



## SYLLABUS

<b>Basic information of the course</b>	
<b>University:</b>	<b>University “Ukshin Hoti” - Prizren</b>
<b>Academic unit:</b>	<b>Faculty of Computer Science</b>
<b>Study program:</b>	<b>Information and Telecommunication Technologies</b>
<b>Course:</b>	<b>Introduction to Networking</b>
<b>Study level:</b>	<b>Bachelor</b>
<b>Course status:</b>	<b>Mandatory</b>
<b>Study year:</b>	<b>1</b>
<b>Number of hours per week:</b>	<b>2+2</b>
<b>Credit value - ECTS:</b>	<b>6</b>
<b>Time / location:</b>	<b>It will be published in the university web site!</b>
<b>Lecturers:</b>	<b>Ass. Prof. Dr. Arsim Susuri Ass. Betim Maloku, Ph. D. c.</b>
<b>Contact details:</b>	<b>arsim.susuri@uni-prizren.com betim.maloku@uni-prizren.com</b>
<b>Course description:</b>	The course offers basic concepts about the design and operation of computer networks. The course also explains the basic concepts of mobile networks and the Internet of Things.
<b>Course objectives:</b>	Through this course it becomes possible for students to know the basic concepts, definitions and best practices of computer networks. Students will be introduced to the basics and concepts of computer networking and some of the approaches applied in the field. Objectives of this course to provide a foundation regarding computer networks.
<b>Learning outcomes:</b>	Upon completion of this course the student will be able to: <ul style="list-style-type: none"> <li>- Familiar with layered communication architectures (OSI and TCP / IP).</li> <li>- Understand the client / server model and the main application layer protocols.</li> <li>- Learn socket programming and how to run client / server programs.</li> <li>- Understand the concepts of reliable data</li> </ul>

	<p>transfer and how TCP implements these concepts.</p> <ul style="list-style-type: none"> <li>- Knowledge of blockage control principles.</li> <li>- Learn the principles of routing and the semantics and syntax of IP.</li> <li>- Familiar with current topics such as security, network management, sensor networks and / or other topics.</li> </ul>		
<b>Contribution on student load (must correspond with learning outcomes)</b>			
<b>Activity</b>	<b>Hours</b>	<b>Days/week</b>	<b>Total/hours</b>
Lectures	2	15	30
Exercise theoretical/laboratory	2	15	30
Practice work	1	2	2
Contact with lecturer/consultations	1	5	5
Field exercises	1	1	1
Midterms	2	2	4
Laboratory exercises	2	2	4
Individual time spent studying (at the library or home)	3	10	30
Final preparation for the exam	5	6	30
Time spent in evaluation (tests, quiz, final exam)	2	3	6
Projects, presentations, etc.	4	2	8
<b>Total</b>			<b>150</b>
<p>Notice: 1 ECTS credits = 25 hours commitment, e.g. if the course has 6 ECTS credits student must have 150 hours during the semester.</p>			
<b>Teaching methods:</b>	<p>The course is a combination of lectures, discussions, numerical and laboratory exercises, while the assignments are presented by the laboratory course lecturers!</p>		
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>- Laboratory exercises: 20%</li> <li>- Midterm 1: 40%.</li> <li>- Midterm 2: 40%.</li> <li>- Or final exam: 100%.</li> </ul>		
<b>Assessment and grading:</b>	<b>Vlerësimi në %</b>	<b>Nota përfundimtare</b>	
	91% - 100%	10	
	81% - 90%	9	
	71% - 80%	8	
	61% - 70%	7	
	51% - 60%	6	
	0% - 50%	5	

Literature	
<b>Basic literature:</b>	<ol style="list-style-type: none"> <li>1. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 8th edition, Pearson, 2020.</li> <li>2. Wireshark Lab: Getting Started v8.0, Supplement to Computer Networking: A Top-Down Approach, 8th ed., J.F. Kurose and K.W. Ross, 2020.</li> </ol>
<b>Additional literature:</b>	<ol style="list-style-type: none"> <li>1. Andrew S. Tanenbaum, Computer Networks 5th edition, Pearson, 2010.</li> <li>2. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 6th edition, Pearson, 2013.</li> </ol>
Study plan	
Week	Lectures
<i>First week:</i>	<ul style="list-style-type: none"> <li>• Introduction to the syllabus</li> <li>• Protocol layers and service models.</li> <li>• OSI and Internet protocols</li> </ul>
<i>Second week:</i>	<ul style="list-style-type: none"> <li>• What is the Internet.</li> <li>• Concepts of Delays, Security and Quality of Service (QoS)</li> </ul>
<i>Third week:</i>	<ul style="list-style-type: none"> <li>• Application layer protocols and client-server model</li> </ul>
<i>Fourth week:</i>	<ul style="list-style-type: none"> <li>• Programming Sockets in C (client-server and web server programs)</li> </ul>
<i>Fifth week:</i>	<ul style="list-style-type: none"> <li>• Reliable data transfer</li> <li>• Stop-and-Go rating. TCP and UDP semantics and syntax</li> </ul>
<i>Sixth week:</i>	<ul style="list-style-type: none"> <li>• TCP RTT rating</li> <li>• Principles of overload control</li> </ul>
<i>Seventh week:</i>	<ul style="list-style-type: none"> <li>• Safety</li> <li>• Summary of threats, cryptography, authentication, and firewalls</li> </ul>
<i>Eighth week:</i>	<ul style="list-style-type: none"> <li>• Test 1</li> </ul>
<i>Ninth week:</i>	<ul style="list-style-type: none"> <li>• Routing principles</li> <li>• Link-state and distance-vector. IP semantics and syntax</li> </ul>
<i>Tenth week:</i>	<ul style="list-style-type: none"> <li>• Link layer</li> <li>• Error detection. Multiple access protocols.</li> <li>• IEEE 802.3 Ethernet</li> </ul>
<i>Eleventh week:</i>	<ul style="list-style-type: none"> <li>• Switching</li> </ul>

