



Subject card

Subject name and code	Reception of Radio Signals, PG_00064010						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2027	Academic year of realisation of subject				2026/2027	
Education level	second-cycle studies	Subject group				Optional subject group Specialty 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	1	Language of instruction				Polish	
Semester of study	1	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Department of Radiocommunication Systems and Networks -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Stefański					
	Teachers	prof. dr hab. inż. Jacek Stefański dr hab. inż. Jarosław Sadowski					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	15.0	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		25.0	75	
Subject objectives	Acquaint students in detail with construction and operation of a modern radio communications receiver						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U12] is able, to an increased extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions	The student can formulate the radio link budget and explain the influence of the receiver parameters on this budget. The student solves simple tasks on the receiver's noise ratio, can explain the causes and effects of intermodulation distortion in the receiver.			[SU4] Assessment of ability to use methods and tools		
	[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student knows the basic elements of the theory of radio reception with particular emphasis on digital systems and knows the reception techniques used in modern cellular systems.			[SW1] Assessment of factual knowledge		
	[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	The student knows and can use specialized vocabulary in the field of modern radio communication.			[SK4] Assessment of communication skills, including language correctness		

Subject contents	Course content – lecture 1. Who invented radio ? 2. Digital and Analog Radio Communication System 3. Block Diagram of Radio Communication System 4. Shannon Theory 5. Radio Link Budget 6. Criteria of Speech and Data Signals Reception 7. Basic Parameters of Receiver 8. Noise of Receiver 9. Noise Figure and Noise Temperature. 10. Analog Receiver Scheme 11. Digital Receiver Scheme 12. Dynamic Range in Digital Receiver 13. Optimal Reception of Digital Signals in Gaussian Channel 14. Signal Reception Techniques for 2G Systems 15. Signal Reception Techniques for 3G Systems 16. Signal Reception Techniques for 4G and 5G Systems		
	Course content – exercises 1. Decibel definition reminder; 2. Radio link budget; 3. System gain; 4. Noise figure and noise temperature; 5. Spectrum efficiency of signal modulation; 6. Frequency mirror in the receiver; 7. Noise characteristic for radio communication system; 8. Power spectrum density of radio signal; 9. Intermodulation distortions; 10. Amplifiers, attenuators and mixers; 11. Analog to digital converter in the receiver; 12. Satellite wireless systems; 13. Transceivers.		
	Course content – project 1. Fundamentals of digital signal processing and spectral analysis; 2. Demodulation of radio signals with analog modulations; 3. Demodulation of radio signals with digital modulations; 4. Detection and decoding of data from digital signals with known transmission structure; 5. Detection and decoding of data from digital signals with unknown transmission structure.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam (lecture + practice)	50.0%	70.0%
	Implementation of project tasks	50.0%	30.0%
Recommended reading	Basic literature	1. Tomasi W., Advanced Electronic Communications Systems, Prentice Hall, Sixth Edition, 2014. 2. Drentea C., Modern Communications Receiver Design and Technology, Artech House, 2010. 3. Fazel K., Kaiser S., Multi-Carrier and Spread Spectrum Systems. From OFDM and MC-CDMA to LTE and WiMAX, 2nd Edition, Wiley & Sons, 2008. 4. Schaub K. B., Kelly J., Production Testing of RF and System-on-a-Chip Device for Wireless Communications, Artech House, 2004. 5. Proakis J. G., Digital Communications, McGraw-Hill, 1989. 6. Mitola J., Software Radio Architecture, John Wiley & Sons, 2000.	
	Supplementary literature	No requirements	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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