COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Computer Networks and their Security	

Academic staff	Core academic unit(s)
Coordinating: Assoc. Prof. dr. Rasa Brūzgienė **Other:**	Kaunas Faculty Institute of Social Sciences and Applied Informatics Muitinės St. 8, LT-44280 Kaunas

Study cycle	Type of the course unit
First	Mandatory

Mode of delivery	Semester or period when it is delivered	Language of instruction
Classroom-based	3 semester	English

Requisites	
Prerequisites: The student must have mastered the fundamentals of computer architecture and informatics, as well as the material from courses on operating systems, data security, and cryptography.	**Co-requisites (if relevant):**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	130	52	78

Purpose of the course unit		
Develop the ability to install and configure local computer network switches, routers, and local wireless network devices. Develop the ability to manage resources of local wired and wireless networks. Develop the ability to detect, locate, and eliminate faults in local wired and wireless networks.		
Learning outcomes of the course unit	**Teaching and learning methods**	**Assessment methods**
Will be able to identify faults in a computer network, monitor, and analyze data flow communication between network devices.	Lectures, laboratory work, independent work active teaching/learning methods (network configuration, network operation modeling, simulation of possible network faults, traffic monitoring, situation analysis)	Assessment quiz K1, exam
Will be able to apply the IPv4 and IPv6 addressing structure, the principles of static and dynamic address assignment, NAT and DNS operation, as well as calculate and assign appropriate IP addresses, subnet masks, and other parameters to each network device.	Lectures, laboratory work, independent work active teaching/learning methods (network configuration, network operation modeling, simulation of possible network faults, traffic monitoring, situation analysis)	Assessment quiz K2, exam
Will be able to practically configure static and dynamic routes in a computer network.	Lectures, laboratory work, independent work	Assessment quiz K3, exam

	active teaching/learning methods (network configuration, network operation modeling, simulation of possible network faults, traffic monitoring, situation analysis)	
Will be able to assess security threats and vulnerabilities at the OSI and TCP/IP layers, and apply the concept and solutions of a secure local network.	Lectures, laboratory work, independent work active teaching/learning methods (network configuration, network operation modeling, simulation of possible network faults, traffic monitoring, situation analysis)	Assessment quiz K4, exam
Will be able to apply wireless communication technologies and security solutions for the configuration and analysis of a hybrid (LAN/WiFi) computer network.	Lectures, laboratory work, independent work active teaching/learning methods (network configuration, network operation modeling, simulation of possible network faults, traffic monitoring, situation analysis)	Assessment quiz K5, exam

Content	**Contact hours**							**Individual work: time and assignments**	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	**Contact hours, total**	**Individual work**	**Tasks for individual work**
1. Fundamentals of computer networking: network types, communication principles, computer network topologies, architecture and peripherals, device characteristics. Configuration of computer network peripherals and performance testing.	2				2		**4**	**8**	Practical tasks; Reporting and preparation for assessment quiz K1.
2. OSI, TCP/IP models, and protocols. Security threats in OSI layers. Analysis of the communication in the computer network over different OSI (TCP/IP) layers.	2				4		**6**	**10**	Practical tasks; Reporting and preparation for assessment quiz K1.
3. Addressing computer networks. IPv4 and IPv6 addressing structures. Static and dynamic addresses. Assignment of the static and dynamic addresses in computer networks, NAT, DNS. Determination and assignment of IP addresses and subnet masks to each network device in a computer network.	2				6		**8**	**10**	Practical tasks; Reporting and preparation for assessment quiz K2.
4. Data routing. Routing protocols. Static and dynamic routing methods. The routing reliability. Dynamic Host Configuration Protocol (DHCPv4, DHCPv6). Principles of static, dynamic data routing configuration in computer network peripherals.	2				6		**8**	**10**	Practical tasks; Reporting and preparation for assessment quiz K3.
5. Security threats and vulnerabilities at OSI, TCP/IP layers, port scanning, and risks due to open ports.	2				2		**4**	**10**	Practical tasks; Reporting and preparation for assessment quiz K4.
6. The concept of a secure local area network (LAN). Network segmentation. Virtual Local Area Network (VLAN),	2				4		**6**	**10**	Practical tasks; Reporting and

