Fakultät für Ingenieurwesen
Facoltà di Ingegneria
unibz Faculty of Engineering

COURSE DESCRIPTION – ACADEMIC YEAR 2024/2025

Course title	Cloud Computing and Distributed Systems
Course code	73076
Scientific sector	INF/01
Degree	Master in Computing for Data Science (LM-18)
Semester	2
Year	1
Credits	6
Modular	No

Total lecturing hours	40
Total exercise hours	20
Attendance	Not compulsory. Non-attending students must contact the lecturer at the start of the course to agree on the modalities of the independent study.
Prerequisites	Basic coding skills, operating systems, networking, open mindset and willingness to solve real problems.
Course page	https://ole.unibz.it/

Specific educational objectives	The course belongs to the type caratterizzanti – discipline informatiche. The Cloud Computing and Distributed Systems course focuses understanding, designing and implementing distributed and cloud systems to solve real life problems. The main educational objectives of the course are: • Understand the core concepts of distributed systems and cloud computing • Cloud infrastructure from the ground up • Analyze trade-offs between cloud deployment models and providers • Distributed systems • Performance, scalability, and availability measurements in the cloud • Security and privacy in cloud computing • Edge computing technologies • Address real-world problems using cloud computing

Lecturer	Riccardo Billero
Contact LA	Office B1.6.20, Faculty of Engineering, NOI Techpark, Via Bruno Buozzi, 1 Riccardo.Billero@unibz.it
Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	During the lecture time span, arrange beforehand by email.

Lecturing Assistant	--
Contact LA	--
Office hours LA	--
List of topics	• Virtualisation • Distributed Systems Algorithms • Network Technologies

	• Cloud Systems • Storage • Cloud Security
Teaching format	Frontal lectures, exercises and team projects

Learning outcomes	Knowledge and understanding • D1.3 have an in-depth knowledge of the scientific method of investigation applied to even complex systems and innovative technologies that support information technology and its applications; • D1.5 know the fundamentals, techniques and methods of design, customisation and implementation of software to support the automation of new-generation information systems for industrial production and company business; Applying knowledge and understanding • D2.4 ability to define an innovative technical solution to an application problem that respects technical, functional and organisational constraints and requirements; Making judgments • D3.1 ability to independently select documentation from various sources, including technical books, digital libraries, technical scientific journals, web portals or open source software and hardware tools; • D3.4 ability to reconcile conflicting project objectives, find acceptable compromises within the limits of cost, resources, time, knowledge or risk; Communication skills • D4.2 ability to structure and draft scientific and technical descriptive documentation of project activities; • D4.4 ability to prepare and deliver presentations with technical content in English; • D4.5 ability to interact and collaborate in the realisation of a project or research with peers and experts; Learning skills: • D5.1 ability to independently extend the knowledge acquired during the course of study by reading and understanding scientific and technical documentation in English; • D5.3 in the context of a problem solving activity, ability to extend even incomplete knowledge with regard to the final objective of the project;

Assessment	The assessment of the course consists of two parts: • Written exam (50%); • Project (50%). Note: Positive project result is necessary to attend the written exam. Projects have to be evaluated BEFORE the final exam, otherwise the exam cannot be registered.

	In case of a positive mark the project will count for the remaining regular exam sessions.
Assessment language	English
Assessment typology	Monocratic
Evaluation criteria and criteria for awarding marks	The students are required to implement a distributed system or cloud based solution for specific problems (e.g., auto-scaling, security, performance, consensus). The project will focus on one or more topics covered during the lectures and labs. The output of the project are: • a written report describing (problem statement, proposed solution, system design and architecture, functionality, development problems/solutions) • a working demo of the application • a project presentation The goal of the project is to assess to which degree students have achieved the following learning outcomes: applying knowledge and understanding, making judgments, communication skills and ability to learn. The aim of the written exam is to assess to which degree students have achieved the learning outcomes concerning applying knowledge and understanding, making judgments, communication skills and ability to learn.

Required readings	Lecture slides. Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it
Supplementary readings	• Erl, T., Puttini, R., Mahmood Z., Cloud Computing. Concepts, Technology & Architecture, Pearson, 2013, ISBN: 978-0133387520 • Coulouris, G., Dollimore, J., Kindberg, T., Blair, G., Distributed Systems. Concepts and Design (5th Edition), Pearson, 2011, ISBN: 978-0132143011 • Aws: The Complete Guide From Beginners To Advanced For Amazon Web Services, 2019 Online resources: https://aws.amazon.com/getting-started/
Software used	Private Cloud (UNIBZ) Amazon AWS