GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Wireless Communication Antennas, PG_00048103
Field of study	Electronics and Telecommunications

Date of commencement of studies	October 2024	Academic year of realisation of subject	2027/2028
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 university
Year of study	4	Language of instruction	Polish
Semester of study	7	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	prof. dr hab. inż. Włodzimierz Zieniutycz

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	3.0	42.0	75

Subject objectives	To provide students the parameters and design solutions of antennas from the point of view of application in wireless communication systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Student simulates the properties of typical antennas i.e. pyramidal horn or microstrip antenna using suitable software. Student designs microstrip antenna using available software.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K6_W34] Knows the characteristics of telecommunications channels, methods of securing information, modulation systems, methods of access to the channel.	Student has mastered the knowledge in the specifics of terrestial and space telecommunication channels which influence the operation of wirelesss systems.	[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	Student measures reflection coefficient, radiation pattern and gain of some typical antennas.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[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 knows and understands propagation phenomena which influence the operation of different wireless systems and explains the operation of some antennas and arrays.	[SW1] Assessment of factual knowledge

Subject contents	
	1. Introduction, wireless communication systems, frequency bands. 2. Propagation environment, types of the waves. 3. Systems requirements and the antenna parameters 4. Antenna arrays for radar system: horns, waveguide slot antennas. 5. Planar antennas for SSR system: strip and microstrio dipoles. 6. Butler matrices. 7. Antennas for positioning systems: helical, SBF, spiral antennas. 8. Planar antennas and arrays for positioning systems. 9. Base station antennas. 10. Multiband antennas for portable phone. 11. Exposure to RF radiation, SAR. Bioelectromagnetics. 12. Antennas for WiFi system. 13. Planar antennas for RFID. 14. Antennas for UWB. 15. Space antennas. 16. Final test

Prerequisites and co-requisites	
	Fundamentals of antenna theory and particularly the parameters of antennas, RF & microwave technology base.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercises	50.0%	35.0%
	Final test	50.0%	65.0%

Recommended reading	Basic literature	
		K. Fujimoto, J.R. James: Mobile Antenna Systems Handbook, Artech House, 2001. W. Zieniutycz: Anteny o sterowanej wiązce w technice radarowej WKŁ, 2012. C.A. Balanis: Antenna Theory Analysis and Design, John Wiley and Sons, 1982. A. Kumar: Fixed and Mobile Terminals Antennas, Artech House 1991.
	Supplementary literature	W. Zieniutycz: Anteny, podstawy polowe, WKŁ, 2000.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Discuss the difference between phased arrays and array of a distributed architecture. 2. Discuss the principle of generation of circular polarization in the spiral antenna. 3. Discuss the construction of the antenna SBF (Short Back Fire). 4. Present the evolution from the classical to the PIFA microstrip antenna. 5. Give examples of applications of RFID technology - requirements for the tag antenna.
Work placement	Not applicable