

# Syllabus

## *Course Description*

<b>Course Title</b>	Software Engineering and Project
<b>Course Code</b>	76273
<b>Course Title Additional</b>	
<b>Scientific-Disciplinary Sector</b>	NN
<b>Language</b>	German
<b>Degree Course</b>	Bachelor in Computer Science
<b>Other Degree Courses (Loaned)</b>	
<b>Lecturers</b>	<p>Prof. Dr. Andrea Alexander Janes,          Andrea.Janes@unibz.it  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/2237">https://www.unibz.it/en/faculties/engineering/academic-staff/person/2237</a></p> <p>Prof. Dr. Claus Pahl,          Claus.Pahl@unibz.it  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/36376">https://www.unibz.it/en/faculties/engineering/academic-staff/person/36376</a></p>
<b>Teaching Assistant</b>	
<b>Semester</b>	First semester
<b>Course Year/s</b>	2
<b>CP</b>	12
<b>Teaching Hours</b>	70
<b>Lab Hours</b>	50
<b>Individual Study Hours</b>	180
<b>Planned Office Hours</b>	36
<b>Contents Summary</b>	<p>Software Engineering:</p> <ul style="list-style-type: none"> <li>• Software life-cycle: principles and methodologies</li> <li>• Software processes and software project management</li> <li>• Requirements engineering: elicitation and modeling</li> <li>• System modeling and construction: UML, design patterns</li> <li>• Software testing and management: principles and techniques</li> <li>• Recent software engineering topics: DevOps, Cloud, SE and AI</li> </ul>

	<p>Coding Capstone:</p> <ul style="list-style-type: none"> <li>• Project Inception &amp; Roadmap</li> <li>• Architecture &amp; Technical Design</li> <li>• Development &amp; Integration</li> <li>• Deployment &amp; Observability</li> <li>• Final Review &amp; Retrospective</li> <li>• Cross-Team Collaboration &amp; Stakeholder Engagement</li> </ul>
<b>Course Topics</b>	<p>Module M1 - Software Engineering – introduces the different phases of a software engineering process. Specific activities, grouped into requirements engineering, systems modelling and design with a focus on architecture concerns, as well as testing and maintenance will be detailed. Recent relevant topics are also discussed. The students will learn the relevant skill in two separate, group-oriented and problem-based projects.</p> <p>Module M2 – Coding Capstone – follows the software lifecycle in a collaborative setting, beginning with a project inception leading into architecture and design. The development and integration phase brings these into programming activities. Deployment and observability ensure that a solution is released and performance monitoring is addressed. The process concludes with a review and retrospective to reflect on successes and identify areas for improvement.</p>
<b>Keywords</b>	Software Engineering, Software Process, Software Architecture, Software Development, Deployment.
<b>Recommended Prerequisites</b>	
<b>Propaedeutic Courses</b>	
<b>Teaching Format</b>	<p>Software Engineering: The Software Engineering course combines frontal lectures with team and/or individual projects. Full-time students work in teams, while non-attending part-time students can opt for individual projects. The projects focus on application developments of a larger scale, addressed in a team- and project-based collaborative work environment.</p> <p>Coding Capstone: The Coding Capstone course is organized as a project-based laboratory in which students work individually or in teams on the design, development, deployment, and evaluation of a software system. The course combines frontal lectures and</p>

