GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	IP Networks, PG_00047958		
Field of study	Informatics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	4.0
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 hab. inż. Jerzy Konorski	
	Teachers	dr hab. inż. Jerzy Konorski	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	15.0	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	4.0	51.0	100

Subject objectives	Learning the principles of operation of basic communication protocols in IP networks

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	Student defines basic IP-based packet network functionalities and protocols; explains the operation of IPv4 and IPv6 protocols, as well as routing and transport protocols. Describes active traffic management and selected QoS support architectures.	[SW1] Assessment of factual knowledge
[K6_W42] Knows and understands, to an advanced extent, architecture, design principles and methods of hardware and software support for local and distributed information systems, including computing systems, databases, computer networks and information applications, as well as the principles of human cooperation with computers and computer-aided teamwork	Student understands IP network architecture and protocol operation related to selected special mechanisms of traffic handling.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Student can compare and analyze the use of existing networking environments using IP in selected applications.	[SU4] Assessment of ability to use methods and tools
[K6_U11] can plan and organise individual and team work	Student prepares, independently or in cooperation with fellow students, a consistent document on selected design methods and problems in IP networks.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_U81] is able to communicate appropriately in foreign language at B2 level of the Common European Framework of Reference for Languages (CEFR) in everyday life, in academic and professional environments	Student can prepare an extender presentation of a selected topic related to IP networks.	[SU5] Assessment of ability to present the results of task

Subject contents

1. Introduction and assessment items 2. Standardization of IP protocols: IETF, RFC 3. ISO/OSI reference model and TCP/IP architecture 4. IPv4 protocol: addressing, datagram format, address space utilization, ARP and ICMP protocols, datagram fragmentation and reassembly 5. IPv4 address space hierarchy, network and host address, address classes 6. Subnetting, CIDR; examples of datagram forwading and routing tables. 7. ROADS problem and hacks to ease it: NAT, proxy ARP, masquerade 8. Need for migration to IPv6: ROADS, network security, QoS, flexible deployment of new protocols, packet switching speedup 9. IPv6 addressing, datagram format, numbering plan analogue, concept of anycast forwarding, ICMPv6 protocol 10. IPv6: QoS support, roleof header extensions, examples of application 11. Active traffic management in IP networks: causes and results of congestion 12. Handling elastic traffic, definitions of fairness, parking lot scenario 13. Active queue management in routers, RED, BLUE and similar packet drop algorithms 14. Mechanisms of QoS differentiation, token buckets, selected fair queuing algorithms 15. Link bandwidth management using CBQ and HTB 16. Integrated services architecture: types of network traffic, need to enhance "best effort", use of IP header information, new router functionality, multipriority token buckets 17. RSVP protocol: message format and semantics, principles of operation, soft state, reservation styles 18. Controlled and Guaranteed QoS services, parameter configuration 19. Differentiated services architecture: scalability problem, use of IP header information, DiffServ domain, new edge router functionality, DSCP-based classification and ingress traffic shaping 20. Differentiated services architecture: SLA and TCA contracts, behavior aggregates PHB types and implementation 21. Resource management in DiffServ domains, bandwidth broker, inter-domain cooperation 23. Routing algorithms in IP networks: interdomain BGP routing

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
final exam	50.0%	40.0%
presentation of a selected topic	50.0%	60.0%

Recommended reading

Basic literature	W. Stallings: Data and computer communications, Pearson Prentice Hall 2007 (rozdz. 18-20) D. E. Comer: Sieci komputerowe TCP/IP, zasady, protokoły, architektura, WNT Warszawa 1998
Supplementary literature	Zestaw wybranych dokumentow Requests for Comments, IETF 2002-2014.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable