

## COURSE DESCRIPTION – ACADEMIC YEAR 2020/2021

<b>Course title</b>	<b>Cloud Computing and Distributed Systems</b>
<b>Course code</b>	76061
<b>Scientific sector</b>	INF/01
<b>Degree</b>	Master in Software Engineering for Information Systems (LM-18)
<b>Semester</b>	2
<b>Year</b>	1
<b>Credits</b>	6
<b>Modular</b>	No
<b>Total lecturing hours</b>	40
<b>Total exercise hours</b>	20
<b>Attendance</b>	Attendance is not compulsory, but non-attending students are suggested to contact the lecturer at the start of the course to agree on the modalities of the independent study.
<b>Prerequisites</b>	Basic coding skills, operating systems, networking, open mindset and willingness to solve real problems.
<b>Course page</b>	<a href="https://ole.unibz.it/">https://ole.unibz.it/</a>
<b>Specific educational objectives</b>	<p>The course belongs to the type caratterizzanti – discipline informatiche “Advanced Topic in Software /Systems Engineering”.</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Understand the core concepts of distributed systems and cloud computing</li> <li>• Cloud infrastructure from the ground up</li> <li>• Analyze trade-offs between cloud deployment models and providers</li> <li>• Distributed systems and Blockchain</li> <li>• Performance, scalability, and availability measurements in the cloud</li> <li>• Security and privacy in cloud computing</li> <li>• Edge computing technologies</li> <li>• Address real-world problems using cloud computing</li> </ul>
<b>Lecturer</b>	<a href="#">El Ioini Nabil</a>
<b>Contact LA</b>	<a href="#">Piazza Domenicani 3</a> , Room 1.08, <a href="mailto:nelioini@unibz.it">nelioini@unibz.it</a>
<b>Scientific sector of lecturer</b>	INF/01
<b>Teaching language</b>	English
<b>Office hours</b>	Arrange beforehand by email.
<b>Lecturing Assistant (if any)</b>	--
<b>Contact LA</b>	--
<b>Office hours LA</b>	--
<b>List of topics</b>	<ul style="list-style-type: none"> <li>• Virtualisation</li> <li>• Distributed Systems Algorithms</li> <li>• Network Technologies</li> <li>• Cloud Systems</li> <li>• Storage</li> </ul>

<b>Teaching format</b>	Frontal lectures, exercises and team projects
<b>Learning outcomes</b>	<p><b>Knowledge and understanding:</b> D1.3 To know in depth the scientific method of investigation applied to complex systems and innovative technologies that support information technology and its applications;</p> <p>D1.5 To know the fundamentals, techniques and methods of design, customization and implementation of software to support the automation of new generation information systems for industrial production and business;</p> <p><b>Applying knowledge and understanding:</b> D2.4 To be able to define an innovative technical solution to an application problem that meets technical, functional and organisational constraints and requirements;</p> <p><b>Making judgments:</b> D3.1 To be able to autonomously select documentation from a variety of sources, including technical books, digital libraries, technical scientific journals, web portals or open source software and hardware tools;</p> <p>D3.4 To be able to reconcile the objectives of the project that are in conflict, to trade-off cost, resources, time, knowledge or risk;</p> <p><b>Communication skills:</b> D4.3 To be able to structure and draft scientific and technical documentation describing project activities;</p> <p>D4.5 To be able to prepare and conduct technical presentations in English;</p> <p>D4.6 To be able to interact and collaborate during the implementation of a project or research with peers and experts;</p> <p><b>Learning skills:</b> D5.1 To be able to independently extend the knowledge acquired during the course of study by reading and understanding scientific and technical documentation in English;</p> <p>D5.3 In the context of a problem solving activity, to be able to extend knowledge, even if incomplete, taking into account the final objective of the project;</p>
<b>Assessment</b>	<p>The assessment of the course consists of two parts:</p> <ul style="list-style-type: none"> <li>• Written exam (50%);</li> <li>• Project (50%).</li> </ul> <p>Note: Positive project result is necessary to attend the written exam.</p>
<b>Assessment language</b>	English
<b>Assessment typology</b>	Monocratic commission

<p><b>Evaluation criteria and criteria for awarding marks</b></p>	<p>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:</p> <ul style="list-style-type: none"> <li>• a written report describing (problem statement, proposed solution, system design and architecture, functionality, development problems/solutions)</li> <li>• a working demo of the application</li> <li>• a project presentation</li> </ul> <p>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.</p> <p>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.</p>
<p><b>Required readings</b></p>	<ul style="list-style-type: none"> <li>• Cloud Computing: Concepts, Technology &amp; Architecture, 2013</li> <li>• Aws: The Complete Guide From Beginners To Advanced For Amazon Web Services, 2019</li> <li>• Distributed Systems: Concepts and Design (5th Edition), 2011</li> </ul>
<p><b>Supplementary readings</b></p>	<p>Online resources:</p> <ul style="list-style-type: none"> <li>• <a href="https://aws.amazon.com/getting-started/">https://aws.amazon.com/getting-started/</a></li> <li>• <a href="https://docs.microsoft.com/en-us/azure/">https://docs.microsoft.com/en-us/azure/</a></li> <li>• <a href="https://ethereum.org/developers/">https://ethereum.org/developers/</a></li> </ul>
<p><b>Software used</b></p>	<ul style="list-style-type: none"> <li>- Private Cloud (UNIBZ)</li> <li>- Amazon AWS</li> <li>- Microsoft Azure</li> </ul>