

1.	Course Title	Virtualization
2.	Code	F18L3S062
3.	Study program	Software engineering and information systems
4.	Study Program Organizer	Faculty of Computer Science and Engineering
5.	Degree (first, second, third cycle)	first cycle
6.	Academic year / semester 3 / summer / optional	7. ECTS credits 6
8.	Teacher	associate professor Boro Jakimovski, assistant professor Sashko Ristov
9.	Course enrollment prerequisites	Оперативни системи
10.	<p>Course program goals (competencies): Introduction to virtualization as a paradigm for creation of virtual computer systems using software virtualization of hardware components. Analysis of different aspects of virtualization, technologies and techniques included in the process, as well as advantages and disadvantages introduces by using virtualization.</p>	
11.	<p>Course program content: Concepts of virtualization. Types of hypervisors. Theory of virtualization, advantages in server environment, application virtualization. Virtual machines. Types of CPU virtualization. Virtualization of physical machines. CPU and memory in virtual environment. Paravirtualization. Xen. New architectures for virtualization. Virtualization of devices for data storage. Dynamic and static storage. Cloning and copying. Redundancy, backup, cloning and templates. Snapshot and checkpoint. Management with devices in virtual environment. Resource sharing. Virtualization of the network. Using virtualization. Security in virtual environment. Server consolidation. Migration of virtual machines.</p>	
12.	<p>Learning methods: Lectures using presentations, interactive lectures, exercises (using equipment and software packages), teamwork, case studies, invited guest lecturers, independent preparation and defense of a project assignment and seminar work.</p>	
13.	Total available time	6 ECTS x 30 hours = 180 hours

14.	Distribution of the available time		30 + 45 + 15 + 15 + 75 = 180 hours			
15.	Teaching activity forms		15.1.	Lectures – theoretical teaching	30 hours	
			15.2.	Exercises (laboratory, auditory), seminar papers, teamwork	45 hours	
16.	Other activity forms		16.1.	Project Tasks	15 hours	
			16.2.	Independent Learning Tasks	15 hours	
			16.3.	Home learning	75 hours	
17.	Assessment methodology					
	17.1.	Tests			10 points	
	17.2.	Seminar paper/project (presentation: written and oral)			10 points	
	17.3.	Activity and learning			10 points	
	17.4.	Final exam			70 points	
18.	Assessment criteria (points/grade)		up to 50 points		5 (five) (F)	
			51 to 60 points		6 (six) (E)	
			61 to 70 points		7 (seven) (D)	
			71 to 80 points		8 (eight) (C)	
			81 to 90 points		9 (nine) (B)	
			91 to 100 points		10 (ten) (A)	
19.	Course completion and final exam requirements		Realized activities 15.1 and 15.2			
20.	Teaching Language		Macedonian and English			
21.	Teaching quality evaluation method		Internal evaluation mechanisms and questionnaires			
22.	Course Material					
	22.1.	Mandatory course material				
		No	Author	Title	Publisher	Year
		1	Matthew Portnoy	Virtualization Essentials, 2nd ed.	Sybex	2016
		2	Humble Devassy Chiramal, Prasad Mukhedkar, Anil Vettathu	Mastering KVM Virtualization	Packt Publishing	2016
	22.2.	Additional course material				

No.	Author	Title	Publisher	Year