



Subject card

Subject name and code		Telecommunications, PG_00064151						
Field of study		Electronics and Telecommunications, Informatics, Automatic Control, Cybernetics and Robotics						
Date of commencement of studies		October 2024	Academic year of realisation of subject			2024/2025		
Education level		second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study		Full-time studies	Mode of delivery			at the university		
Year of study		1	Language of instruction			English		
Semester of study		1	ECTS credits			5.0		
Learning profile		general academic profile	Assessment form			exam		
Conducting unit		Department of Teleinformation Networks -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)		Subject supervisor		dr inż. Bartosz Czaplewski				
		Teachers		dr inż. Bartosz Czaplewski dr hab. inż. Sławomir Ambroziak mgr inż. Jacek Litka dr inż. Wojciech Siwicki				
Lesson types and methods of instruction		Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
		Number of study hours	20.0	0.0	20.0	0.0	0.0	40
		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	40	8.0		77.0		125
Subject objectives		Acquainting with the basics of operation of modern telecommunications systems.						
Learning outcomes		Course outcome		Subject outcome		Method of verification		
		[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		Student identifies, classifies and describes the basic concepts, problems and challenges of the area telecommunications.		[SW1] Assessment of factual knowledge		
		[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 is able to carry out simple experiments, realize research and analyze the results from telecommunications area.		[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		

Subject contents	<p>Lecture:1. Basic concepts: telecommunications, information, information sources, signal, telecommunications service, telecommunications system, telecommunications channel, telecommunications network.2. The telecommunications system and functions of its elements; open and feedback system.3. Description of analog signals in the domain of time and frequency; logarithmic measures of the signal level.4. Transmission media (open space, conductive lines, optical fiber) and their parameters; transmission of signals in the base band and in the higher frequency band.5. Analog modulation and demodulation; modulation of amplitude, frequency and phase; synchronous and asynchronous demodulation.6. Disturbances (noise, crosstalk, echo, multi-path) and distortions (linear and non-linear); reasons for their formation and general properties.7. Processing analog signals into digital form; sampling, quantization, coding.8. Quantization noise, compression and speech signal expansion.9. Source coding, source entropy, lossy and lossless compression; classification of coding and compression methods.10. Telecommunication channel: analogue, digital; properties, interference and distortion, channel capacity, Shannon's theorem.11. Transmission of digital signals in the basic band; transmission codes and their properties.12. Channel and corrective coding, detection and correction of errors.13. Multiplexing as a technique for maximizing the use of transmission resources; multiplexing: FDM, TDM, WDM, CDM and SDM.14. ISO / OSI layered model of equipment and systems cooperation; application of this model in telecommunications.15. Telecommunications network (fixed and mobile subscribers); structure and functional elements; classification of services.16. Connecting process; channel switching and packet switching.17. Service request process for both fixed and mobile subscribers.18. Access networks and core networks.19. The evolution of the Internet network to the operator's network of telecommunications services.20. Next generation networks - NGN and NGI. Laboratory:1. Pulse code modulation (PCM).2. Properties of selected transmission lines.3. Transmission codes and modulations.4. Detection and correction of errors in digital systems.5. Sampling, quantization and compression, and sound and image quality.6. Interfaces and access to the telecommunications network.</p>																	
Prerequisites and co-requisites																		
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 712 794 757">Subject passing criteria</th> <th data-bbox="794 712 1137 757">Passing threshold</th> <th data-bbox="1137 712 1487 757">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 757 794 790">test - part 1</td> <td data-bbox="794 757 1137 790">50.0%</td> <td data-bbox="1137 757 1487 790">30.0%</td> </tr> <tr> <td data-bbox="451 790 794 824">test - part 2</td> <td data-bbox="794 790 1137 824">50.0%</td> <td data-bbox="1137 790 1487 824">30.0%</td> </tr> <tr> <td data-bbox="451 824 794 857">measurement reports - part 1</td> <td data-bbox="794 824 1137 857">50.0%</td> <td data-bbox="1137 824 1487 857">20.0%</td> </tr> <tr> <td data-bbox="451 857 794 891">measurement reports - part 2</td> <td data-bbox="794 857 1137 891">50.0%</td> <td data-bbox="1137 857 1487 891">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	test - part 1	50.0%	30.0%	test - part 2	50.0%	30.0%	measurement reports - part 1	50.0%	20.0%	measurement reports - part 2	50.0%	20.0%
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Recommended reading	Basic literature	<p>1. Lathi B.P.: Modern Digital and Analog Communication Systems, Oxford University Press, 2009. Sklar B.: Digital Communications, Pearson Education, 2001. Schneier B.: Applied Cryptography: Protocols, Algorithms, and Source Code in C, 1996</p>																
	Supplementary literature	<p>1. Zalecenia ITU-T2.S. Kula: Systemy i sieci dostepowe xDSL, WKŁ, Warszawa 2009. J. Fridrich, Steganography in Digital Media: Principles, Algorithms, and Applications, Cambridge University Press, 2010</p>																
	eResources addresses	<p>Adresy na platformie eNauzanie: Telecommunications - 2024/2025 - Moodle ID: 40694 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=40694</p>																
Example issues/ example questions/ tasks being completed	none																	
Work placement	Not applicable																	

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