



## Subject card

Subject name and code	Telecommunication Systems, PG_00047898						
Field of study	Informatics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
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	6		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Teleinformation Networks -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Sylwester Kaczmarek				
	Teachers		dr hab. inż. Sylwester Kaczmarek				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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		10.0		45.0	100
Subject objectives	Getting to know basic technologies applied in telecommunications networks, principles of the organization of the networks and phenomena which are taking place in the realization of services with diversified quality requirements.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications		He is able to analyse situations in the telecommunications network and to make basic measurements in three first layers of the ISO/OSI model.		[SU1] Assessment of task fulfilment		
	[K6_W03] Knows and understands, to an advanced 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 describes realization technologies of the telecommunication networks as well as by users available telecommunication services. Student explains architectures, solutions and working principles of functional elements of this networks. Student has also the skill of observation and description of event taking place on the physical, link and network level.		[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE: Global Information Infrastructure (GII) place and role of Telecommunications. GII convergence planes. The essence of telecommunications. Entities of the service delivery process. Telecommunications market goals. Aims of the telecommunications market. Basic definitions. Features, structure and resources of the information exchange system. Basic functions: transmission, switching, multiplexing. Transmission mediums and parameters defining their features. The essence of the problem in signal transmission via the transmission medium. Analogue and digital technology. Processing the information into a telecommunications signal. Problem of the maximization of using transmission mediums. The channel, the link, the transmission system. Telecommunications connection: connectionoriented systems and connectionless systems. Circuits switching, message switching and packets switching. The structure of the telecommunications network and the addressing. Connection control on the node and networks level. The need for signalling. Signalling network. Routing function. The problem of subscriber movement. Mobile subscriber network and addressing. Telecommunications services and theirs classification. Problem of the openness to the telecommunication services. The intelligent network services (IN). A short history of telecommunications. PSTN, IDN, ISDN, GSM, UMTS, LTE - next steps in telecommunications development. STM and ATM technology. The need to evolve IP networks to IP QoS networks. IP QoS network architectures: IntServ, DiffServ, MPLS. Generalized MPLS - GMPLS. Broadband network access. IMS/NGN as an example of the implementation of the NGN concept. Service scenario and its performance parameters. Transmission plane in telecommunications. Changes in the services market and their consequences for telecommunications. SDN - Software Defined Networks. NFV - Network Function Virtualization.</p> <p>LAB: Physical layer for the S/T and U interface of the BRA-ISDN access. Physical layer for the E1 interface of the PCM30/32 system. Structure of the frame and multiframe of PCM30/32 system. DWDM optical transmission systems. The use of GMPLS in optical networks. Call handling scenario in the PSTN/ISDN network. Signalling messages for DSS1. Signalling messages for SS7 with ISUP. Teleservices and supplementary services in networks with circuits switching and with packets switching. Access to broadband services in the ADSL, VDSL and GEAPON systems.</p>		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	50.0%	36.0%
	Midterm tests	50.0%	64.0%
Recommended reading	Basic literature	Materials prepared by the lecturer available in electronic form in PDF files and in the form of a photocopy (on request).	
	Supplementary literature	No requirements.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		