

# Syllabus

## *Course Description*

<b>Course Title</b>	Robot Control
<b>Course Code</b>	42417
<b>Course Title Additional</b>	
<b>Scientific-Disciplinary Sector</b>	IINF-04/A
<b>Language</b>	German
<b>Degree Course</b>	Bachelor in Electronics and Cyber-Physical Systems Engineering
<b>Other Degree Courses (Loaned)</b>	
<b>Lecturers</b>	Prof. Dr. Angelika Peer, Angelika.Peer@unibz.it <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/38684">https://www.unibz.it/en/faculties/engineering/academic-staff/person/38684</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	Second semester
<b>Course Year/s</b>	3
<b>CP</b>	6
<b>Teaching Hours</b>	36
<b>Lab Hours</b>	24
<b>Individual Study Hours</b>	90
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	<ol style="list-style-type: none"><li>1. Robot kinematics and dynamics</li><li>2. Trajectory planning</li><li>3. Motion control</li><li>4. Interaction control</li><li>5. Vision-based control</li><li>6. Remote control</li><li>7. Computer-aided simulation and design</li></ol>
<b>Course Topics</b>	The lecture introduces to topics of robot modelling in terms of kinematics and dynamics, trajectory planning and the control of robot manipulators with focus on motion control in joint and task

	<p>space, interaction control, and vision-based control. Matlab/Simulink is introduced as computer-aided simulation and design tool to support the controller analysis and design.</p>
<b>Keywords</b>	Robot kinematics and dynamics; Trajectory planning; Motion control; Interaction control; Vision-based control; Computer-aided simulation and design
<b>Recommended Prerequisites</b>	
<b>Propaedeutic Courses</b>	
<b>Teaching Format</b>	The lessons are divided into frontal classroom lessons, and exercises to be solved alone or in a group with the help of Matlab/Simulink.
<b>Mandatory Attendance</b>	recommended
<b>Specific Educational Objectives and Learning Outcomes</b>	<p>Knowledge and understanding</p> <p>1. Knowledge and understanding in the field of control of robot manipulators</p> <p>Applying knowledge and understanding</p> <p>2. Ability to apply knowledge for solving given problems, including solving them with numerical data and with the help of software packages like Matlab/Simulink.</p> <p>Making judgements</p> <p>3. Ability to judge plausibility of results.</p> <p>Communication skills</p> <p>4. Maturing of technical-scientific terminology.</p> <p>Ability to learn</p> <p>5. Learning skills to independently study and apply methods of robot control for specific applications beyond topics covered in this lecture.</p>
<b>Specific Educational Objectives and Learning Outcomes (additional info.)</b>	
<b>Assessment</b>	<p>Formative assessment: In-class exercises (continuously as part of course accompanying exercises)</p> <p>Summative assessment: oral exam of approx. 30 minutes</p>
<b>Evaluation Criteria</b>	<ul style="list-style-type: none"> <li>• Clarity and correctness of answers;</li> <li>• Soundness of the sketched approach to address a problem and the single steps involved;</li> <li>• Ability to summarize, evaluate, and establish relationships between topics;</li> </ul>

	<ul style="list-style-type: none"><li>• Correct usage of terminology</li></ul>
<b>Required Readings</b>	Blackboard and slides
<b>Supplementary Readings</b>	<p>Introduction to Robotics – Mechanics and Control, John Craig, Pearson, 2018.</p> <p>Robotics – Modelling, Planning and Control, Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, Springer, 2009.</p> <p>Robot Modeling and Control, Mark W. Spong, Seth Hutchinson, M. Vidyasagar, Wiley, 2006.</p> <p>Modern Robotics – Mechanics, Planning and Control, Kevin M. Lynch, Frank C. Park, Cambridge, 2018.</p> <p>Modelling, Identification &amp; Control of Robots, W. Khalil &amp; E. Dombre, Kogan Page Science, 2004.</p> <p>Robotics, Vision and Control, Peter Corke, Springer, 2011.</p>
<b>Further Information</b>	Software used: Matlab/Simulink
<b>Sustainable Development Goals (SDGs)</b>	Quality education