



SYLLABUS

Basic information of the course	
University:	University “Ukshin Hoti” - Prizren
Academic unit:	Faculty of Computer Science
Study program:	Information and Telecommunication Technologies
Course:	Cloud Computing
Study level:	Bachelor
Course status:	Mandatory
Study year:	2
Number of hours per week:	2+2
Credit value - ECTS:	6
Time / location:	It will be published in the university web site!
Lecturers:	Ass. Fesal Baxhaku, Ph. D. c. Ass. Arbër Beshiri, Ph. D. c.
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Course description:	This course provides students with an introduction to the basic concepts, definitions, and best practices of cloud computing. Topics include Cloud Computing Models, Infrastructure-As-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).
Course objectives:	The purpose of this course is to give students an introduction of the cloud computing basics and some of the approaches that apply to this field. The objectives of this course to provide a foundation of the cloud computing and program experience using virtualized resources. In particular, students will gain knowledge about: <ul style="list-style-type: none"> - Cloud Computing Models, - Infrastructure-As-a-Service (IaaS), - Platform-as-a-Service (PaaS) and - Software-as-a-Service (SaaS).
Learning outcomes:	Upon completion of this course the student will be able to: <ul style="list-style-type: none"> - Understand the foundations, evolution and

	concepts of cloud computing <ul style="list-style-type: none"> - Identify and describe different patterns in cloud computing, their differences. - Recognized with the technologies and key standards in cloud computing - Describe the motivation, current state and future trends in cloud computing - Implement and practice learning through project forms and / or case studies. 		
Contribution on student load (must correspond with learning outcomes)			
Activity	Hours	Days/week	Total/hours
Lectures	2	15	30
Exercise theoretical/laboratory	2	15	30
Practice work	1	2	2
Contact with lecturer/consultations	1	15	15
Field exercises	-	-	-
Midterms	2	2	4
Laboratory exercises	2	1	2
Individual time spent studying (at the library or home)	3	15	45
Final preparation for the exam	3	5	15
Time spent in evaluation (tests, quiz, final exam)	2	3	6
Projects, presentations, etc.	1	1	1
Total			150
Notice: 1 ECTS credits = 25 hours commitment, e.g. if the course has 6 ECTS credits student must have 150 hours during the semester.			
Teaching methods:	The course is a combination of lectures, discussions, numerical and laboratory exercises, while the assignments are presented by the laboratory course lecturers!		
Assessment methods:	<ul style="list-style-type: none"> - Attendance in lectures and exercises: 5% + 5%. - Exercises: 10%. - Midterm 1: 40%. - Midterm 2: 40%. - Or final exam: 100%. 		
Assessment and grading:	Vlerësimi në %		Nota përfundimtare
	91% - 100%		10
	81% - 90%		9
	71% - 80%		8

	61% - 70%	7
	51% - 60%	6
	0% - 50%	5
Literature		
Basic literature:	<ol style="list-style-type: none"> 1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, McGraw-Hill, 2010. 2. Dan Marinescu, Cloud Computing Theory and Practice, Elsevier, 2013. 3. Cloud Computing Lab Manual. 	
Additional literature:	<ol style="list-style-type: none"> 1. B. Furht, A. Escalante, Handbook of Cloud Computing, Springer, 2010. 2. J. Joseph, C. Fellenstein, Grid Computing, IBM Press. 	
Study plan		
Week	Lectures	
<i>First week:</i>	<ul style="list-style-type: none"> • Presentation of the syllabus • Introduction <ul style="list-style-type: none"> ○ Definition of cloud ○ Cloud computing features ○ Types of clouds ○ Cloud components 	
<i>Second week:</i>	<ul style="list-style-type: none"> • Infrastructure-as-a-Service (IaaS) • Hardware Virtualization <ul style="list-style-type: none"> ○ Processor ○ Memory ○ I/O ○ Network 	
<i>Third week:</i>	<ul style="list-style-type: none"> • Infrastructure-as-a-Service (IaaS) • Software Virtualization <ul style="list-style-type: none"> ○ Hypervisors ○ Complete virtualization ○ Pre-virtualization 	
<i>Fourth week:</i>	<ul style="list-style-type: none"> • Infrastructure-as-a-Service (IaaS) • IaaS ecosystems <ul style="list-style-type: none"> ○ Open source ○ Public clouds 	
<i>Fifth week:</i>	<ul style="list-style-type: none"> • Infrastructure-as-a-Service (IaaS) • IaaS ecosystems <ul style="list-style-type: none"> ○ Public clouds 	
<i>Sixth week:</i>	<ul style="list-style-type: none"> • Infrastructure-as-a-Service (IaaS) • Other issues with cloud <ul style="list-style-type: none"> ○ Direct migration 	

