



MEĐIMURSKO VELEUČILIŠTE U ČAKOVCU

POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR: 2020/2021

1. GENERAL COURSE INFORMATION

1.1 Course name	Computer systems integration			
1.2 Study program/s	Undergraduate professional study of computer engineering			
1.3 Course status (O, E)	Elective course	1.6 Mode of instruction (number of hours)	Lectures	15
1.4 Course code			Exercises	45
1.5 Course abbreviation	IRS		Seminars	
1.6 Semester	6 th		E-learning	
1.7 ECTS	5	1.7 Place and time of instruction	Premises of the Polytechnic of Međimurje in Čakovec, according to the schedule published on the website of the Polytechnic	

2. TEACHING STAFF

2.1 Course leader/s-title	Robert Poljak, lecturer	contact	robert.poljak@mev.hr
2.2 Assistant/s- title	-	contact	-
2.3 Instruction held by- title	Robert Poljak, lecturer	contact	robert.poljak@mev.hr

3. COURSE DESCRIPTION

3.1 Course goals	The goal of the course is to prepare students to configure and use Mikrotik RouterOS devices as well as connect these devices with the rest of the network infrastructure.							
3.2 Prerequisites	There are no prerequisites for enrolling or finishing the course.							
3.3 Course outcomes	After successfully completing the course, students will be able to: I1 - Explain how to use and apply the RouterOS router to manage and limit network traffic I2 - Explain how to use and apply the use of VPN and SNMP I3 - Explain how to use and apply the use of IEEE 802.11 wireless networks I4 - Explain how to use and apply the use of dynamic routing protocols							
3.4 Course content	Through lectures and exercises, the course introduces students to ways to use Mikrotik RouterOS devices. The lectures cover various modules of RouterOS software and the technologies used in them. The practical part deals with examples of device configuration through working with real devices and device emulation software.							
3.5 Types of coursework	X	Lectures	X	Exercises	Blended e-learning	X	Individual activities	Laboratory
		Seminars and workshops	X	Distant learning	Field classes		Multimedia and network	Mentorship
		Other						
3.6 Language of instruction	Croatian/English							
	2	Class attendance		Seminars			Essay	
		Class activity		Project			Report/paper	

3.7 Monitoring students' work (1 ECTS = 30 hours)	1	Midterm exams	2	Practical task		Continuous knowledge check																																										
		Written exam		Experimental work																																												
		Oral exam		Research																																												
3.8 Assessment and evaluation of students' work during classes and at the final exam	<table border="1"> <thead> <tr> <th>Activity specification</th> <th>Percent %</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td colspan="3">Assessment during instruction</td> </tr> <tr> <td>Midterm for the practical part</td> <td>70%</td> <td>70</td> </tr> <tr> <td>Midterm for the theoretical part</td> <td>30%</td> <td>30</td> </tr> <tr> <td colspan="3"><i>Exam assessment for the students who failed to fulfil all the obligatory requirements during the semester</i></td> </tr> <tr> <td>Oral exam</td> <td>100%</td> <td>100</td> </tr> <tr> <td>Total:</td> <td>100%</td> <td>100</td> </tr> </tbody> </table>						Activity specification	Percent %	Points	Assessment during instruction			Midterm for the practical part	70%	70	Midterm for the theoretical part	30%	30	<i>Exam assessment for the students who failed to fulfil all the obligatory requirements during the semester</i>			Oral exam	100%	100	Total:	100%	100																					
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3.10 Specific features related with taking the course	<p>For a student to pass the course, he/she must earn a minimum of 50% of the points available for that learning outcome for EACH learning outcome. The final grade is obtained on the exam period and is the sum of points earned during classes. Students who did not complete the midterm exam must attend the oral exam where all learning outcomes are checked.</p>																																															
3.11 Students obligations	<p>Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam.</p> <p>Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council,</p>																																															

