

MICRO-450

**Basics of robotics for manipulation**

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Cursus	Sem.	Type
Mechanical engineering	MA1, MA3	Opt.
Neuro-X minor	H	Opt.
Neuro-X	MA1, MA3	Opt.
Robotics	MA1, MA3	Obl.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Lecture	3 weekly
<b>Number of positions</b>	

**Summary**

This course introduces the basics of robotics for manipulation. The aspects concerning robot architectures (Serial, Parallel and Cartesian), sensors, kinematics and dynamic modelling and control are presented. Each of these theoretical topics is in concern with a industrial context.

**Content****Introduction to robotics and applications**

- History
- Types of robots
- Fields of applications
- Parallel robots

**Modeling**

- Solid body kinematics
- Direct and inverse coordinate transformation
- Jacobians
- Dynamics

**Basics of robotics control**

- Control strategies and overall architecture
- Trajectory generation (interpolation and dynamic profiles)

**Components**

- Sensors
- Actuators
- Man-machine interface

**Keywords**

Robotics, Modeling, Kinematics, Dynamics, Control

**Learning Prerequisites****Recommended courses**

## Control theory

### Learning Outcomes

By the end of the course, the student must be able to:

- Choose or select robot, actuators and sensors
- Use knowledge in kinematics
- Design a robot controller
- Apply theoretical knowledge (measurement, dynamics and kinematics) to robotics
- Optimize the design of a robot
- Establish different robot models (kinematics and dynamics)

### Transversal skills

- Give feedback (critique) in an appropriate fashion.
- Access and evaluate appropriate sources of information.
- Manage priorities.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.

### Teaching methods

Course ex cathedra + exercises

### Assessment methods

written exam

### Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

### Resources

#### Bibliography

Lecture notes- available in PDF - on moodle

#### Moodle Link

- <https://go.epfl.ch/MICRO-450>