GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer Networks, PG_00068273		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Computer Communications -> Faculty of Electronics Telecommunications and Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Nowicki	
	Teachers	dr inż. Krzysztof Nowicki	

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	2.0	28.0	75

Subject objectives

Student becomes familiar with logical layered architectures, classifies basic networking problems and identifies and analyzes selected protocols and mechanisms implemented in standard LAN and WAN solution

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	The student demonstrates knowledge of basic network architectures and communication protocols. The student recognizes and understands the mechanisms for creating virtual networks in a LAN environment. The student demonstrates knowledge of wired and wireless networks described by the IEEE 802 series of standards. The student demonstrates knowledge of basic IP network protocols.	[SW1] Assessment of factual knowledge
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student is able to choose and apply appropriate methods and tools for building and evaluating the work of computer networks	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents	1. Classification and general characteristics of computer networks 2. Layered network architectures - ISO / OSI, TCP / IP 3. Theoretical foundations of data transmission 4. Problems of designing the data link layer (synchronization, flow control, error detection and detection) 5. LAN networks - general characteristics - classification of access methods 6. Wired solutions of the competitive type: Ethernet networks - MAC layer functions and medium access rules - IEEE 802.3 standard 7. Wireless LANs - general characteristics; medium characteristics; WiFi/Bluetooth/5G-6G comparison 8. IEEE 802.11 standard - operating modes and access methods 9. Ethernet - IEEE 802 standards; MEF; ITU, IETF 10. Wired Media a) Fiber Optic Media (Single- and Multi-Mode, Glass and Plastic) b) Copper Media (Multi- and Single-Pair Twisted Pair) 11. Ethernet Dominance - New Technologies a) in Offices/Companies - Solutions b) in Industry - Solutions c) in Cars (Automotive Ethernet) d) in Smart Buildings - Solutions e) for the Internet of Things (IoT) - Solutions f) in Metropolitan Area Networks and Wide Area Networks - Carrier Ethernet Solutions g) Comparison of Solutions - 12. LAN Network Connection Methods 13. Virtual Local Area Networks 14. Wide Area Networks - WANs 15. TCP/IP Architecture - IP Protocols and Transport Protocols 16. IPv6 Protocols, Addressing 17. IPv4/IPv6 Migration 18. Routing Methods 19. Network Congestion Mitigation Methods IP 20. Network Applications and Services (DNS, DHCP, NTP, Email) 21. Artificial Intelligence (AI) Techniques in Computer Network Control Management as a Means to Increase Network Manageability, Performance, and Security 22. The Role, Combination, and Coexistence of AI Techniques and Standard Techniques Based on Deterministic Rules and Algorithms in Network Control Management. The Concept of the MLOps Model. 23. Network Security
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lec.	50.0%	60.0%
lab.	50.0%	40.0%

Recommended reading

Basic literature	Nowicki K., Woźniak J.: Przewodowe i bezprzewodowe sieci LAN, OW PW 2002 Tannenbaum A., Feamster N., Wetherall D.,: Computer Networks, Pearson Education, 2022
Supplementary literature	Nowicki K.: Ethernet - sieci, mechanizmy, Infotech Nowicki K, Światowiak J.: Protokoły IPv6 Krawczyk H., Kaczmarek S., Nowicki K. - Aplikacje i usługi a technologie sieciowe, WN PWN 2018
eResources addresses	

Example issues/ example questions/ tasks being completed	Description of network architectures and basic standards. Comparison of standard wired and wireless LAN networks. Features of dedicated Ethernet solutions Comparison of methods and devices for connecting networks. Description of addressing methods in LAN and WAN networks. Description and comparison of selected routing protocols and basic communication protocols in IP networks. Description of selected network applications. Possibilities of using artificial intelligence in computer networks
Work placement	Not applicable