COURSE OUTLINE

GENERAL

SCHOOL	Sciences and Engineering		
ACADEMIC UNIT	Computer Science		
LEVEL OF STUDIES	1st Cycle		
COURSE CODE	COMP-474	**SEMESTER**	Spring
COURSE TITLE	Cloud Computing		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	2.5	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	specialization
PREREQUISITE COURSES:	COMP-270 and Junior Standing
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	

LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

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

- Describe the concept, benefits, principles, architecture, and implementation technology of cloud computing
- Compare and contrast cloud computing with other computing paradigms
- Explain in detail aspects of 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

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Project planning and management
Production of free, creative and inductive thinking

SYLLABUS

1.Introduction to Cloud Computing
   a. Definition of Cloud Computing and Technology Landscape
   b. The Cloud ComputingCharacteristics
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.The Future of computing
   a. IoT and Edge Computing
   b. The IoT-Edge-Cloud Continuum
   c. Green computing and sustainability

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	*Use of ICT in teaching / Χρήση ΤΠΕ* *Communication with students / Επικοινωνία με Φοιτητές*
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	- Hands-on Projects - Class Participation - Midterm Examination - Final Exam

Activity	***Semester workload***
Lectures	35
Preparation	26
Coursework	40
Exam Preparation	45
Examination	4
Course total	***150***

ATTACHED BIBLIOGRAPHY

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