



Subject card

Subject name and code	NGN Systems and Architectures, PG_00048114						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
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			2.0		
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	0.0	0.0	0.0	30
	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	30		2.0		18.0	50
Subject objectives	Obtain knowledge about next-generation network systems and architectures, including next-generation internet in the context of real-time services.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W35] Knows the concepts of the technique of signal transmission, operation of telecommunications networks and multimedia services and the rules for providing them		Student describes conceptions and realizations of architectures for the next generation networks being based on the packet switching and the Internet. Student propose mechanisms and architectures those assure realization of the differentiated qualities of network services.			[SW1] Assessment of factual knowledge	
	[K6_U31] can identify telecommunications network architectures, differentiates their areas and functional elements, evaluates the quality of service delivery, calculates parameters of functional elements		Student determines correct solutions of systems and architectures fulfilling qualitative and service needs formulated by users.			[SU2] Assessment of ability to analyse information	

Subject contents	<p>Evolution of services, technologies and networks - integration or convergence. Convergence planes. Broadband networks with guaranteed quality of service. Succession of technologies and architectures: STM, ATM, IP QoS. ATM technology as an attempt to integrate services and networks. Mechanisms used in ATM to guarantee service quality. Advantages and limitations of ATM technology. Changes in the nature of traffic and services and the choice of the target service platform. Traffic source types. Features of IP technology from the point of view of the target service platform. QoS guarantee problem in IP. The use of ATM mechanisms in IP QoS. IntServ and DiffServ architectures for implementing IP QoS. IntServ concept - advantages and disadvantages. RSVP signalling protocol for implementing IntServ. Connection execution process. DiffServ concept - service classes. Functional model of the edge node. Functional model of the core node. Aggregate stream connection requests support. AC and Broadband Broker function. Guarantee of service quality in a multi-domain IP QoS network. The problem of realizing switching functions and traffic engineering. MPLS technology is the answer to these problems. Functional elements in MPLS and creation of LSP paths. Functional models of the input-output node and inside the MPLS domain. GMPLS - generalized MPLS across technologies. Implementation of the "speech" service in the IP QoS network - VoIP. VoIP call control - Softswitch concept. Technology convergence - gateway concept. Protocols and functionality of the MGW media gateway. MGS signalling gateway protocols and functionality. SIP architecture. NGN architecture as a response to the convergence of technologies, services and networks. Functionalities of layers: transfer (media), connection control servers, service control servers, applications. Example of implementation of the NGN system. SDN software defined networks according to ITU-T and IETF. NFV - virtualization of network functions. Directions of next generation network evolution.</p>								
Prerequisites and co-requisites	No requirements								
Assessment methods and criteria	<table border="1" data-bbox="451 624 1487 692"> <thead> <tr> <th data-bbox="451 624 798 658">Subject passing criteria</th> <th data-bbox="805 624 1141 658">Passing threshold</th> <th data-bbox="1149 624 1487 658">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 658 798 692">Midterm tests</td> <td data-bbox="805 658 1141 692">50.0%</td> <td data-bbox="1149 658 1487 692">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm tests	50.0%	100.0%
Subject passing criteria	Passing threshold	Percentage of the final grade							
Midterm tests	50.0%	100.0%							
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								