



## Course Syllabus

<b>Course Code</b>	<b>Course Title</b>	<b>ECTS Credits</b>
COMP-474	Cloud Computing	6
<b>Prerequisites</b>	<b>Department</b>	<b>Semester</b>
COMP-211 and Junior Standing	Computer Science	Spring
<b>Type of Course</b>	<b>Field</b>	<b>Language of Instruction</b>
Elective	Data Science	English
<b>Level of Course</b>	<b>Lecturer(s)</b>	<b>Year of Study</b>
1 <sup>st</sup> Cycle	Dr. M. Symeonidis	3 <sup>rd</sup> /4 <sup>th</sup>
<b>Mode of Delivery</b>	<b>Work Placement</b>	<b>Corequisites</b>
Face-to-Face	N/A	None

### Course Objectives:

The main objectives of the course are to:

- Introduce the background and concepts of cloud computing
- Compare and contrast cloud computing with other computing paradigms
- Cover in detail the different technologies used in cloud computing including virtualization, scalability, elasticity, and load balancing
- Expose the students to cloud services, technologies, and platforms
- Make students aware of problems and challenges when designing and developing applications using cloud computing technology
- Expose the students to development tools/environments/frameworks to develop applications using cloud computing infrastructure

### Learning Outcomes:

After completion of the course students are expected to be able to:

- Describe the concept, benefits, principals, architecture, and implementation technology of cloud computing
- Compare and contrast the cloud computing with other computing paradigms
- Explain in details aspects of the cloud computing including: virtualization, scalability, elasticity, and load balancing

- Explain fundamental architecture, models, services, and platforms that are used in the cloud computing domain
- Be aware of problems and challenges as to avoid them when designing and developing cloud-based applications
- Design and develop cloud-based applications to be hosted by various cloud computing infrastructures
- Demonstrate the ability to select an appropriate technology/platform/environment in order to provide a cloud computing-based application that fulfills the design requirements

### Course Content:

1. Introduction to Cloud Computing
  - a. Definition of Cloud Computing and Technology Landscape
  - b. The Cloud Computing Characteristics
2. Cloud Architecture and Concepts
  - a. Cloud Service Models (e.g., IaaS, PaaS, SaaS)
  - b. Deployment Model (e.g., Private, Public, Hybrid)
3. Virtualization in Depth
  - a. Virtualization Technologies
  - b. Hardware Virtualization vs Containerization
  - c. Overprovisioning
4. Cloud Elasticity
  - a. Horizontal and Vertical Scalability
  - b. Load Balancing
  - c. Monitoring metrics and SLOs
5. Hands-on Tutorial on Containerization
  - a. Docker in practice
  - b. Deployment of Cloud Applications
6. Microservices and DevOps
  - a. Monoliths vs Microservices
  - b. Microservices design patterns
  - c. Continuous Delivery Pipelines
7. Cloud security and networks
  - a. Cloud-based Virtual Networks
  - b. Virtual Network Functions (e.g., firewalls) and Network Rules
8. Cloud datacenters and economies of scale
  - a. Cloud Computing as economy of scale
  - b. Total cost of ownership (TCO)
9. Edge computing and the future of Cloud computing
  - a. IoT and Edge Applications
  - b. Relation between Edge & Cloud computing

**Learning Activities and Teaching Methods:**

Lectures, In Class Exercises, Software Tool Tutorials, Case-Study Presentations, Discussions.

**Assessment Methods:**

Hands-on Projects, Class Participation, Midterm Examination, Final Exam

**Required Textbooks / Readings:**

Title	Author(s)	Publisher	Year	ISBN
Cloud Computing Theory and Practice 3rd Edition	Dan Marinescu	Elsevier	2022	9780323852777

**Recommended Textbooks / Readings:**

Title	Author(s)	Publisher	Year	ISBN
Cloud Computing for Science and Engineering	Ian Foster and Dennis B. Gannon	The MIT Press	2017	9780262343992
Cloud Computing: Concepts, Technology and Architecture	Thomas Earl and Zaigham Mahmood and Ricardo Puttini	Pearson	2013	9780133489903
Docker in Action	Jeff Nickoloff and Stephen Kuenzli	Manning	2019	9781617294761