	<ul style="list-style-type: none"> ○ Scaling ○ Availability ○ Management ○ Performance ○ Security
<i>Seventh week:</i>	<ul style="list-style-type: none"> ● Infrastructure-as-a-Service (IaaS) ● Other issues with cloud <ul style="list-style-type: none"> ○ Availability ○ Management ○ Performance ○ Security
<i>Eighth week:</i>	<ul style="list-style-type: none"> ● Test I
<i>Ninth week:</i>	<ul style="list-style-type: none"> ● Platform-as-a-Service (PaaS) ● Requirements for PaaS ● Reference architecture for PaaS ● Commercial PaaS ● Goggle File System (GFS)
<i>Tenth week:</i>	<ul style="list-style-type: none"> ● MapReduce ● Challenges ● Applications of MapReduce ● Hadoop Distributed File System (HDFS) ● Architecture ● Virtual application ● Managing virtual application
<i>Eleventh week:</i>	<ul style="list-style-type: none"> ● Software-as-a-Service (SaaS) ● Features and benefits ● High level architecture
<i>Twelfth week:</i>	<ul style="list-style-type: none"> ● Green Cloud Computing ● Energy consumption in large datacenters ● Datacenter metrics ● Energy efficiency for different levels of usage
<i>Thirteenth week:</i>	<ul style="list-style-type: none"> ● Security in cloud computing ● Loss of control in cloud computing ● Lack of trust in the cloud ● Taxonomy of fear ● Model of threat ● Types of attacks
<i>Fourteenth week:</i>	<ul style="list-style-type: none"> ● Privacy in cloud computing ● Main fears ● Auditing, monitoring and managing risk ● Possible solutions ● Minimizing lack of trust ● Minimizing loss of control
<i>Fifteenth week:</i>	<ul style="list-style-type: none"> ● Test II

Exercises

Study plan	
Java	Exercises
<i>First week:</i>	<ul style="list-style-type: none"> Working with Google Drive for creating data sheets
<i>Second week:</i>	<ul style="list-style-type: none"> Installation and configuration of JustCloud
<i>Third week:</i>	<ul style="list-style-type: none"> Working with Cloud9 for demonstrating different programming languages
<i>Fourth week:</i>	<ul style="list-style-type: none"> Working with Codenvy
<i>Fifth week:</i>	<ul style="list-style-type: none"> Installation and configuration of Hadoop/Eucalyptus
<i>Sixth week:</i>	<ul style="list-style-type: none"> Working and installing Google App Engine
<i>Seventh week:</i>	<ul style="list-style-type: none"> Working and installing Microsoft Azure
<i>Eighth week:</i>	<ul style="list-style-type: none"> Working with Mangrasoft Aneka
<i>Ninth week:</i>	<ul style="list-style-type: none"> Case study – Amazon
<i>Tenth week:</i>	<ul style="list-style-type: none"> Case study – Google Apps
<i>Eleventh week:</i>	<ul style="list-style-type: none"> Business solutions from Google for data access and data upload 1
<i>Twelfth week:</i>	<ul style="list-style-type: none"> Business solutions from Google for data access and data upload 2
<i>Thirteenth week:</i>	<ul style="list-style-type: none"> Application of hypervisors as software managers through controlling panels 1
<i>Fourteenth week:</i>	<ul style="list-style-type: none"> Application of hypervisors as software managers through controlling panels 2
<i>Fifteenth week:</i>	<ul style="list-style-type: none"> Repetition of exercises Reinforcement for the test 2

Academic policies and rules of conduct
<ul style="list-style-type: none"> 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!