	<p>technical briefings with supervised development activities, technical reviews, milestone presentations, and stakeholder discussions, encouraging collaborative work and the practical application of software engineering methodologies in realistic project settings.</p>
<p><b>Mandatory Attendance</b></p>	<p>Attendance is not mandatory but strongly recommended. Non-attending students should contact the lecturer at the start of the course to agree on the modalities of the independent study.</p>
<p><b>Specific Educational Objectives and Learning Outcomes</b></p>	<p>Knowledge and understanding:</p> <ul style="list-style-type: none"> <li>- D1.2: Know in details the fundamental principles of programming.</li> <li>- D1.7: To have a thorough knowledge of the main fundamentals techniques and methods of software design, development and maintenance</li> </ul> <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> <li>- D2.2: Be able to develop small and medium size programs using different programming languages and paradigms.</li> <li>- D2.3: Be able to solve problems using programming methodologies.</li> <li>- D2.5: Be able to apply the own knowledge to the analysis, design, development and testing of information systems which satisfy given requirements</li> <li>- D2.8: Be able to solve typical problems in computer science based on software engineering methodologies, such as the definition of requirements, the analysis of possible methods for a solution, the selection of the most appropriate methods and tools as well as their application</li> <li>- D2.9: Be able to evaluate the quality of information systems and to identify critical aspects.</li> <li>- D2.16: Be able to coordinate small project teams and to interact with members of the group.</li> </ul> <p>Making judgements:</p> <ul style="list-style-type: none"> <li>- D3.1: Be able to collect and interpret useful data and to judge information systems and their applicability.</li> <li>- D3.2: Be able to work autonomously according to the own level of knowledge and understanding.</li> <li>- D3.3: Be able to take the responsibility for development of projects or IT consulting.</li> </ul>

	<p>Communication skills:</p> <ul style="list-style-type: none"> <li>- D4.1: Be able to use one of the three languages English, Italian and German, and be able to use technical terms and communication appropriately.</li> <li>- D4.2: Be able to negotiate with a customer for the definition of the pre-requisites and features of information systems.</li> <li>- D4.3: Be able to structure and write technical documentation.</li> <li>- D4.4: Be able to work in teams for the realization of IT systems.</li> </ul> <p>Learning skills:</p> <ul style="list-style-type: none"> <li>- D5.1: Have developed learning capabilities to pursue further studies with a high degree of autonomy.</li> <li>- D5.2: Have acquired learning capabilities that enable to carry out project activities in companies, public institutions or in distributed development communities.</li> <li>- D5.3: Be able to follow the fast technological evolution and to learn cutting edge IT technologies and innovative aspects of last generation information systems.</li> </ul>
<p><b>Specific Educational Objectives and Learning Outcomes (additional info.)</b></p>	
<p><b>Assessment</b></p>	<p>The assessment structure differs between the two courses included in this module. Software Engineering is assessed through a project worth 40% and a written exam worth 60%, while Coding Capstone is assessed through a project worth 60% and an oral exam worth 40%. Both attending and non-attending students are required to complete a development project, either individually or in teams. The oral examination assesses each student's theoretical understanding as well as their ability to discuss and reflect on the project results. Students must obtain a passing grade on the project component before being admitted to the oral exam, and both assessment components must be passed in order to successfully complete the module. A positively evaluated project remains valid for three examination sessions.</p> <p>The Software Engineering course provides students with a solid understanding of software life-cycle principles, software processes, requirements engineering, system modeling, design patterns, software testing, and modern topics such as DevOps, Cloud</p>

	<p>computing, and AI-assisted software engineering. These topics contribute to the acquisition of the ability to design, develop, test, and evaluate software systems using appropriate methodologies and tools (D2.2, D2.3, D2.5, D2.8, D2.9). Through modeling activities, documentation, and requirements analysis, students also strengthen their communication and technical writing skills (D4.2, D4.3, D4.4), while the discussion of emerging technologies promotes autonomous learning and continuous professional development (D5.1, D5.3).</p> <p>The Coding Capstone course focuses on the practical realization of software systems through project inception, architecture and technical design, development, deployment, observability, retrospectives, and stakeholder collaboration. By working on realistic development projects, students apply software engineering methodologies in collaborative environments and strengthen their ability to independently design and implement software solutions (D2.2, D2.5, D2.8, D3.2, D3.3). Team coordination, cross-team collaboration, and stakeholder engagement foster communication and teamwork competences (D2.16, D4.1, D4.2, D4.4), while deployment, observability, and retrospective activities develop the ability to evaluate system quality and reflect critically on development processes (D2.9, D3.1). The project-based structure also promotes self-directed learning and prepares students to work effectively in industrial and distributed software development contexts (D5.1, D5.2, D5.3). Both courses contribute to enhance the knowledge in software development and software engineering knowledge (D1.2, D1.7).</p>
<p><b>Evaluation Criteria</b></p>	<p>Module 1: Software Engineering          For attending students, the grade is calculated based on (i) the lab assessment (40% weight) and (ii) the written final exam (60% weight). For non-attending students, they should follow the delivery schedule for the lab assessments, the grade is calculated the same way.</p> <p>Module 2: Coding Capstone          For attending students, the grade is calculated based on (i) the lab assessment (60% weight) and (ii) the written final exam (40% weight). For non-attending students, they should follow the delivery schedule for the lab assessments, the grade is calculated</p>

