SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeş Bolyai University**	
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 programme / Qualification	**Computer Science**	

2. Information regarding the discipline

2.1 Name of the discipline	**Computer Networks**						
2.2 Course coordinator	PhD. Assoc. Prof. Adrian Sergiu DARABANT						
2.3 Seminar coordinator	PhD. Assoc. Prof. Adrian Sergiu DARABANT						
2.4. Year of study	**2**	2.5 Semester	**3**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Compulsory**

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

3.1 Hours per week	4	3.2 Of which: course	2	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	56	3.5 Of which: course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					20
Preparation for seminars/labs, homework, papers, portfolios and essays					30
Tutorship					11
Evaluations					13
Other activities:					-

3.7 Total individual study hours	94
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

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 activities	• Laboratory with Internet connected computers; Linux and Windows;

6. Specific competencies acquired

Professional competencies	C6. Design and administration of computer networks
Transversal competencies	CT1 Applying organized and efficient work rules, responsible attitude towards scientific/ teaching domains in order to obtain a creative exploitation of own potential, while respecting the principles and rules of professional ethics CT3 Use of effective methods and techniques for learning, information, research and capacity to exploit knowledge, to adapt to a dynamic society and communication in Romanian language and in a foreign language

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

7.1 General objective of the discipline	• Be able to understand the fundamental principles and inner workings of a computer network and of Internet
7.2 Specific objective of the discipline	• Learning the underlying concepts and principles of modern computer networks with emphasis on protocols, architectures, and implementation issues; • Learning to program networking applications using TCP/IP • Learning and understand the layered Internet protocols architecture • Have all the basis knowledge about TCP/IP – theoretical aspects and programming communicating applications

8. Content

8.1 Course	Teaching methods	Remarks
1. Computer Networks Introduction. Definition. Examples. Network Topologies.	Exposure: description, explanation,	
2. The socket programming API. Network programming using TCP and UDP.	Exposure: description, explanation, examples,	
3. Protocols: definition. Protocol layers. The OSI reference model. The TCP/IP layered model.	Exposure: description, explanation, examples, debate, dialogue	
4. The functions and services of the IP layer. Structure of an IP datagram. IP addressing (classfull). Datagram check summing. The ARP protocol.	Exposure: description, explanation, examples, discussion of case studies	
5. The concept of Subnetworks and Supernetworks. CIDR. Network masks.	Exposure: description, explanation, examples, proofs	
6. The UDP protocol and services. The structure of an UDP datagram UDP ports and processes.	Exposure: description, explanation, examples,	

7. The TCP protocol. Structure of a TCP segment. Principles of TCP data transmission.	Exposure: description, explanation, discussion of case studies	
8. The TCP Sliding Window mechanism. Flow Control. Congestion avoidance.	Exposure: description, explanation, examples	
9. Broadcast and multicast communication. The ICMP protocol. Error and network state signaling.	Exposure: description, explanation, examples, discussion of case studies	
10. The application layer. HTTP, SMTP, FTP	Exposure: description, explanation, examples, debate	
11. The Internet Domain Name System. The DNS protocol.	Exposure: description, explanation, examples, discussion of case studies	
12. Network routing. Distance based and link state based routing algorithms. Routing protocols: RIP, BGP, OSPF.	Exposure: description, explanation, examples, discussion of case studies	
13. The physical layer. Transmission media. Characteristics, fiber networks, wireless networks.	Exposure: description, explanation, examples, discussion of case studies	
14. Error detection and correction.	Exposure: description, examples, discussion of case studies,	

Bibliography

1. J. Kurose, K. Ross, Computer Networking: A Top Down Approach, Addison-Wesley, rev2,3,4 2002-2007.
2. Douglas E. Comer, Internetworking with TCP/IP
    a. Vol 1- Principles, Protocols, and Architecture
    b. Vol 3- Client-Server Programming and Applications
3. G.R.Wright, R. Stevens, TCP/IP Illustrated – vol 1,2, Addison Wesley.
4. Matt Naugle, Illustrated TCP/IP – A Graphic Guide to protocol suite, John Willey & Sons, 1999.
5. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, UNIX® Network Programming Volume 1, Third Edition: The Sockets Networking API
6. Peterson, Larry - Davie, Bruce: Computer Networks: A Systems Approach. Morgan Kaufman, (3rd ed.), 2003.
7. Stallings, William: Data and Computer Communications. Prentice Hall, (6th ed.), 2000.
8. Tanenbaum, Andrew S.: Computer Networks. Prentice Hall, (4th ed.), 2003.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Laboratory Configuration. Necessary tools, Virtual machines and build systems;	Explanation, dialogue, case studies, example, proofs	
2. A simple client-server TCP application;	Dialogue, debate, case studies	
3. Concurrent TCP client-server applications;	Dialogue, debate, case studies, examples, proofs	
4. Concurrent Multiplexed TCP- Servers. The select call. Network debugging – wireshark	Dialogue, debate, case studies, examples	
5. Simple UDP client-server;	Dialogue, debate, case studies, examples	
6. Complex/Concurrent UDP applications. Ping. Traceroute. Ipconfig/ifconfig.	Dialogue, debate, case studies, examples	
7. Mid term evaluation;	Dialogue, debate, case studies, examples	
8. Network Simulation. Packet Tracer installation.	Explanation, dialogue, case studies	
9. Packet Tracer simple network simulation.	Explanation, dialogue, case studies, examples	

10. Packet Tracer - Physical/logical network design.	Explanation, dialogue, case studies, examples	
11. Packet Tracer – NAT	Testing data, discussion, evaluation	
12. Packet Tracer – RIP Routing	Explanation, dialogue, case studies	
13. Packet Tracer – Complex design	discussion, evaluation	
14. Lab Evaluation.	Explanation, dialogue, case studies	

Bibliography

1. Douglas E. Comer, Internetworking with TCP/IP - Vol 3- Client-Server Programming and Applications
2. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, UNIX® Network Programming Volume 1, Third Edition: The Sockets Networking API
3. Cisco Networking Academy Classes, http://cisco.netacad.net

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 Curriculla 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 basic principle of computer networks theory; - apply the course concepts - problem solving	Written exam	50%
10.5 Seminar/lab activities	- TCP/IP programming skills and network simulation knowledge	-Mid-term and final term lab tests	50%
10.6 Minimum performance standards			
➢ At least grade 5 (from a scale of 1 to 10) at both written exam and laboratory assessments.			

Date Signature of course coordinator Signature of seminar coordinator

15.04.2018 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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