

1. Course Title (Course Code)

Cloud Computing (2278)

2. Instructor

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3. Term

Spring 2

4. Outline and Objectives

Cloud Computing is a hot technical topic these days although its concepts have been around for a long time. It has been utilized in IT, business, social media, and many other fields of application, and this makes mastering Cloud Computing a must for future professionals.

This course serves as an introduction to Cloud Computing. It is designed to show how the technology is realized and used in different scenarios. Take the course as a short trip to explore Cloud Computing and demonstrations of its usage scenarios. You will learn about

- The basic principles of Cloud Computing
- Cloud infrastructure and management
- Cloud Computing service models
- Cloud security
- Cloud implementation

5. Goals (Attainment Targets)

By the end of this course, students will be able to:

- (1). Define Cloud Computing technology.
- (2). Describe the infrastructure of the Cloud.
- (3). Explain the different service models of the Cloud and compare them.
- (4). Explain the security issues related to Cloud Computing.
- (5). Construct a simple system for providing a Cloud service.
- (6). Experiment with one of the widely available Cloud services.

6. Correspondence relationship between Educational goals and Course goals

Educational goals			Course goals
High level ICT skill	Basic academic skills		(5), (6)
	Specialized knowledge and literacy		(1), (2), (3), (4)
Human skill (Tankyu skill)	Ability to continually improve own strengths		(2), (3), (4), (5)
	Ability to discover and resolve the problem in society	Problem setting	(3), (4)
		Hypothesis planning	(5)
		Hypothesis testing	(6)
		Practice	(5), (6)
	Fundamental Competencies for Working Persons	Ability to step forward	(5), (6)
		Ability to think through	(5)
		Ability to work in a team	(5), (6)
Professional ethics			(1)

7. Course Requirements

A previous architectural knowledge of Cloud Computing is not required, but the skill of programming (especially in object-oriented programming language) is necessary for completing the practical examples.

8. Textbooks

For this course, a set of lecture slides, handouts, and reports will be distributed in timely manner through Moodle.

9. Reference Books

The following books can enhance the experience of the students and give them alternatives to the technologies introduced in the course:

- Cloud Computing: A Hands-On Approach (ISBN-13: 978-1494435141)
- Learning Openstack (ISBN-13: 978-1783986965)

10. Evaluation

Goals	Evaluation method & point					
	term-end exam	quiz	report	presentation	deliverable	other
(1)		○				
(2)		○				
(3)		○				
(4)		○				
(5)		○				
(6)				○		
Allocation		55		45		

Course Schedule

(Notice) This schedule is a tentative plan; there might be changes, additions, and revisions etc. at the time of delivering the course.

Lesson 1: Definition and characteristics of Cloud Computing

(lecture, demonstration, 90 minutes)

This session includes:

1. Orientation of the course and the syllabus.
2. An extensive overview of Cloud Computing technology and the characteristics that make Cloud Computing a hot topic in IT industry.
3. Demonstration of a sample project that has been deployed on a Cloud Computing platform.
4. A discussion on the comparison between the deployment on a local server/machine and on the Cloud.

Lesson 2: Cloud models, services, and applications (1) (lecture, 90 minutes)

This session includes:

1. Introduction of the arrangements adopted by Cloud Computing providers.
2. Deployment and service models (IaaS, PaaS, and SaaS).

Lesson 3: Cloud models, services, and applications (2)

(lecture, discussion, 90 minutes)

This session includes:

1. Examples of a number of Cloud-based services and applications.
2. A discussion on the sample applications and other possible fields of use.

Lesson 4: Cloud concepts and technologies (1) (lecture, lab work, 90 minutes)

This session includes:

- An overview of the technologies utilized for Cloud Computing (Virtualization, Load balancing, Replication, and Monitoring...etc).
- Lab-work: installing a Virtual Machine (which is one of the main resources in Cloud Computing) using VirtualBox/KVM.

Lesson 5: Cloud concepts and technologies (2) (lecture, lab work, 90 minutes)

This session includes:

- An overview of the network solutions in Cloud Computing (Software Defined Network and Network Function Virtualization)
- Lab-work: complete the installation of the Virtual Machine by configuring resources and network options.

Lesson 6: Cloud services and platforms (lecture, exercise, 90 minutes)

This session includes:

- An overview of the compute, storage, database, application, contents delivery, analytics, deployment & management, identity & access management services.
- Examples of these services.

Lesson 7: Open source private cloud software (1) (lecture, lab work, 90 minutes)

This session includes:

- An overview of open source software used for managing clouds (CloudStack and OpenStack).
- Lab work: download and configure a Virtual Machine provided by Oracle to test OpenStack on VirtualBox.

Lesson 8: Open source private cloud software (2) (lecture, lab work, 90 minutes)

In this session, we continue the lab work we started in the previous session and try to experience the use of OpenStack software pre-installed on the Virtual Machine.

Lesson 9: Review (lecture, discussion, 90 minutes)

In this session, we go through the main points we have studied so far in order to confirm what we have learnt and answer any questions about the concepts of Cloud Computing.

Lesson 10: Cloud application design (1) (lecture, lab work, 90 minutes)

This session includes:

- An overview of the design considerations and the reference architecture for Cloud applications.
- Introduction of Cloud application design methodologies
- Lab work: starting a new Cloud application on Google Apps Engine.

Lesson 11: Cloud application design (2) (lab work, 90 minutes)

In this session, we continue the work on the application on Google Apps Engine and try to test its functions.

Lesson 12: Cloud application benchmarking and tuning
(lecture, discussion, 90 minutes)

In this session, we study about the tracing, workload modeling and benchmarking tools for Cloud applications..

Lesson 13: Cloud security, Limitations and deployment considerations
(lecture, discussion, 90 minutes)

This session includes:

- An overview of the Cloud Security Architecture (CSA), authentication, and data security.
- Discussion about considering using a service that is already available compared to setting up a new service

Lesson 14: Recommendations for successful migration (lecture, 90 minutes)

We study about migrating a service from a local server/machine to the Cloud and the issues that should be considered for this operation.

Lesson 15: Conclusion (discussion, 90 minutes)

This is the final session in which we try to recall the most important issues and concepts we learned in this course. In this session the students will present their works on Cloud based projects they select.