

## GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Antenna Techniques, PG_00048083								
Field of study	Electronics and Telecommunications								
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	at the university		
Year of study	3		Language of instruction			Polish			
Semester of study	6		ECTS credits			1.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Microwave and Antenna Engineering -> Faculty of Electronics, Telecommunications and Informatics								
Name and surname	Subject supervisor		dr hab. inż. Ra	afał Lech					
of lecturer (lecturers)	Teachers		dr hab. inż. R	hab. inż. Rafał Lech					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	;t	Seminar	SUM	
	Number of study hours	15.0	0.0	0.0	0.0		0.0	15	
	E-learning hours inclu	ıded: 0.0							
Learning activity and number of study hours	Learning activity	Participation ir classes includ plan	I didactic         Participation in           ed in study         consultation hours		n iours	Self-study		SUM	
	Number of study hours	15		1.0		9.0		25	
Subject objectives	Presentation of antennas analysis tools, properties and parameters of typical antennas, methods of measurement of antenna's parameters								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_W02] Knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study		Student has mastered basic theorems concerning antenna theory, knows the structure, properties and parameters of typical antennas as well as measurement methods of fundamental antenna parameters.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		tudent has mastered to plan numerical simulations and experiments concerning antena design and measurements			[SU3] Assessment of ability to use knowledge gained from the subject			

Subject contents	<ol> <li>Introduction. Antenna parameters: pattern, directivity, gain.</li> <li>Input impedance of antenna, radiation resistance.</li> <li>Polarization parameters of antennas, noise in antennas. Antenna bandwidth.</li> <li>Basic concepts: physical sources of the radiation field, magnetic current.</li> <li>Equivalence principle, angular spectrum.</li> <li>Near and far fields properties.</li> <li>Uniform linear and planar antenna arrays: Array factor.</li> <li>Antenna arrays with nonuniform amplitude distribution.</li> <li>Fourier and Woodword methods of array synthesis. Smart antennas.</li> <li>Radiating elements: Hertz and magnetic dipoles, half-wave dipole.</li> <li>Feeding structures, baluns.</li> <li>Microstrip and slot antennas.</li> <li>Traveling wave antennas: Yagi-Uda and helical antennas.</li> <li>Frequency independent antennas: biconical, and spiral antenna. Log-periodic antennas.</li> <li>Reflector antennas. Directivity of parabolic reflector.</li> <li>Lens antennas.</li> <li>Antenna measurement: pattern, gain and polarization state measurements.</li> <li>Final test.</li> </ol>						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	Midterm colloquia	50.0%	100.0%				
Recommended reading	Basic literature Supplementary literature	<ol> <li>C.A. Balanis: Antenna Theory Analysis and Design, John Wiley and Sons, 1982</li> <li>W. Zieniutycz: Anteny, podstawy polowe, WKŁ, 2000</li> <li>Stutzman W. L., Thiele G. A.: Antenna Theory and Design, John Wiley New York, 1981</li> <li>No requirements</li> </ol>					
	eResources addresses	Adresv na platformie eNauczanie:					
Example issues/ example questions/ tasks being completed	<ol> <li>Define the concept of an equivalent problem due to the external field.</li> <li>Discuss the properties of the electromagnetic field in the far field zone.</li> <li>Discuss the construction of planar version of Marchand balun.</li> <li>Discuss the amplitude and phase distributions in parabolic antenna apetrure.</li> </ol>						
Work placement	Not applicable						