

# Syllabus

## *Course Description*

<b>Course Title</b>	Operating and real-time systems
<b>Course Code</b>	42429
<b>Course Title Additional</b>	
<b>Scientific-Disciplinary Sector</b>	IINF-05/A
<b>Language</b>	Italian
<b>Degree Course</b>	Bachelor in Electronics and Cyber-Physical Systems Engineering
<b>Other Degree Courses (Loaned)</b>	
<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>	Second semester
<b>Course Year/s</b>	2
<b>CP</b>	6
<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>• Operating systems principles.</li> <li>• Real time systems principles.</li> <li>• Multi-programming, multi-tasking.</li> <li>• Scheduling and management of processes.</li> <li>• Communication and synchronization.</li> <li>• Memory management.</li> </ul>
<b>Course Topics</b>	<ul style="list-style-type: none"> <li>• Operating systems principles.</li> <li>• Real time systems principles.</li> <li>• Multi-programming, multi-tasking.</li> <li>• Scheduling and management of processes.</li> </ul>

	<ul style="list-style-type: none"> <li>• Communication and synchronization.</li> <li>• Memory management.</li> </ul>
<b>Keywords</b>	Processes, scheduling, synchronization, memory, real-time
<b>Recommended Prerequisites</b>	C programming at intermediate level, as taught in the Fundamentals of Programming II course; Data structures and algorithms key concepts, as taught in the Algorithms and Programming course
<b>Propaedeutic Courses</b>	
<b>Teaching Format</b>	Frontal lectures, exercises, labs
<b>Mandatory Attendance</b>	Attendance is not compulsory, but non-attending students have to contact the lecturers at the start of the course to agree on the modalities of the independent study.
<b>Specific Educational Objectives and Learning Outcomes</b>	<p>Knowledge and understanding</p> <p>Know the fundamental principles and programming techniques of operating and real-time systems;</p> <p>Know the innovative aspects of the last generation of operating systems.</p> <p>Applying knowledge and understanding</p> <p>Ability to develop programs to interact with microcontrollers and the operating systems of modern computers.</p> <p>Making judgements</p> <p>Be able to work autonomously according to the own level of knowledge and understanding.</p> <p>Communication skills</p> <p>Be able to use one of the three languages English, Italian and German, and be able to use technical terms and communication appropriately.</p> <p>Ability to learn</p> <p>Have developed learning capabilities to pursue further studies with a high degree of autonomy.</p>
<b>Specific Educational Objectives and Learning Outcomes (additional info.)</b>	Students gain an understanding of the theoretical and practical concepts of operating systems with a focus on the algorithmic aspects orchestrating the underlying hardware structure of a computer and the basic parallel programming techniques. After this

	<p>course the students are able to understand the main principles for designing an OS, operate on an OS through a terminal, and develop code with elements of parallelism.</p>
<b>Assessment</b>	<p>Written exam. The mark for each part of the exam is 18-30, or insufficient.</p> <p>The written exam comprises verification questions and open questions to test knowledge application skills on the arguments discussed during the course.</p> <p>In case of doubts on the final mark. the lecturer reserves the right to ask for an additional oral examination.</p> <p>The oral exam comprises verification questions and open questions to test knowledge application skills. It can increase or decrease the mark obtained in the written exam.</p>
<b>Evaluation Criteria</b>	<p>The final mark is computed in proportion of the correct answers given in the written exam.</p> <p>The optional oral exam can increase or decrease the mark obtained in the written exam.</p> <p>Relevant for the oral exam: clarity of answers, ability to recall principles and methods, and deep understanding about the course topics presented in the lectures.</p> <p>Non-attending students have the same evaluation criteria and requirements for passing the exam as attending students.</p>
<b>Required Readings</b>	<p>Silberschatz, P. B. Galvin, G. Gagne, <a href="#">Operating Systems Concepts</a></p>
<b>Supplementary Readings</b>	<p>Web resources provided by the lecturer during the lectures</p>
<b>Further Information</b>	<p>Software used: C compiler and debugger, Bash shell, GNU/Linux</p>
<b>Sustainable Development Goals (SDGs)</b>	<p>Quality education</p>