

COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

Course title	Introduction to robot control
Course code	43079
Scientific sector	ING-INF/04
Degree	Bachelor in Industrial and Mechanical Engineering (L9)
Semester	1
Year	3
Credits	6
Modular	No
Total lecturing hours	36
Total lab hours	24
Attendance	Recommended
Prerequisites	Lectures and exercises of Mathematical Analysis I and II, Geometry, Physics I, Mechanics of Machinery
Course page	https://ole.unibz.it/
Specific educational objectives	The course belongs to the type "free choice course". It is designed for acquiring professional skills and knowledge.
Lecturer	Prof. Angelika Peer, https://www.unibz.it/it/faculties/engineering/academic-staff/person/38684-angelika-peer
Contact	NOI Techpark A1.4.29A, angelika.peer@unibz.it , phone: +39 0471 017 766
Scientific sector of lecturer	ING-INF/04 – AUTOMATION
Teaching language	English
Office hours	After consultation and agreement with lecturer
Lecturing Assistant (if any)	-
Contact LA	-
Office hours LA	-
List of topics	<ul style="list-style-type: none"> • Robot kinematics and dynamics • Trajectory planning • Motion control • Interaction control • Vision-based control • Remote control • Computer-aided simulation and design
Teaching format	The lessons are divided into frontal classroom lessons, and exercises to be solved alone or in a group with the help of Matlab/Simulink.
Learning outcomes	<p><u>Knowledge and understanding</u> Knowledge and understanding in the field of: 1. Theory of control of robot manipulators</p> <p><u>Applying knowledge and understanding</u></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><u>Making judgements</u></p> <p>3. Ability to judge plausibility of results.</p> <p><u>Communication skills</u></p> <p>4. Maturing of technical-scientific terminology.</p> <p><u>Ability to learn</u></p> <p>5. Learning skills to independently study and apply methods of systems and control for specific applications beyond topics covered in this lecture.</p>
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Assessment	Oral: oral exam (30 min) with verification questions
Assessment language	English
Assessment Typology	Monocratic (Collegiale se esame modulare)
Evaluation criteria and criteria for awarding marks	<ul style="list-style-type: none"> • clarity and correctness of answers; • soundness of the sketched approach to address a problem and the single steps involved; • ability to summarize, evaluate, and establish relationships between topics; • correct usage of terminology

Required readings	<p>Blackboard and slides</p> <p>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it and Iliaria Miceli, Iliaria.Miceli@unibz.it</p>
Supplementary readings	<p>Introduction to Robotics – Mechanics and Control, John Craig, Pearson, 2018</p> <p>Robotics – Modelling, Planning and Control, Bruno Siciliano, Lorenzo Sciacivco, 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 & Control of Robots, W. Khalil & E. Dombre, Kogan Page Science, 2004</p> <p>Robotics, Vision and Control, Peter Corke, Springer, 2011</p>
Software used	Matlab/Simulink