SYLLABUS

1. Information regarding the programme

1.1 Higher education	Babeş Bolyai University	
institution		
1.2 Faculty	Faculty of Mathematics and Computer Science	
1.3 Department	Department of Computer Science	
1.4 Field of study	Computer Science	
1.5 Study cycle	Bachelor	
1.6 Study program/	Computer Science	
Qualification		

2. Information regarding the discipline

2.1 Name of the discipline S				ecialized Protocols	s in C	computer Ne	tworks
2.2 Course coordinator				PhD. Assoc. Prof. Adrian Sergiu DARABANT			
2.3 Seminar coordinator				PhD. Assoc. Prof. Adrian Sergiu DARABANT			ABANT
2.4. Year of	3	2.5	5	2.6. Type of	С	2.7 Type of	Optional
study		Semester		evaluation		discipline	
2.8 Code of	de of MLE5033						
discipline							

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	5	Of which: 3.2 course	2	3.3	1 lab+
-				seminar/laboratory	2 pr
3.4 Total hours in the curriculum	70	Of which: 3.5 course	28	3.6	42
				seminar/laboratory	
Time allotment:		•		·	hours
Learning using manual, course support, bibliography, course notes					10
Additional documentation (in libraries, on electronic platforms, field documentation)					4
Preparation for seminars/labs, homew	vork, j	papers, portofolios and	essays	3	4
Tutorship					2
Evaluations					10
Other activities:					-
3.7 Total individual study hours		30			•

3.8 Total hours per semester	100
3.9 Number of ECTS credits	4

4. Prerequisites (if necessary)

4.1. curriculum	Computer Networks, Operating Systems, Computer System Architecture	
4.2. competencies	• Good knowledge of TCP/IP, basis of network security, data encryption algorithms.	

5. Conditions (if necessary)

5.1. for the course	Classroom with network and Internet access and to laboratory	
		equipment.
5.2. for the seminar /lab	• Laboratory with Internet connected computers;	
activities		servers and desktops, routers, switches, wireless access points;

6. Specific competencies acquired

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onal	competencies	•	C6.2 Identification and explanation of basic and advanced architectures for systems and computer networks management.
fessi	peter	•	C6.4 Performance, response time and resource consumption measurements; establishing
LO L	m		and enforcing access rights.
Ъ	00	•	C6.5 Implementation of computer networking projects.
		•	CT1 Applying organized and efficient work rules, responsible attitude towards scientific/
	6S		teaching domains in order to obtain a creative exploitation of own potential, while
rsal	ncio		respecting the principles and rules of professional ethics
Transversal	competencies	•	CT3 Use of effective methods and techniques for learning, information, research and
ans	duu		capacity to exploit knowledge, to adapt to a dynamic society and communication in
Ţ	CO		Romanian language and in a foreign language

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• Acquire advanced practical knowledge and experience with network security policies, VOIP communication, Virtual Private Networks, intrusion detection, firewalls
7.2 Specific objective of the discipline	 Ability to define and implement network security policies (firewalls, packet filtering, authentication) Ability to implement network tunnels and various network interconnection strategies using data encryption and entity authentication. Ability to implement VOIP technologies on heterogeneous networks and interconnection VOIP access points with public telephony providers (PSTN) Acquire practical knowledge about network penetration techniques. Understand and contain the limitations of various security mechanisms in wired and wireless networks;

8. Content

8.	1 Course	Teaching methods	Remarks		
1.	IP Layer security. Linux firewalls.	Exposure, conversation, explanation,			
	Netfilter.	didactical demonstration			
2.	Windows firewalls. Implementing network	Exposure, conversation, explanation,			
	security policies using Windows and Unix	didactical demonstration			
	firewalls.				
3.	Proxy servers and helper protocols. Squid,	Exposure, conversation, explanation,			
	Microsoft ISA, SOCKS	didactical demonstration			
4.	Virtual Private Networks, tunneling	Exposure, conversation, explanation,			
	architecture and technologies. Principles	didactical demonstration			
	and practice.				

