

关。GDAŃSK UNIVERSITY 创 OF TECHNOLOGY

Subject card

Subject name and code	Antenna Technique, PG_00050023								
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 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		dr inż. Małgorzata Warecka prof. dr hab. inż. Włodzimierz Zieniutycz						
Lesson types and methods	Lesson type	esson type Lecture		Tutorial Laboratory Pro		t	Seminar	SUM	
of instruction	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 ir classes include plan		a didactic Participation in ed in study consultation hours		Self-study SUM				
	Number of study hours	45		8.0		22.0		75	
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_U09		He can assess the suitability of numerical tools to design the selected antennas (e.g. microstrip, reflector antennas) and arrays used in space application.			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information			
	K7_U12		He can simulate numerically electric parameters of selected antennas and arrays used in space application. He can design classical microstrip antenna using the suitable numerical tools.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			
	K7_W12		Has knowledge on the specificity of the wireless channel used in space application			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			
	K7_U08		He can measure the electric parameters (e.g. radiation pattern, gain) of selected antennas and arrays used in space application.			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment			
	K7_W07		Has knowledge on the space specifics and its influence on the design, technology and measurement methods of electric parameters of the antennas and arrays operating in space.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			

Subject contents	1. Introduction: electromagnetic frequency bands, basics of radiation theory and electromagnetic wave guiding, quantitative description of field phenomena.						
	2. Antenna parameters: radiation pattern, gain, effective antenna aperture, polarization parameters, noise parameters.						
	3. Theory of antenna array, the concept of array factor, , homogeneous and nonhomogeneous linear array, planar array, beam forming systems.						
	4. Overview of selected types of antennas: dipoles and their power supply systems, biconical, helical, spiral antennas, tubes, microstrip antennas, slot, reflector antennas.						
	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.						
	6. Antenna measurement: environmental measurements, antenna parameters measurement: radiation pattern, gain, ellipticity, reflection.						
	7. Final test						
Prerequisites and co-requisites	Basic of electromagnetics						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	written test from lecture	50.0%	70.0%				
	reports from laboratory	50.0%	30.0%				
Recommended reading	Basic literature 1. C. A. Balanis: Antenna Theory, Analysis and Design, John Wile 1982.						
		2. W. A. Imbriale, S. Gao, L. Boccia: Space Antenna handbook, J. Wiley, 2012.					
		3. W. Zieniutycz: Anteny - podstawy	/ polowe, WKŁ, 2001 (in Polish)				
	Supplementary literature	1. G. E. Evans: Antenna Measurement Techniques, Artech House, 1990					
	eResources addresses	Adresy na platformie eNauczanie: Technika antenowa (TKiS) - 23/24 - Moodle ID: 32035 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32035					
Example issues/ example questions/ tasks being completed	1. Define the gain of antenna.						
	2. The angular spectrum - discuss the application in antenna measurement.						
	3. Discuss the properties of biconical antenna.						
	4. Discuss the formula on reflector antenna directivity.						
Work placement	Not applicable						