Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Introduction to Robot control
Course code	43079
Scientific sector	ING-INF/04
Degree	Bachelor in Industrial and Mechanical Engineering
Semester	II
Year	OPT
Academic Year	2019/20
Credits	6
Modular	//

Total lecturing hours	36
Total lab hours	0
Total exercise hours	24
Attendance	Recommended
Prerequisites	Lectures and exercises of Mathematical Analysis I and II, Geometry, Physics I, Mechanics of Machinery
Course page	

Specific educational objectives	The student should understand the basic principles of the theory of the control of robot manipulators.

Lecturer	Prof. Angelika Peer, e-mail: angelika.peer@unibz.it, https://www.unibz.it/de/faculties/sciencetechnology/academic-staff/person/38684-angelika-peer
Scientific sector of the lecturer	ING-INF/04 – AUTOMATION
Teaching language	English
Office hours	After consultation and agreement with lecturer
Teaching assistant (if any)	-
Office hours	-
List of topics covered	1. Short review of selected topics of control theory as well as robot kinematics and dynamics 2. Trajectory planning 3. Motion control 4. Interaction control 5. Control of redundant manipulators 6. Control of haptic devices 7. Telemanipulation 8. Visual servoing 9. Computer-aided simulation and design
Teaching format	The lessons are divided into theoretical classroom lessons, and exercises using blackboard and slides as well as exercises.

Learning outcomes (ILOs)	The learning outcomes need to refer to the Dublin Descriptors:

	Knowledge and understanding Knowledge and understanding in the field of: 1. Theory of control of robot manipulators Applying knowledge and understanding 2. Ability to apply knowledge for solving given problems, including solving them with numerical data, possibly with the help of software packages like Matlab/Simulink. Making judgements 3. Ability to judge plausibility of results. Communication skills 4. Maturing of technical-scientific terminology. Ability to learn 5. Learning skills to independently study and apply methods of systems and control for specific applications beyond topics covered in this lecture.

Assessment	**Formative assessment** **Form** | **Length /duration** | **ILOs assessed** In-class exercises | Continuously as part of course-accompanying exercises | 1-5 **Summative assessment** **Form** | **%** | **Length /duration** | **ILOs assessed** Written | 100 | 90 minutes | 1-5
Assessment language	English
Evaluation criteria and criteria for awarding marks	The written exam consists of two parts: A first part with a series of questions with to-be-freely formulated answers, as well as a second part consisting of several mathematical problems to be solved, which are distributed among the various topics covered. Judged will be: • the correctness of the approach and the mathematical steps of the solution, the calculation of numerical results; • the correctness of the provided answers and arguments presented and the terminology used.

Required readings	Blackboard and slides
Supplementary readings	Robotics – Modelling, Planning and Control, Bruno

	Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, Springer, 2009. Robot Modeling and Control, Mark W. Spong, Seth Hutchinson, M. Vidyasagar, Wiley, 2005. Modern Robotics – Mechanics, Planning and Control, Kevin M. Lynch, Frank C. Park, Cambridge, 2016.