GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Wireless communication topics, PG_00062754		
Field of study	Technologies for Industry 5.0		
Date of commencement of studies	October 2026	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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Microwave and Antenna Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Cwalina	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	15.0	0.0	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	5.0	50.0	100

Subject objectives

The aim of the course is to introduce to wireless communication topics, taking into account the basic physical phenomena related to radio waves propagation, the basic components used in wireless systems together with their parameters, which will allow course participants to set up and deploy wireless links.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] demonstrates knowledge on materials used in industrial technologies, their structure and fabrication, knows the principles of conducting research, analyzing it and creating technical documentation	The student will become familiar with basic issues related to the propagation of radio waves and the parameters of waveguides, components, and systems used in wireless communication.	[SW1] Assessment of factual knowledge
[K6_U03] has the ability to plan, prepare and carry out engineering activities using practical knowledge and understanding of the specificity of materials, devices and tools, processes and technologies, and prepare a substantive report	The student can analyze radio waves and determine the basic parameters of wireless communication links to select appropriate link components.	[SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
1. Plane wave: basic parameters and effects
2. Propagation media: Impedance and reflection from the interface between two media
3. Plane wave oblique incidence at the Interface between two media
4. Standing wave coefficient and reflection coefficient, multi-layer media
5. Matching of the two media: impedance transformers
6. Coaxial and microstrip transmission lines: basic parameters
7. Scattering matrix and basic types of passive components
8. Antenna types and their basic parameters
9. Wireless systems and basic parameters of wireless communication devices
10. Propagation in real environments of wireless system installations and range equation

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Plane Wave: Basic Parameters and Effects Media Impedance and Reflection from the Interface of Two Media Oblique Incidence of a Plane Wave at the Interface of Two and Multilayer Media Standing Wave Coefficient and Reflection Coefficient Matching Two Media: Impedance Transformers Coaxial and Microstrip Transmission Lines: Basic Parameters Scattering Matrix and Basic Passive Components Types of Antennas and Their Basic Parameters Wireless Systems and Basic Parameters of Wireless Communication Devices and Range Equation Propagation in Real Environments of Wireless System Installations</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of mathematics, electronics, electricity and magnetism.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory points</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Tests</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>P. Kowalczyk, R. Lech, W. Zieniutycz: "Pola i Fale Elektromagnetyczne w Zadaniach", Wydawnictwo Politechniki Gdanskiej, Gdansk 2015; ISBN 978-83-7348-626-3

P. Kowalczyk, R. Lech, J. Mazur: "Technika Wysokich Częstotliwości w Zadaniach", Wydawnictwo Politechniki Gdanskiej, Gdansk 2022; ISBN 978-83-7348-859-5</td></tr>
<tr><td>Supplementary literature</td><td>D.Pozar: "Microwave engineering", Willey&Sons, 1998</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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