



Subject card

Subject name and code	Wireless Communication Systems, PG_00048104						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2023/2024		
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 inż. Kamil Trzebiatowski					
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 praktyczną 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_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			[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.	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		

Subject contents	<p>Review of digital modulation</p> <p>Review of multiple access and spectrum spreading</p> <p>OFDM modulation and spectrum spreading</p> <p>Radio interface in systems of computer wireless networks (WiFi, WiMAX)</p> <p>Radio interface in 4G systems (LTE)</p> <p>Basic parameters of digitally modulated signals important for designing RF circuits</p> <p>Architecture of subsystems in wireless communications</p> <p>Basic RF circuits in wireless systems</p> <p>Influence of RF circuits on system quality</p> <p>Nonlinear effects, noise and interferences in wireless communication systems – link budget</p> <p>System analysis in modern microwave/RF circuit simulators –Agilent ADS</p> <p>Behavioral models of circuit blocks in wireless communication system</p> <p>ADS simulation tests of selected communication systems</p> <p>Measurements of devices in wireless communication systems</p> <p>Introduction to radar systems and radio identification (RFID)</p>		
Prerequisites and co-requisites	Basic signal theory and DSP		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture - test	50.0%	60.0%
	lecture - activity	0.0%	10.0%
	laboratory	50.0%	30.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. A. Luzzatto, G. Shirazi, Wireless Transceiver Design, Wiley, 2007 2. K.Wesołowski, Podstawy cyfrowych systemów telekomunikacyjnych, WKŁ, 2006 	
	Supplementary literature	none	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Systemy Komunikacji Bezprzewodowej - 2023 - Moodle ID: 30593 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30593</p>	
Example issues/ example questions/ tasks being completed	Explain the negative effects resulting from strong variations of modulated signal envelope.		
Work placement	Not applicable		