

Specification for the book of courses

Study program	Computing and Informatics			
Module	Computer Systems Security			
Type and level of studies	Master studies			
The name of the course	Cloud Computing			
Lecturer (for lectures)	Stojanović M. Natalija, Ćirić M. Vladimir			
Lecturer/associate (for exercises)	Stojanović M. Natalija			
Lecturer/associate (for OFE)				
Number of ECTS	4	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	The goal of this course is to give an insight to the students into the concepts of virtualization and cloud systems, as well as insight into service-oriented principles.			
Course outcomes	It is expected for the students to acquire the knowledge needed to plan, design and implement virtual and cloud service system, as well as to implement virtualization concepts based on the solutions offered by different vendors. Students will also acquire the necessary theoretical and practical skills to develop applications on cloud computing.			
Course outline				
Theoretical teaching	Objectives and concepts of virtualization. Virtualization technologies. Hypervisor-based virtualization. Container-based virtualization. Docker. Kubernetes. Virtual services and applications. Service-oriented architectures. Methods, technologies and applications of cloud computing. Software as a Service (SaaS), platform as a service (PaaS), infrastructure as a service (IaaS). Data storage in the cloud computing. Virtual file systems. Security of cloud computing. Techniques for implementing high-reliability cloud computing. Data backup techniques. Migration of services. Resource planning. Application development in the cloud computing and open source solutions. High-performance computing on the cloud (Hadoop, MapReduce, HDFS). Hadoop open technologies: Hive, Pig, HBase, Mahout.			
Practical teaching (exercises, OFE, study and research)	Laboratory exercises. Installation and management of virtual machines in different environments. Migration. Data backup. Container-based virtualization. Docker. Kubernetes. Planning and implementation of techniques for reliability increasing. Development of computer applications in the cloud. Open Technologies: Hive, Pig, HBAs, Mahout.			
Textbooks/references				
1	Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Mc. Graw Hill, 2010, ISBN: 978-0-07-162695-8			
2	Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization", Jones & Bartlett, 2013, ISBN: 978-1-44-96-4739-1			
3	Karl Matthias, Sean Kane, "Docker Up and Running", O'Reilly, 2015.			
4	Tom White, Hadoop: The Definitive Guide, 4th Edition, O'Reilly Media, 2015.			
5	Thilina Gunarathne, Srinath Perera, Hadoop MapReduce Cookbook, Packt Publishing Ltd., 2013.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	0		
Teaching methods	Lectures, exercises, lab exercises.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures		Written exam	40	
Exercises	40	Oral exam		
Colloquia				
Projects	20			