	<ul style="list-style-type: none"> <li>• Mediums. Signal power. Data coding</li> </ul>
<i>Twelfth week:</i>	<ul style="list-style-type: none"> <li>• Mobile and wireless networks</li> </ul>
<i>Thirteenth week:</i>	<ul style="list-style-type: none"> <li>• Network management including SNMP.</li> <li>• Network problem solving</li> </ul>
<i>Fourteenth week:</i>	<ul style="list-style-type: none"> <li>• SDN (Software Defined Networking) and IoT (Internet of Things)</li> </ul>
<i>Fifteenth week:</i>	<ul style="list-style-type: none"> <li>• Test 2</li> </ul>

## Exercises

Study plan	
Java	Exercises
<i>First week:</i>	<ul style="list-style-type: none"> <li>• Introduction to the syllabus (for the part of the exercises)</li> </ul>
<i>Second week:</i>	<ul style="list-style-type: none"> <li>• Installing the Wireshark software tool</li> </ul>
<i>Third week:</i>	<ul style="list-style-type: none"> <li>• Introduction to the Wireshark tool.</li> <li>• Analyze different network cards through Wireshark.</li> <li>• HTTP protocol analysis through Wireshark</li> </ul>
<i>Fourth week:</i>	<ul style="list-style-type: none"> <li>• Packet analysis on DNS server through Wireshark</li> </ul>
<i>Fifth week:</i>	<ul style="list-style-type: none"> <li>• Capture and analyze TCP packets through Wireshark</li> </ul>
<i>Sixth week:</i>	<ul style="list-style-type: none"> <li>• Capture and analyze UDP packets through Wireshark</li> </ul>
<i>Seventh week:</i>	<ul style="list-style-type: none"> <li>• Capture and analyze the third layer IP packet header (IPv4 and IPv6)</li> </ul>
<i>Eighth week:</i>	<ul style="list-style-type: none"> <li>• Repetition of exercises</li> <li>• Reinforcement for test 1</li> </ul>
<i>Ninth week:</i>	<ul style="list-style-type: none"> <li>• Analysis of the operation of the NAT service, through Wireshark</li> </ul>
<i>Tenth week:</i>	<ul style="list-style-type: none"> <li>• Capture and analyze ICMP packages, through Wireshark</li> </ul>
<i>Eleventh week:</i>	<ul style="list-style-type: none"> <li>• Communication of packets through Ethernet technology and ARP protocol. Analysis through Wireshark</li> </ul>
<i>Twelfth week:</i>	<ul style="list-style-type: none"> <li>• Analysis of DHCP server operation through Wireshark</li> </ul>
<i>Thirteenth week:</i>	<ul style="list-style-type: none"> <li>• Capture via Wireshark IP packets which are transmitted via 802.11 standard (WiFi)</li> </ul>
<i>Fourteenth week:</i>	<ul style="list-style-type: none"> <li>• SSL protocol analysis through the Wireshark tool.</li> </ul>
<i>Fifteenth week:</i>	<ul style="list-style-type: none"> <li>• Repetition of exercises</li> <li>• Reinforcement for test 2</li> </ul>

### **Academic policies and rules of conduct**

- Generally lecture presentations will be made through MS PowerPoint, tables, material usage, computer programs and numeric exercises.
- Additional resources (scientific papers, publications, national bulletins, as well as recent discoveries and research) will be provided by professors.
- In the absence of the opportunity for practical work to be organized weekly, in cooperation with the management of the university, this activity will be organized on certain days in: organizations, companies, etc.
- During each session will be organized the conversation and co-participation with the students!
- Students are required to be regular in lectures and exercises!
- It will be evaluated when the students collaborate and participate in the lectures and course exercises!
- Timely arrival in lectures and exercises is mandatory!