GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Wireless Communication Systems, PG_00048104		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
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	assessment
Conducting unit	Department of Microwave and Antenna Engineering -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Krzysztof Nyka	
	Teachers	dr hab. inż. Krzysztof Nyka	

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

Celem przedmiotu jest wprowadzenie do technik radiowych stosowanych we współczesnych systemach komunikacji bezprzewodowej pod kątem projektowania i doboru układów w torach wysokiej częstotliwości. Studenci poznają najważniejsze metody modulacji i rozpraszania sygnału i ich wrażliwość na niedoskonałości urządzeń zastosowanych w systemie komunikacyjnym. Przedmiot obejmuje wprowadzenie i praktyczna naukę obsługi zaawansowanego narzędzia symulacyjnego, Keysight ADS Communication Designer umożliwiających zintegrowane projektowanie na poziomie układów, podsystemów i całego systemu komunikacyjnego.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W34] Knows the characteristics of telecommunications channels, methods of securing information, modulation systems, methods of access to the channel.	knows the principles of operation and basic parameters of selected wireless communication systems and the requirements concerning RF circuits used in those systems	[SW1] Assessment of factual knowledge
[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	applies basic RF circuits in selected wireless communication systems and analyzes their operation in those systems	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Review of digital modulation

Review of multiple access and spectrum spreading

OFDM modulation and spectrum spreading

Radio interface in systems of computer wireless networks (WiFi, WiMAX)

Radio interface in 4G systems (LTE)

Basic parameters of digitally modulated signals important for designing RF circuits

Architecture of subsystems in wireless communications

Basic RF circuits in wireless systems

Influence of RF circuits on system quality

Nonlinear effects, noise and interferences in wireless communication systems – link budget

System analysis in modern microwave/RF circuit simulators –Agilent ADS

Behavioral models of circuit blocks in wireless communication system

ADS simulation tests of selected communication systems

Measurements of devices in wireless communication systems

Introduction to radar systems and radio identification (RFID)</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic signal theory and DSP</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</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>lecture - activity</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>lecture - test</td><td>50.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. A. Luzzatto, G. Shirazi, Wireless Transceiver Design, Wiley, 2007
2. K.Wesołowski, Podstawy cyfrowych systemów telekomunikacyjnych, WKŁ, 2006</td></tr>
<tr><td>Supplementary literature</td><td>none</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Explain the negative effects resulting from strong variations of modulated signal envelope.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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