GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Telecommunication Signals, PG_00048115		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
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	dr inż. Sławomir Gajewski	
	Teachers	dr inż. Sławomir Gajewski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	1.0	9.0	25

Subject objectives

Learning basic properties of modulated signals and methods of telecommunications systems quality evaluation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems	student critically assesses the properties of systems from the point of view of the type of modulation	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Course content – lecture
1. Signals transmission in communication systems. Performance of transmission. Noise characteristics of communication system. 2. Fundamentals of multiple access methods. The target of modulation. Modulation with harmonic carrier and pulse carrier. Modulation gain. Temporary amplitude, phase and frequency. 3. Analog amplitude modulation. Characteristics of amplitude modulated signals, spectrum, power, frequency band of signals. Reception of signals. Comparison of different types of amplitude modulation. 4. Analog angle modulation. Characteristics of phase and frequency modulated signals, spectrum, power, frequency band. Reception of signals. Preemphasis and deemphasis. 5. Time domain characteristics of amplitude and angle modulated signals with harmonic and rectangle modulating signals. Characteristics of temporary amplitude, phase and frequency, comparisons. 6. Digital communication system, performance of transmission. Noise characteristics of digital system. 7. Digital baseband modulations. A/D conversion, quantization noise. 8. PCM modulation, companding methods, compressor and expandor, noise characteristics. Time domain characteristics of PCM modulated signals. 9. Delta modulation, adaptation, noise characteristics. DPCM modulation, sigma-delta modulation. 10. Reception of binary signals transmitted over AWGN channel. Vector signals representation. Optimisation of reception – matched filter, correlating receiver. 11. Baseband transmission of digital signals. Intersymbol interference (ISI). Channel without ISI – raised cosine filter. 12. Digital modulations with harmonic carrier – ASK, FSK, PSK. Characteristics of modulated signals, spectrum, time-domain characteristics. 13. M-ary digital modulations, quadrature modulation QPSK, methods of modulated signals reception and their performance. 14. Comparison of noise characteristics for digital systems. Vector representation of signals, decision areas. 15. Noise characteristics for digital system with channel coding.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium	50.0%	100.0%

Recommended reading	Basic literature	Haykin S.: Systemy telekomunikacyjne, tom 1 i 2. WKiŁ 2004 r. (lub wydania wcześniejsze)
	Supplementary literature	No requirements
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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