GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Telecommunications, PG_00046328					
Field of study	Electronics and Telecommunications, Informatics, Automatic Control, Cybernetics and Robotics					
Date of commencement of studies	October 2022	Academic year of realisation of subject		2022/2023		
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 hab. inż. Sławomir Ambroziak dr inż. Bartosz Czaplewski 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	17.0	68.0	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_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions	Student identifies, classifies and describes the basic concepts, problems and challenges of the area telecommunications.	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment

Subject contents	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.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - part 2	50.0%	30.0%
	Lecture - part 1	50.0%	30.0%
	Laboratory - part 2	50.0%	20.0%
	Laboratory - part 1	50.0%	20.0%

Recommended reading	Basic literature	1.Lathi B.P.: Modern Digital and Analog Communication Systems, Oxford University Press, 2009 2.Sklar B.: Digital Communications, Pearson Educations, 2001 3.Schneier B.: Applied Cryptography: Protocols, Algorithms, and Source Code in C, 1996
	Supplementary literature	1.Zalecenia ITU-T 2.S.Kula: Systemy i sieci dostepowe xDSL, WKŁ, Warszawa 2009 3.J. Fridrich, Steganography in Digital Media: Principles, Algorithms, and Applications, Cambridge University Press, 2010
	eResources addresses	Adresy na platformie eNauczanie: Telecommunications - 2022/2023 - Moodle ID: 24413 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24413

Example issues/ example questions/ tasks being completed	none
Work placement	Not applicable