5.	IP-IP tunnels. PPTP/GRE VPN tunnels.	Exposure, conversation, explanation,
	L2TP tunnels. Implementation of	didactical demonstration
	Windows-Windows and Linux-Windows	
-	tunnels.	
6.	Openvpn –bridged and routed	Exposure, conversation, explanation,
	architectures.SSH vpn, Cloud VPN,	didactical demonstration
	Tungle VPN, Hamachi, Social VPN, Wireguard,etc	
7	IPSec. Tunnel mode and Transport mode	Exposure, conversation, explanation,
7.	IPSec. Windows/Linux IPSec	didactical demonstration
	implementations.	undactical demonstration
8.	Network intrusion or TCP/IP feature? TCP	Exposure, conversation, explanation,
	and UDP firewall hole punching. STUN.	didactical demonstration
	Skype, Hamachi.	
9.	VOIP technologies. The SIP protocol.	Exposure, conversation, explanation,
	H323. Softphones. Asterisk: the digital	didactical demonstration
	PBX telephony platform.	
10.	Anonymity networks and hiding	Exposure, conversation, explanation,
	techniques. The Thor network.	didactical demonstration
11.	P2P protocols: Bittorrent, eMule,	Exposure, conversation, explanation,
	eDonkey.	didactical demonstration
12.	Symmetric and public key encryption.	Exposure, conversation, explanation,
	Digital Certificates and Certificate	didactical demonstration
	Authorities. Digital signatures.	
13.	IPv6. Network intrusion and abusing.	Exposure, conversation, explanation,
		didactical demonstration
14.	QoS and traffic shaping.	Exposure, conversation, explanation,
		didactical demonstration

Bibliography

1) W. Richard Stevens TCP/IP Illustrated, Vol I: The Protocols, Addison Wesley, ISBN 0-201-63346-0

- 2) Gary R. Wright and W. Richard Stevens TCP/IP Illustrated, Vol II: The Implementation Addison Wesley, ISBN 0-201-63354-X
- 3) James F. Kurose and Keith W. Ross Computer Networking, A top-down approach featuring the Internet. Addison Wesley, 2001.
- 4) Douglas E. Comer and David L. Stevens Internetworking with TCP/IP, Vol II: Design, Implementation, and Internals. Prentice Hall.
- 5) William Stallings Computer Networking with Internet Protocols and Technology Prentice Hall 2004.

6) Forouzan, B.A. TCP/IP Protocol Suite second ed (2003) Mc Graw-Hill

7) Hassan, M. and Jain, R. High Performance TCP/IP Networking Concepts, Issues, and Solutions. Pearson Prentice Hall 2004.

8.2 Seminar / laboratory		Teaching methods	Remarks
1. Network security lay	er. Implementation	Dialogue, debate, case studies, examples,	
of netfilter/iptables an	nd Windows	proofs	
firewalls. Tests in a s	imulated network.		
2. Proxy servers and VI	PN technologies. IP-	Dialogue, debate, case studies, examples,	
IP, PPTP, openvpn, S	Social VPN, SSH	proofs	
VPN			
3. IPSec Windows/Linu	IX	Dialogue, debate, case studies, examples,	
		proofs	
4. Asterisk/Trixbox VO	IP telephony.	Dialogue, debate, case studies, examples,	
Multimedia streamin	g.	proofs	
5. Firewall Hole punchi	ng. Skype, Hamachi.	Dialogue, debate, case studies, examples,	
Wake on LAN.		proofs	

6. The Thor network. WPA and WEP	Dialogue, debate, case studies, examples,
security cracking.	proofs
7. P2P networking: Bittorent, EMule,etc	Dialogue, debate, case studies, examples,
	proofs

Bibliography

- 1. W. Richard Stevens TCP/IP Illustrated, Vol I: The Protocols, Addison Wesley, ISBN 0-201-63346-0
- Gary R. Wright and W. Richard Stevens TCP/IP Illustrated, Vol II: The Implementation Addison Wesley, ISBN 0-201-63354-X
- 3. James F. Kurose and Keith W. Ross Computer Networking, A top-down approach featuring the Internet. Addison Wesley, 2001.
- 4. Cisco Networking Academy Classes, <u>http://cisco.netacad.net</u>

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The course respects the IEEE and ACM Curriculum Recommendations for Computer Science studies;
- The course exists in the studying program of all major universities in Romania and abroad;
- The content of the course covers the most important aspects necessary for a network engineer/architect in a network specialized company.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	 know the applied technologies taught during the course; problem solving 	Colloquium, subject presentation	50%
10.5 Seminar/lab activities	- be able to implement course concepts and presented technologies	-Project presentation at the end of the semester	50%
10.6 Minimum perform	nance standards		
> At least grade	5 (from a scale of 1 to 10) at bo	oth presentation and laboratory	[,] project.
ate Signature of course coordinator		Signature of seminar coordinator	

10.03.2024 Assoc Prof PhD Adrian Sergiu DARABANT Assoc. Prof. PhD Adrian Sergiu DARABANT

Date of approval

Signature of the head of department

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.prof Dr DIOSAN Laura....