ME-516

Lifecycle performance of product systems

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Cursus	Sem.	Type
Energy Science and Technology	MA2, MA4	Opt.
Mechanical engineering minor	E	Opt.
Mechanical engineering	MA2, MA4	Opt.
Minor in Engineering for sustainability	E	Opt.
Robotics, Control and Intelligent Systems		Opt.
Robotics	MA2, MA4	Opt.
Systems Engineering minor	E	Opt.

Language of teaching	English
Credits	3
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

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

Summary

Provide the conceptual, technical and methodological understanding of measuring and evaluating the production/consumption decisions on the environmental, social and economic performance of products and services over their life cycle.

Content

- Overview of the performance challenges of products and services over their life cycle.
- Lifecycle characteristics of products in Beginning of Life (BOL), Middle of Life (MOL) and End of Life (EOL) phases.
- Key Performance Indicators (KPI) of products and services
- Overview of methodologies and approaches including Life Cycle Assessment (LCA), Life Cycle Costing (LCC), Social Life Cycle Assessment (SLCA), eco-design and circular manufacturing/circular economy.
- Overview of design & assessment tools.
- Discussions and presentations based on case studies and scientific articles.
- Hands-on practical LCA experience: evaluation of product/services and possible alternatives using professional tools.

Keywords

Product Lifecycle, Life Cycle Assessment, Life Cycle Costing, Circular economy

Learning Prerequisites

Important concepts to start the course

- Principles of mechanical design
- Principles of materials

Learning Outcomes

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

- Choose suitable methods and tools for (a) the development of, (b) the modelling 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

• Choose production tools and methods based on performance and cost requirements and needs, taking into consideration applicability limits and associated hypotheses CP8

• Apply adapt and synthesize learned engineering skills to create novel solutions CP14

Transversal skills

• Plan and carry out activities in a way which makes optimal use of available time and other resources.
• Use a work methodology appropriate to the task.
• Negotiate effectively within the group.
• Give feedback (critique) in an appropriate fashion.
• Demonstrate a capacity for creativity.
• Use both general and domain specific IT resources and tools
• Write a scientific or technical report.
• Make an oral presentation.
• Collect data.

Teaching methods

The course is organized in theoretical sessions, presentations of selected topics by students and a project (Environmental Life Cycle Assessment) to be realized by the students in groups using appropriate software.

Expected student activities

• Participation in the course
• Study documents and do presentations
• Prepare and ask questions
• Do a project using a software tool
• Write a project report

Assessment methods

• report on the project (80%)
• presentations in the class (20%)

Resources

Notes/Handbook

Course material documentation is distributed in the Moodle platform during the semester.

Moodle Link

• https://go.epfl.ch/ME-516