Virtual Private Network (VPN) configuration. Network firewalls, IDS/IPS systems.									preparation for assessment quiz K4.
7. Wireless communications. Network types, protocols, architecture, peripherals, and configuration.	2				2		**4**	**10**	Practical tasks; Reporting and preparation for assessment quiz K5.
8. Security threats to the wireless network. WPA2, WPA3 protocols. Architecture and configurations for a secure wireless network. Secure configuration and analysis of a hybrid (LAN/WiFi) computer network.	2				6		**8**	**10**	Practical tasks; Reporting and preparation for assessment quiz K5.
9. Consultation, exam.		4							
Total	**16**	**4**					**52**	**78**	

Assessment strategy	**Weight %**	**Deadline**	**Assessment criteria**
I assessment quiz (K1)	10 %	At a set time	Assessment criteria: quantity and quality of tasks completed, validity of the results and conclusions, quality of the description of the work, valid answers to the questions posed by the teacher. Each paper has an equal weighting of 10% of the overall grade. The lecturer, in order to ensure that generative artificial intelligence (AI) tools ("ChatGPT" or others) were not used in preparing the practical work report (i.e., that the content of the report was not generated by AI tools), has the right to ask follow-up questions and, if necessary, modify or annul the grade for the practical work. Grading scale: 10–9: excellent knowledge and skills. 90–100% correct answers. 8–7: good knowledge and skills, with minor errors possible in answers. 70–89% correct answers. 6–5: average knowledge and skills, with many errors in answers. 50–69% correct answers. 4–3: poor knowledge and skills, below average, with essential errors in answers. 20–49% correct answers. 2–1: knowledge and skills do not meet minimum requirements. 0–19% correct answers.
II assessment quiz (K2)	10 %	At a set time	
III assessment quiz (K3)	10 %	At a set time	
IV assessment quiz (K4)	10 %	At a set time	
V assessment quiz (K5)	10 %	At a set time	
Exam (E)	50 %	At a set time	A computer-based test consisting of closed-ended as well as open-ended questions. The questions cover material from theoretical lectures and laboratory work. Grading scale: 10–9: excellent knowledge and skills. 90–100% correct answers. 8–7: good knowledge and skills, with minor errors possible in answers. 70–89% correct answers. 6–5: average knowledge and skills, with many errors in answers. 50–69% correct answers. 4–3: poor knowledge and skills, below average, with essential errors in answers. 20–49% correct answers. 2–1: knowledge and skills do not meet minimum requirements. 0–19% correct answers.
Final grade: 0,1K1+0,1K2+0,1K3+0,1K4+0,1K5+0,50E			

Author (-s)	**Publishing year**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing house or web link**
Required reading				
1. Wendell Odom	2019	CCNA 200-301 Official Cert Guide, Volume 1 1st Edition,	1 edition	Cisco Press; 1 edition (September 10, 2019)

		Fundamentals, Ethernet Switching, IPv4/IPv6 routing, and Wireless LANs.		ISBN-13: 978-0135792735 ISBN-10: 0135792738
2. Wendell Odom	2019	CCNA 200-301 Official Cert Guide, Volume 2 1st Edition, *Security, IP Services, Architecture, and Automation.*	1 edition	Cisco Press; 1 edition (December 10, 2019) ISBN-13: 978-1587147135 ISBN-10: 1587147130
3. Jim Doherty	2022	Wireless and Mobile Device Security, 2nd Edition	5 edition	Jones & Bartlett Learning; 2nd edition, ISBN:9781284228465
Recommended reading				
4. Gerardus Blokdyk	2021	IPv6: complete self-assesment guide		5STARCooks, ISBN 978-0655402077
5. Kavaliūnas, Rimantas, Lagzdinytė, Ingrida, Liutkauskas, Vidmantas, Plėštys, Rimantas, Vilutis, Gytis.	2015	Kompiuterių tinklai: Mokomoji knyga (3-ioji patais. ir papild. laida. ed.)		Kaunas: Technologija., ISBN: 9789955255901.