COMPUTER NETWORKS

Faculty of Computer Science				
Study programme:	**Computer Science**		Degree level:	**Engineer's degree full-time programme**
Specialization	**---**		Diploma path:	**2026/2027W - 2026/2027S**
Module name:	**Computer Networks** (Sieci komputerowe)			
Module type:	**obligatory**	**Semester: 1**	ECTS:**4**	Module ID:**FCS-00026**
No. of hrs in semester:	Lecture (L) - **30** Classes(C) - **0** Specialization workshop (SW) - **0** Project (P) - **0** Laboratory classes (LC) - **30** Seminar (S) - **0**			
Prerequisites	-			

Aims and objectives:	To familiarize students with the basic model of data transmission in computer networks and the implementation of the mechanisms defined in that model. To provide an overview of topics related to computer networks. To gain knowledge about problems that arise during network operation and their causes. Understanding the principles of operation and use of basic services available on the Internet. Ability to design and configure a simple computer network, including the configuration of network services. References to the SFIA micro-competency educational framework: IT infrastructure ITOP - level 2 Network support NTAS - level 4		
Forms of teching activities::	lecture, laboratory classes,	Assessment:	Evaluation must be relevant to the intended learning outcomes: Lectures - written test. Labs - excersises in network and services configuration.
Module content:	Lecture: Introduction to computer networks. A brief history Classification of networks. Data transmission model. The concept of a communication protocol. Encapsulation of data units. The OSI model, the TCP/IP protocol suite Network devices. Network packet analysis Physical layer—bit transmission methods, types and properties of the transmission medium Data link layer—the concept of physical addressing, segmentation mechanisms, and frame structure Virtual LANs. Physical link access algorithms Network layer – logical addressing and its implementation in IPv4 and IPv6 protocols. ARP protocol Routing mechanisms in IP networks. Internal and external routing protocols. General structure of the Internet DNS system: structure and operating principles. DHCP server Transport layer – TCP and UDP protocols Masquerading – types and implementations Session layer. Presentation layer Application layer – selected protocols, including (E)SMTP Introduction to wide area network technologies. Trends in computer network development Course completion Laboratory: Network types and topologies – structured cabling (twisted-pair cable termination, network topologies, etc.) IP addressing/subnet mask – IP address management (subnet calculation, abbreviated subnet mask, etc.) Configuration of Linux network interfaces + Mikrotik/Winbox interface (Linux interface configuration + Mikrotik telnet/ssh connection) Overview of bridges and VLANs + ARP protocol (difference between bridges and VLANs, MAC table, ARP protocol operation, Layer 2 Static and dynamic routing on Mikrotik – static routes + OSPF (IP address configuration, static entries, single-area OSPF) Firewall configuration on Mikrotik – basics of traffic filtering (basic policy configuration, port knocking if applicable) Project implementation Project presentation and lab completion		
Teaching methods:	laboratory exercises, lecture problem, informative lecture,		

Learning outcomes		
Symbol	Specify min. 4, max. 8 learning outcomes in the following order: knowledge – skills – competence. Each learning outcome must be verifiable	Reference to the programme learning outcomes of education
LO1	knows the principles of data transmission in computer networks and knows the principles of operation of basic network devices	INF1_W03 INF1_W08
LO2	knows selected protocols, norms and standards used in computer networks	INF1_W12
LO3	can configure selected network services and devices, working independently and in a team	H1_U02 INF1_U07 INF1_U09 INF1_U12
LO4	can diagnose the root causes of failures in computer networks using appropriate tools	INF1_U12

No. of learning outcome	Methods of assessing the learning outcome	Type of teaching activities (if more than one) during which the outcome is assessed
LO1	wirtten test	L
LO2	wirtten test	L
LO3	written report	Lab

LO4	written report	Lab	
Student's workload (in hours)	**1** - Attendance at lectures	None	30
	2 - Attendance at classes	None	30
	3 - Performance of projects tasks (with presentation)	None	20
	4 - Participation in student-teacher sessions	None	4
	5 - Preparation for the exam	None	16
		TOTAL:	**100**
Quantitative indicators	Student's workload - activities that require direct teacher participation: (4)+(1)+(2)	64	**ECTS** 2.6
	Student's workload connected with practical classes (3)+(2)	50	2.0
Basic references:	1. P.L. Dordal, An Introduction to Computer Networks, Department of Computer Science, Loyola University Chicago, 2020, online: http://intronetworks.cs.luc.edu/current1/html 2. Curriculum to courses LPIC-1 oraz LPIC-2, online: https://learning.lpi.org/en/learning-materials/learning-materials 3. Douglas E. Comer "Computer Networks and Internets", Pearson; 6th edition, 2014 4. Andrew Tanenbaum "Computer Networks", Prentice Hall, Indian International Ed.; 5th edition, 2010 5. Mikrotik documentation, http::/www.mikrotik.com 6. DHCP Server , https://www.isc.org 7. Apache project, http://www.apache.org		
Further reading	1. IEEE specifications 802.2, 802.3, 802.4, 802.5, 802.11: standards.ieee.org/getieee802/, 2. Request For Comments 3. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", 5th edition, Elsevier, 2012.		

Unit:	Department of Information Systems and Computer Networks	Lecturer/ instructor	
Date of issuing the programme:	30th March 2026	Author of the programme:	dr inż. Andrzej Chmielewski

L - lecture, C - classes, LC - laboratory classes, P-project, SW - specialization workshop, S - seminar