	which then decides on the justification of student absences with the obligatory opinion of the course leader.			
3.12 Written assignments	Seminar papers must be computer written and must have between 8 and 12 text cards (font Calibri, size 12) from introduction to conclusion, together with pictures, tables, etc. Seminar papers must have an adequate title page, table of content, numbered pages and list of literature used. The seminar paper should be divided into chapters and contain a list of references, a list of figures, tables, and graphs and a summary / conclusion containing 250 words. The student guarantees the authenticity of the work with his signature.			
3.13 Required reading	1.	Tyler Hart - Networking with MikroTik, MTCNA Study Guide, First Edition (2017.)		
3.14 Additional reading	1.	Stephen R.W. Discher - RouterOS by Example (2011.)		
	2.	Web site https://wiki.mikrotik.com/wiki/Main_Page		
4 ADDITIONAL COURSE INFORMATION				
4.1 Quality control	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.			
4.2 Contact the teacher	Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her any day during working hours by coming in person or by landline. It is also possible to ask questions by e-mail, which will be answered in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.			
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the classes or possible postponement of classes will be posted on the bulletin board and on the website of the Polytechnic at least 24 hours in advance.			
4.4 Course contribution to the study program	IS10 Distinguish types and communication protocols of computer networks IS18 Apply standards, methods, and techniques to analyse security threats and defend against them IS19 Use tools and methods for planning, building, and maintaining computer networks based on wired or wireless communication media IS20 Install, configure, and manage specific operating systems and network services in complex network environments			
5. ANALYSIS OF COURSE TOPICS (the number of hours is equal to the number of lectures and exercises of the course)				
LECTURES				
Hours	Topic and description	Method	Learning outcomes	Course outcome
1.	Introduction to the RouterOS operating system and an overview of basic functionalities	Lecture	List the ways to use RouterOS	1
2.	RouterOS versions and software upgrade management	Lecture	Compare the advantages and disadvantages of software upgrades	1
3.	Stateful Firewall	Lecture	List the ways to influence network traffic through the Firewall	1
4.	Network Address Translation	Lecture	Explain the benefit of using NAT	1
5.	Mangle and marking network traffic	Lecture	Explain the benefit of using Mangle and traffic marks	1

6.	Queues and traffic limitation	Lecture	Explain the benefit of using Queues	2
7.	Simple Network Management protocol	Lecture	List the reasons for using the SNMP protocol	2
8.	Virtual Private Networks	Lecture	List the reasons for using the VPN	2
9.	IEEE 802.11 wireless networks	Lecture	Compare the use of wired and wireless computer networks	2
10.	IEEE 802.11 wireless networks	Lecture	Compare WiFi network standards and their characteristics	3
11.	Wireless Access Point Controller	Lecture	Compare the advantages and disadvantages of central access point management	3
12.	Static and dynamic routing	Lecture	List the reasons for using dynamic routing protocols	4
13.	OSPF Dynamic Routing Protocol	Lecture	List the advantages and disadvantages of the OSPF protocol	4
14.	Preparation for the midterm exam	Individual	-	-
15.	Midterm exam	Individual	-	-
EXERCISES/ SEMINARS				
Hours	Topic and description	Method	Learning outcomes	Course outcome
1.-3.	RouterOS device configuration	Computer exercises	Use the Winbox tool for basic device configuration	1
4.-6.	IP address and static routes configuration	Computer exercises	Use the Winbox tool to configure IP addresses and static routes	1
7.-9.	Firewall	Computer exercises	Use the Winbox tool to configure Firewall	1
10.-12.	Firewall	Computer exercises	Use the Winbox tool to configure Firewall	1
13.-15.	Network Address Translation	Computer exercises	Use the Winbox tool to configure NAT	1
16.-18.	Network Address Translation	Computer exercises	Use the Winbox tool to configure NAT	2
19.-21.	Simple Network Management Protocol	Computer exercises	Use the Winbox tool to configure SNMP	2
22.-24.	Virtual Private Networks	Computer exercises	Use the Winbox tool to configure VPN	2
25.-27.	IEEE 802.11 wireless networks	Computer exercises	Use the Winbox tool to configure Wi-Fi	2
28.-30.	IEEE 802.11 wireless networks	Computer exercises	Use the Winbox tool to configure Wi-Fi	3
31.-33.	Wireless Access Point Controllers	Computer exercises	Use the Winbox tool to configure CAPsMAN	3
34.-36.	OSPF dynamic routing protocol	Computer exercises	Use the Winbox tool to configure OSPF	4
37.-39.	OSPF dynamic routing protocol	Computer exercises	Use the Winbox tool to configure OSPF	4
40.-42.	Preparation for the midterm exam	Individual	-	-
43.-45.	Midterm exam	Individual	-	-