

ME-410

Mechanical product design and development

Paik Jamie

Cursus	Sem.	Type
Mechanical engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Withdrawal Session	Unauthorized Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
Hours	3 weekly
Courses	2 weekly
Project	1 weekly
Number of positions	30

It is not allowed to withdraw from this subject after the registration deadline.

Remark

réservé aux étudiants GM

Summary

Study and explore design principles of the different mechatronic components and systems. We will cover in-depth especially on meso-scale actuators, sensors and body construction methods.

Content

Each group will be responsible for producing a product based on the hands-on tutorials that will cover

1. acutators (Shape memory alloy, penumatic actuators)
2. structures (origami, cable-pulled underactuated system, 3D printed modular blocks)
3. model (SMA actuator, silicone based blocks)

each group is evaluated on their prototype and report.

Keywords

Sensors and Actuators, Smart actuators, Flexures, Compliant mechanisms. Polymer, Design Methodology, pneumatic actuators, origami robots

Learning Prerequisites**Important concepts to start the course**

product development will be on a wearable technology.

Learning Outcomes

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

- Choose the development of, (b) the modeling and simulation of, (c) the analysis of and (d) the choice of solution for an engineering problem in the mechanical engineering domain (product design, manufacturing process and system production) (CP1)
- Analyze to the design requests and define the specifications (CP3)

- List the functions of an existing or new product based on the specifications (CP4)
- Choose the main conceptual design solutions and identify the respective components to fulfill one function, taking into account the performance, technology and price constraints (CP5)
- Formulate the modeling hypotheses to tackle a problem and choose solution methods and tools considering the available resources (CP6)
- Choose the models and analysis criteria following the specifications (CP7) - Describe the technology implemented in advanced meso scale systems (actuators and sensors)
- Apply a concept of a meso scale device into a real device considering the scaling laws and boundary conditions involved

Teaching methods

lecture, tutorials and group work

Expected student activities

group project

Assessment methods

80% Project (30% presentation + 50% report)
20% midterm

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes
Others	Dr. Gunjan Argawal Mr. Matt Robertson Mr. Amir Firouzeh Mr. Zhenishbek Zhakypov

Resources

Notes/Handbook

in class notes

Websites

- <http://rrl.epfl.ch>