

Course Code MSE 351 **Course Name** CLOUD & DISTRIBUTED SYSTEMS

Pre-Requisite

Course Type Major Elective **ECTS Credit** 7.5

Language of Instruction English

Year of Study $3^{rd}/5^{th}$

Level of Course BSc/1st Cycle Mode of Delivery On Campus

Course Objectives:

This course aims to provide students a solid understanding in cloud and distributed systems. Initially students will learn how to distinguish the various types of cloud computing and also classify the various security threads within Cloud. Later in the course students will be exposed to some of the most common computing mechanisms and through various case studies comprehend and understand Clous architectures. Using virtualization technologies students will learn how to design and build distributed systems.

Learning Outcomes

- 1. Understand the Fundamentals of Cloud Computing.
- 2. Categorize and define the various types of cloud computing.
- 3. Understand the fundamentals of Cloud Security
- 4. Recommend cloud computing mechanisms for specific case studies
- 5. Design and Build Distributed Systems

Teaching Methodology:

<u>In the Classroom</u>: Lecturers make use of whiteboards, flipcharts, overhead projector, VR glasses, video material and power point presentations. Students are supplied with handouts on extra or relevant material. Two Personal Computer Labs equipped with Multimedia PCs of the latest technology with the required software, scanners, printers and LCD-Projectors, satisfy the classes' requirements. All PCs are connected to the Internet, through a Broad Band High speed permanent connection using cable technology.

<u>Web Supported Learning</u>: All the teaching material and the Lecturer's presentations are uploaded on the electronic learning platform of the college as a supporting studying tool.

<u>Guest Speakers / Visits</u>: External visits to agencies or relevant industry/subject related organizations are arranged. Guest speakers that are experts in their field are invited to address the students. Students are also encouraged to visit industry players and familiarize themselves with the profession they have chosen.

<u>Teaching Methods</u>: Lectures, presentations, videos, problem and case study discussion, discussion on relevant articles, independent and private study, preparation of projects, fieldwork and group work.

Course Content:

1. Understanding Cloud Computing

- a. Origins and Influences
- b. Basic Concepts and Terminology
- c. Goals and Benefits
- d. Risks and Challenges

2. Fundamentals Concepts and Models

- a. Roles and Boundaries
- b. Cloud Characteristics
- c. Cloud Delivery Models
 - I. Infrastructure-as-a-Service (laaS)
 - II. Platform-as-a-Service (PaaS)
 - III. Software-as-a-Service (SaaS)
- d. Cloud Deployment Models

3. Cloud-Enabling Technology

- a. Data Center Technology
- b. Virtualization Technology
- c. Containerization

4. Fundamental Cloud Security

- a. Threat Agents
- b. Cloud Security Threads
- c. Security Policy Disparity
- d. Contracts
- e. Risk Management

5. Cloud Infrastructure Mechanisms

- a. Logical Network Perimeter
- b. Virtual Server
- c. Cloud Storage Device
- d. Cloud Usage Monitor
- e. Resource Replication
- f. Ready-Made Environment

6. Cloud Architectures

- a. Workload Distribution Architecture
- b. Resource Pooling Architecture
- c. Dynamic Scalability Architecture
- d. Elastic Resource Capacity Architecture
- e. Service Load Balancing Architecture
- f. Cloud Bursting Architecture
- g. Load Balanced Virtual Server Instances Architecture
- h. Zero Downtime Architecture

7. Serverless Computing

- a. What is serverless
- b. Serverless vs Traditional
- c. Scalability
- d. Functions as a Service (FaaS

Assessment Methods:

The final course grade is made up of:

Coursework

Final Examination

Final Examination marks constitute 60% of the final semester mark, while Midterm Examinations and assignments (when applicable) constitute the 40%

The pass mark is set at 50%

The Midterm examinations are based on material covered during a given period and are set towards the end of November in the case of Fall semesters, the end of March in the case of Spring semesters, and the end of July in the case of summer sessions.

These take place during lesson time and take no more than two study periods to complete.

Final examinations are based on material covered throughout the semester. The dates for these are set down on the academic calendar. The Final Examinations have duration of three hours for Diplomas, Bachelor Degrees and Master Degrees.

Final examination marks are combined with the marks from the Midterm examinations, participation and assignments (when applicable) to produce the final mark for the semester.

Required Textbooks/Reading:

Required Bibliography:

Title	Author(s)	Publisher	Year
Cloud Computing: Concepts,	Thomas Erl, Ricardo	PrenticeHall/2013	2013
Technology & Architecture	Puttini, Zaigham		
	Mahmood		

Recommended Further Bibliography:

Title	Author(s)	Publisher	Year
Designing Distributed Systems	Brendan Burns	O'Reilly; 1 edition – 23 Feb 2018	2018
Cloud Computing (The MIT Press	NayanB. Ruparelia	The MIT Press/2016	2016
Essential knowledge Series): The MIT			
Press Essential knowledge Series			