	<p>the same way.</p> <p>A student needs to be approved in both modules to be approved in the course. The final grade is the average value of the grades from both modules.</p>
<b>Required Readings</b>	<p>Teaching materials, lecture slides, and additional supporting resources will be provided during the course lectures.</p> <p>Software Engineering: Sommerville, I. Software Engineering. 10th Edition. Pearson</p>
<b>Supplementary Readings</b>	
<b>Further Information</b>	
<b>Sustainable Development Goals (SDGs)</b>	Industry, innovation and infrastructure, Quality education

## *Course Module*

<b>Course Constituent Title</b>	Software Engineering and Project M1: Software Engineering
<b>Course Code</b>	76273A
<b>Scientific-Disciplinary Sector</b>	INFO-01/A
<b>Language</b>	German
<b>Lecturers</b>	<p>Prof. Dr. Claus Pahl,  Claus.Pahl@unibz.it  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/36376">https://www.unibz.it/en/faculties/engineering/academic-staff/person/36376</a></p>
<b>Teaching Assistant</b>	
<b>Semester</b>	First semester
<b>CP</b>	6
<b>Responsible Lecturer</b>	
<b>Teaching Hours</b>	40
<b>Lab Hours</b>	20
<b>Individual Study Hours</b>	90
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	<ul style="list-style-type: none"> <li>• Software life-cycle: principles and methodologies</li> <li>• Software processes and software project management</li> <li>• Requirements engineering: elicitation and modeling</li> </ul>

	<ul style="list-style-type: none"> <li>• System modeling and construction: UML, design patterns</li> <li>• Software testing and management: principles and techniques</li> <li>• Recent software engineering topics: DevOps, Cloud, SE and AI</li> </ul>
<b>Course Topics</b>	
<b>Teaching Format</b>	Frontal lectures, exercises; team and/or individual projects.
<b>Required Readings</b>	<ul style="list-style-type: none"> <li>• Sommerville, I. Software Engineering. 10th Edition. Pearson.</li> </ul>
<b>Supplementary Readings</b>	

## *Course Module*

<b>Course Constituent Title</b>	Software Engineering and Project M2: Coding Capstone
<b>Course Code</b>	76273B
<b>Scientific-Disciplinary Sector</b>	INFO-01/A
<b>Language</b>	German
<b>Lecturers</b>	Prof. Dr. Andrea Alexander Janes, Andrea.Janes@unibz.it <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/2237">https://www.unibz.it/en/faculties/engineering/academic-staff/person/2237</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	First semester
<b>CP</b>	6
<b>Responsible Lecturer</b>	
<b>Teaching Hours</b>	30
<b>Lab Hours</b>	30
<b>Individual Study Hours</b>	90
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	<ul style="list-style-type: none"> <li>• Project Inception &amp; Roadmap</li> <li>• Architecture &amp; Technical Design</li> <li>• Development &amp; Integration</li> <li>• Deployment &amp; Observability</li> <li>• Final Review &amp; Retrospective</li> <li>• Cross-Team Collaboration &amp; Stakeholder Engagement</li> </ul>
<b>Course Topics</b>	

<b>Teaching Format</b>	The Coding Capstone course is organized as a project-based laboratory in which students work individually or in teams on the design, development, deployment, and evaluation of a software system. The course combines frontal lectures and technical briefings with supervised development activities, technical reviews, milestone presentations, and stakeholder discussions, encouraging collaborative work and the practical application of software engineering methodologies in realistic project settings.
<b>Required Readings</b>	Teaching materials, lecture slides, and additional supporting resources will be provided during the course lectures.
<b>Supplementary Readings</b>	