



### ROBOT CONTROL

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|------------------------------|---|
| <b>Anno immatricolazione</b> | 2019/2020   |
| <b>Anno offerta</b>          | 2019/2020   |
| <b>Normativa</b>             | DM270   |
| <b>SSD</b>                   | ING-INF/04 (AUTOMATICA)   |
| <b>Dipartimento</b>          | DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE  |
| <b>Corso di studio</b>       | COMPUTER ENGINEERING  |
| <b>Curriculum</b>            | Embedded and Control Systems  |
| <b>Anno di corso</b>         | 1°  |
| <b>Periodo didattico</b>     | Secondo Semestre (02/03/2020 - 12/06/2020)  |
| <b>Crediti</b>               | 6   |
| <b>Ore</b>                   | 45 ore di attività frontale   |
| <b>Lingua insegnamento</b>   | English   |
| <b>Tipo esame</b>            | SCRITTO   |
| <b>Docente</b>               | FERRARA ANTONELLA (titolare) - 6 CFU  |
| <b>Prerequisiti</b>          | Knowledge acquired in previous courses in Automatic Control and Mathematical Methods in Engineering.  |
| <b>Obiettivi formativi</b>   | The course provides the basic methodological tools to model and control industrial robots.  |
| <b>Programma e contenuti</b> | <p>Modelling of robotic systems:<br/>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:<br/>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.

**Metodi didattici**

Lectures (hours/year in lecture theatre): 45  
Practical class (hours/year in lecture theatre): 0  
Practicals / Workshops (hours/year in lecture theatre): 0

**Testi di riferimento**

Lecture notes

Robotics: Modelling, Planning and Control (Advanced Textbooks in Control and Signal Processing). Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo. Springer.

**Modalità verifica apprendimento**

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 and 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:  
[http://sisdin.unipv.it/labsisdin/teaching/courses/robcon/files/Robot\\_Control\\_Exam\\_Example.pdf](http://sisdin.unipv.it/labsisdin/teaching/courses/robcon/files/Robot_Control_Exam_Example.pdf)

**Altre informazioni**

**Obiettivi Agenda 2030 per lo sviluppo sostenibile**

[Sbl legenda sviluppo sostenibile](#)