays used in space applications, as well as to use numeric tools for simulation of these parameters and for design of classical microstrip antenna.			[SU1] Assessment of task fulfilment			

Subject contents	<p>1. Introduction: electromagnetic frequency bands, basics of radiation theory and electromagnetic wave guiding, quantitative description of field phenomena.</p> <p>2. Antenna parameters: radiation pattern, gain, effective antenna aperture, polarization parameters, noise parameters.</p> <p>3. Theory of antenna array, the concept of array factor, , homogeneous and nonhomogeneous linear array, planar array, beam forming systems.</p> <p>4. Overview of selected types of antennas: dipoles and their power supply systems, biconical, helical, spiral antennas,tubes, microstrip antennas, slot, reflector antennas.</p> <p>5. Earthly space and space as a specific working environmentsfor antennas - factors determining the choice of material and the process of designing and antennas construction.</p> <p>6. Antenna measurement: environmental measurements, antenna parameters measurement: radiation pattern, gain, ellipticity, reflection.</p>														
Prerequisites and co-requisites	Basic of electromagnetics														
Assessment methods and criteria	<table border="1" data-bbox="448 757 1495 902"> <thead> <tr> <th data-bbox="448 757 794 801">Subject passing criteria</th> <th data-bbox="794 757 1141 801">Passing threshold</th> <th data-bbox="1141 757 1495 801">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 801 794 835">project</td> <td data-bbox="794 801 1141 835">50.0%</td> <td data-bbox="1141 801 1495 835">30.0%</td> </tr> <tr> <td data-bbox="448 835 794 869">written test from lecture</td> <td data-bbox="794 835 1141 869">50.0%</td> <td data-bbox="1141 835 1495 869">40.0%</td> </tr> <tr> <td data-bbox="448 869 794 902">reports from laboratory</td> <td data-bbox="794 869 1141 902">50.0%</td> <td data-bbox="1141 869 1495 902">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	project	50.0%	30.0%	written test from lecture	50.0%	40.0%	reports from laboratory	50.0%	30.0%
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Example issues/ example questions/ tasks being completed	<p>1. Define the gain of antenna.</p> <p>2. The angular spectrum - discuss the application in antenna measurement.</p> <p>3. Discuss the properties of biconical antenna.</p> <p>4. Discuss the formula on reflector antenna directivity.</p>														
Work placement	Not applicable														