

DESCRIPTION OF THE STUDY SUBJECT

Title

COMPUTER NETWORK TECHNOLOGIES AND SECURITY

Scope of the subjects

Semester	Mode of studies	Structure*				Total number of hours	Number of credits	Group and type of subjects
		L	Lw	C	S			
V	Full-time	36	63	18	131	248	9	Subjects for deepening in the branch
VI	Part-time	12	42	63	131	248	9	

*L – lectures, PS – practical activities, seminars, LW – laboratory work, PR – practice, CP – course paper, C – consultations, S – self-study

Aim of the subject

To know network technological solutions, hardware, standards, be able to combine local computer networks, use global networking services. To design computer networks, considering the user's needs and technical possibilities of equipment. To be able to choose suitable hardware of the network, adjust it by applying appropriate network protocols. To maintain computer networks, combine network services. To be able to ensure security of computer networks at various levels.

Necessary background knowledge for studying the subject

Students shall have heard the subjects computer hardware, operating systems management, computer networks and telecommunications.

Content of the subject

Title of the topic and description of the content	Number of contact hours			S	Total number of hours
	L	Lw	C		
1. The overview of network protocols according to OSI layers. TCP / IP protocol suite, IPv4 and IPv6 addressing, LAN, WAN, subnets, fixed (FLSM) and variable (VLSM) size masks. DHCP service.	4	-	-	-	4
Laboratory work No. 1. IP addresses for the network and subnets of a small enterprise.	-	4	-	7	11
2. Hardware of network nodes, repeaters, switches, routers. Connection lines. Data transfer using protocols of physical, data (Mac, Arp, etc.) and transport (TCP, UDP, etc.) layer. Ethernet standard. Control of network nodes via a graphical interface.	4	-	-	-	4
Laboratory work No. 2. Ethernet network design of a small enterprise, its adjustment.	-	4	-	10	14
Preparation for the defence of laboratory works and their defence No. 1	-	1	2	7	10
3. Network layer protocols. Static and dynamic (RIP, OSPF, EIGRP, etc.) routing.	4	-	-	-	4
Laboratory work No. 3. Network of the enterprise with several Ethernet subnets, routing.	-	4	2	12	18
4. Management of the network node through command-line interface. Network layer protocols, static and dynamic (RIP, OSPF, EIGRP, etc.) routing. Cisco protocols.	3	-	-	-	3
Laboratory work No. 4. Adjustment of the router through the command line. Redundant node configuration copies, restoration, passwords.	-	6	-	10	16
Preparation for the defence of laboratory works and their defence No. 2	-	2	2	5	9
5. Switching management, STP and other protocols ensuring continuous operation of the network. Secure network of the enterprise, VLAN and other solutions.	4	-	-	-	4
Laboratory work No. 5. STP harmonisation in switches of the enterprise. Laboratory work No. 6. VLAN designing and installation in computer network of the enterprise.	-	8	2	15	25
6. Application layer protocols. DNS, SMB and other network services, their harmonisation.	4	-	-	-	4
Laboratory work No. 7. harmonisation of DNS and / or SMB and / or other services of the enterprise network.	-	7	2	12	21
Preparation for the defence of laboratory works and their defence	-	2	2	5	9

Title of the topic and description of the content	Number of contact hours			S	Total number of hours
	L	Lw	C		
No. 3					
7. WAN networks, standards (PPP, DSL, etc.), application. VPN, secure connection of remote enterprise networks. Network node management through a remote access interface (Telnet, SSH, etc.). Virtual networks. Bridges.	4	-	-	-	4
Laboratory work No. 8. Joining of remote departments of the enterprise via VPN.	-	7	1	12	20
8. Network safety assurance solutions. ACL, proxy servers and other security measures of network nodes. Specialized network nodes-firewalls. Translation of network addresses.	3	-	-	-	3
Laboratory work No. 9. Adjustment of NAT service and / or node firewall of enterprise network.	-	8	-	12	20
Preparation for the defence of laboratory works and their defence No.4	-	2	2	5	9
9. Wireless networks, peculiarities of their adjustment.	3	-	-	-	3
Laboratory work No. 10. Integration of wireless subnet into the computer network of the enterprise.	-	3	1	8	12
10. Physical and software analysis tools of data flows. SNMP protocol.	3	-	-	-	3
Laboratory work No. 11. Traffic analysis of the enterprise network and evaluation of obtained results.	-	4	-	6	10
Preparation for the defence of laboratory works and their defence No. 5	-	1	2	5	8
Total number of hours	36	63	18	131	248

Assessment of learning outcomes

Ten-point criteria-based assessment system as well as cumulative assessment using individual cumulative index (ICI) are applied. The overall grade is the sum of grades for defence of laboratory works multiplied by weighted coefficients. $ICI = 0,15 DLw1 + 0,15 DLw 2 + 0,25 DLw 3 + 0,25 DLw 4 + 0,2 DLw 5$

Recommended literature

Key literature						
No.	Year of publishing	Author(s) and title of the publication	Publishing house	Number of copies and/or internet link		
				ŠSC library	Other premises	Other libraries *
1.	2011	Plėštys R., Kavaliūnas R., Vilutis G., Lagzdinytė I., Liutkauskas V. Kompiuterių tinklai	Technologija	4	-	3
2.	2008	Garla E. Kompiuterių tinklų projektavimas	Ciklonas	2	-	82
3.	2007	Valterytė R. Kompiuterių tinklai	Vytauto Didžiojo universitetas	4	-	18
4.	2015	FreeVideoLectures. Networking Video Lectures/Tutorials	Freevidelectures.com	http://freevidelectures.com/Subject/Networking#		
5.	2010	Kenneth Mansfield, Jr., James Antonakos Computer Networking for LANS to WANS: Hardware, Software and Security	USA	https://books.google.lt/books?id=VQvhAN9iBuMC&printsec=frontcover&dq=Network+Hardware&hl=lt&sa=X&ved=0ahUKEwiamcO_94HKAhVD1ywKHd5eDQQQ6AEIGjAA#v=onepage&q=Network%20Hardware&f=false		
Additional literature						
No.	Year of publishing	Author(s) and title of the publication	Publishing house and/or internet link			
1.	2010	Tanenbaum A.S., Wetherall D.J. Computer Networks, 5th Edition.	Prentice Hall			
2.	2005, 2003	Kaklauskas L. Kompiuterių tinklai 1-2 dalys	Šiaulių universiteto leidykla			

3.	2011	FreeBookCentre.net. Computer Networking Books.	http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html
4.	2007	Lučinskij M. Duomenų saugos pradmenys.	Smaltija
5.	2011	Kaklauskas L., Sakalauskas L.. Study of on-line measurement of traffic self-similarity. Central European Journal of Operations Research, DOI: 10.1007/s10100-011-0216-5.	Central European Journal of Operations Research

* ŠAVB – Šiauliai Region Povilas Višinskis Public Library, ŠU – library of Šiauliai University

Required material resources and their short description

<ul style="list-style-type: none">• Equipment (devices): computer laboratory (16 units), computers connected to the local network and connected to the Internet, multimedia projector. Every workstation is equipped with VirtualBox, VMware or any other virtualization platform of operating systems.• Software: MS Windows 10, Windows 2012 Server or later, distribution of Unix or Linux network operating systems.

The description prepared by:

Associate Professor Dr. Liudvikas Kaklauskas