

Mechanical design methods in robotics

Credits: 4 Semester 1 Compulsory: No

Format	Lectures 25 h	Supervised project 15 h	Private study 85 h
---------------	---------------	-------------------------	--------------------

Lecturers: (D.Chablat; Ph.Wenger) (ECN)

Objectives: This course presents the overview of the design process – specification, conceptual design, product design. The students will learn basic principles of industrial robot design.

Contents:

The following subjects will be discussed:

- Conceptual design: concept generation, concept evaluation.
- Product design: documentation, product generation, evaluation for function and performance, evaluation for cost, ease of assembly and other measures.
- Computer aids for mechanical design. CAD/CAE/CAM systems.
- The design of robotic production cell.
- Fundamentals of integrated design of control and drive systems taking into account measurement, gearing and transmission systems.
- Design of a serial robot manipulator (using CAD).

Practical Work: CAD design of manipulator.

Abilities: After completing this course, the students will be able to:

- Design a serial robotic manipulator.
- Formulate properly the needed information for conceptual design (requirements),
- Use CAD systems on the basic level for the design of typical mechanism (serial arm),
- Elaborate the design on general level without material, drive systems and actuators consideration,
- Provide the conceptual documentation for the arm design.

Assessment: 30% continuous assessment, 70% from end of semester examination.

Recommended texts:

- K.C.Gupta, *Mechanics and Control of Robots*, Springer 1997
- J.E.Shigley, J.J.Uicker, *Theory of Machines and Mechanisms*, McGraw Hill 1995.

Further readings: CAD software documentation