



ROBOT CONTROL	
Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-INF/04 (AUTOMATICS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRICAL ENGINEERING
Curriculum	Sistemi elettrici
Year of study	2°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	45 lesson hours
Language	English
Activity type	WRITTEN TEST
Teacher	FERRARA ANTONELLA (titolare) - 6 ECTS
Prerequisites	Knowledge acquired in previous courses in Automatic Control and Mathematical Methods in Engineering.
Learning outcomes	The course provides the basic methodological tools to model and control industrial robots.
Course contents	<p>Modelling of robotic systems: Structure of robotic manipulators. Classification. The joint space and the operational space. Direct kinematics. Inverse kinematics. Differential kinematics. Euler angles. Relationship between geometrical and analytical Jacobian. Dynamic modeling.</p> <p>Robot control: Planning. Motion control in the joint space (decentralized and centralized) and in the operational space (inverse dynamics). Interaction</p>

	control: force control, hybrid force/position control.
Teaching methods	<p>Lectures (hours/year in lecture theatre): 45</p> <p>Practical class (hours/year in lecture theatre): 0</p> <p>Practicals / Workshops (hours/year in lecture theatre): 0</p>
Reccomended or required readings	<p>Lecture notes</p> <p>Robotics: Modelling, Planning and Control (Advanced Textbooks in Control and Signal Processing). Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo. Springer.</p>
Assessment methods	<p>Closed-book, closed-notes, 2 hour written exam consisting of 3 sections assessing knowledge and understanding of the course topics and ability to apply them in a problem solving context. Each section will be independently graded. Threshold to pass is 18/30 an maximum mark is 30/30 cum laude. The final mark is obtained as the weighted mean of marks given to each section of the written exam. Example of a written exam:</p> <p>http://sisdin.unipv.it/labsisdin/teaching/courses/robcon/files/Robot_Control_Exam_Example.pdf</p>
Further information	
Sustainable development goals - Agenda 2030	\$lbl legenda sviluppo sostenibile