



## Subject card

Subject name and code	Ethernet Networks, PG_00048055						
Field of study	Informatics, Electronics and Telecommunications						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2022/2023		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Computer Communications -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Nowicki					
	Teachers	dr inż. Krzysztof Nowicki dr inż. Wojciech Gumiński					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	15.0	60
	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	60	10.0		55.0	125	
Subject objectives	Acquainted with the concept of Ethernet from end to end. Feasibility of the concept now and in the coming years. Acquainted with the problems of scalability, reliability, quality, manageability and offer services in Ethernet networks						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	Student is able to assess the importance of developing Ethernet and IP solutions in solving cognitive and practical problems	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_U42] can solve engineering and research problems including design, assessment and maintenance of information systems and applications, using experimental methods and management techniques	Student is able to solve engineering and research problems in the design, evaluation and maintenance of Ethernet systems and network applications using experimental methods and management techniques	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[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.	The student knows the structure and operation of network components and systems, including the IEEE 802.2 standardization process, classifies various Ethernet solutions, understands Ethernet concepts from end to end, knows the theory of switching and complex relationships between them, and selected specific issues: Layer solutions physical - PMD, PMI and intermediary layers, Compatibility of Ethernet solutions, Connecting Ethernet PoE networks, EFM, VLAN, link acquisition effect, link aggregation methods, Supporting multicast transmissions, CE	[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 is able to describe and analyze the operation of elements, systems and systems related to Ethernet networks (local and urban), measure their parameters and examine technical characteristics, interpret the results obtained and draw conclusions.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[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 is able to describe and analyze the operation of elements, systems and systems related to Ethernet networks (local and urban), measure their parameters and examine technical characteristics, interpret the results obtained and draw conclusions.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K7_W43] Knows and understands, to an increased extent, the nformal, technical and social aspects of the operation of complex information systems in the information society and in the global information n infrastructure.	The student knows the technical and social aspects of the operation of complex information systems in the information society. The student is able to describe the IEEE 802 standardization processes, classify Ethernet solutions, explain the concept of Ethernet from end to end	[SW1] Assessment of factual knowledge
Subject contents	History of Ethernet and IP networks. Standardization processes (IEEE, MEF, IETF, ITU-T). Domination of Ethernet solutions on the market of local and urban networks. Fast / Giga / 10 Gigabit Ethernet 40/100/400 Gb / Ethernet. Ethernet concept from end to end. Ethernet Carrier concept (Management, Scalability, Reliability, QoS, Security, Services), Physical layer solutions - PMD, PMI and intermediate layers. Structured cabling, Compatibility of Ethernet solutions. Ethernet PoE network connection - EFM devices power supply problems - First mile Ethernet RPR Multimedia networks in Ethernet networks - the effect of link acquisition, the Big Bang analysis. Adaptation of Ethernet to IP protocols. Flow control. Switching in the second, third and fourth layer - comparison, advantages and disadvantages. New ways to determine VLAN membership. Link aggregation methods. Supporting multicast transmissions. Industrial Ethernet. The principles of cooperation between Ethernet networks and wireless solutions. Development perspectives for Ethernet and IP networks		
Prerequisites and co-requisites	Lecture and laboratory "Computer Networks"		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	project	50.0%	25.0%
	lecture	50.0%	25.0%
	laboratory	50.0%	25.0%
	seminar	50.0%	25.0%

Recommended reading	Basic literature	<p>Nowicki K.: Ethernet - sieci, mechanizmy, Infotech 2006</p> <p>Nowicki K., Uhl T.: Monitorowanie i bezpieczeństwo sieci komputerowych, WN AM Szczecin, 2016</p>
	Supplementary literature	<p>Nowicki K., Woźniak J.: Przewodowe i bezprzewodowe sieci LAN, OW PW 2002</p> <p>Nowicki K., Uhl T.: Ethernet End-to-End, Shaker Verlag 2008</p> <p>Krawczyk H., Kaczmarek S., Nowicki K.: Aplikacje i usługi a technologie sieciowe, WN PWN 2018</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Issues: Standardization processes of computer networks. Domination of Ethernet solutions on the market of local and urban networks. End-to-end Ethernet and CE concept. Multimedia in Ethernet networks. Principles of Ethernet network cooperation with wireless solutions. Problems of scalability, manageability, reliability, security, quality and implementation of services in Ethernet networks.</p> <p>Questions: Comparison of 1/10/40/100 Gb / s Ethernet physical layer solutions. Present compatibility problems of Ethernet solutions. PoE - power supply problems. EFM. Introduce new ways to determine VLAN membership. Multicast support Industrial Ethernet.</p> <p>Tasks carried out: monitoring, eavesdropping, attacks on mechanisms, device recognition, Ethernet network design</p>	
Work placement	Not applicable	