

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Electronics		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Computer Networks		
Lecturer (for lectures)		Nikolić R. Tatjana		
Lecturer/associate (for exercises)		Nikolić S. Goran, Jovanović D. Borisav		
Lecturer/associate (for OFE)		Nikolić S. Goran, Jovanović D. Borisav		
Number of ECTS	6	Course status (obligatory/elective)	Obligatory	
Prerequisites				
Course objectives		To introduce students to: a) basic principles of data transfer, b) architectures of computer networks, communication protocols and interfaces, c) different concepts and techniques that are necessary for the successful implementation of computer networks.		
Course outcomes		The resulting knowledge of this subject will enable the students to understand the principles of computer communications, components, applications, protocols, standards, and implementation strategies that are the basis for the design, operation, and maintenance of computer networks.		
Course outline				
Theoretical teaching		Data transmission and networking. Network components. Layer model. The development of the Internet. The ISO-OSI reference model. The TCP/IP protocol stack. The physical layer and the data link layer. Signals and electrical interfaces. Asynchronous and synchronous transmission. Digital and analog transmission. Modulation techniques. Multiplexing. Errors detection and correction. Management at the data link layer and protocols for accessing the media. Point to point access. Random access, Ethernet. Wireless transmission characteristics, 802.11xx. The network layer, networking, network address translation. Forwarding and fragmentation of a datagram. IPv4 and IPv6. Routing. Routing algorithms: distance vector, link state. Subnets and hierarchical addressing. Mobile IP. Autonomous systems and the structure of the Internet. Algorithms for interdomain routing. The transport layer. Ports and client-server model. UDP. TCP, segments, establishing a connection, state diagram, flow control, sliding window protocol, error control. Congestion control, the nature of congestion, router model, models of congestion control, slow start, fast retransmission, fast recovery. The application layer. TELNET, FTP, DNS, electronic mail. HTTP/Web. Static, dynamic and active Web documents. Proxy server and pages caching. Aspects of security in the network operation. The attacks, protections, encryption, authorized access.		
Practical teaching (exercises, OFE, study and research)		During the implementation of the curriculum it is planned that students independently do the following labs relating to various Internet protocols: 1) Protocol stack; 2) Ethernet; 3) 802.11; 4) IPv4; 5) ICMP; 6) ARP; 7) DHCP; 8) UDP; 9) TCP; 10) DNS; 11) HTTP.		
Textbooks/references				
1	Computer networks, PowerPoint presentations for all lectures, available on the website of the course			
2	Andrew S. Tanenbaum, David J. Wetherall, Computer networks, 5th ed., Pearson Education, 2011.			
3	James F. Kurose, Keith W. Ross, Computer networking: a top-down approach, 6th ed., Pearson Education, 2013.			
4	Mile Stojčev, Goran Nikolić, Nataša Popović, Exercise manual for computer networks and interfaces, Faculty of Electronic Engineering Niš, in Serbian, 2011.			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1	0	0
Teaching methods		Lectures, exercises, labs, homeworks, colloquia, projects, consultations		
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures			Written exam	30
Exercises		20	Oral exam	30
Colloquia		20		

Projects			