

Mechanical Design Methodology and Product Development

Programme course

6 credits

Konstruktionsmetodik och produktutveckling

TMKA02

Valid from:

Determined by

Board of Studies for Mechanical
Engineering and Design

Date determined

Main field of study

Mechanical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- Mechanical Engineering, M Sc in Engineering

Prerequisites

Basic knowledge of engineering materials, mechanics, solid mechanics, physics, thermodynamics, fluid mechanics and production engineering.

Intended learning outcomes

The course is an introductory course to general design methodology for mechanical engineering problems. After completing the course, students should be able to:

- Tackling minor technical problems in a systematic manner using general design methodology from requirements through concept selection and layout to physical prototype.
- Describe and explain the mechanical design process.
- Describe the concepts of functional, technical principle and technical solution / mean.
- Describe and explain existing technical systems / products in terms of the above.
- Make a simple plausibility assessment and design a technical solution in relation to actual requirements and boundary conditions by applying previously acquired knowledge in mechanics, solid mechanics, thermodynamics and fluid mechanics.
- In small groups perform and both orally and in a written report present design tasks where the above theoretical targets apply.
- Describe some basic design principles for sustainability and environmental friendly development (the Hannover Principles).

Course content

- Product development
- The design process and the engineering designer's role
- Types of mechanical design problems
- Group work and project planning
- Problem analysis and specification
- Concept generation, including functional analysis and solution generation
- Concept evaluation
- Layout design
- Detailed design and drawings
- DFM (Design for Manufacturing)
- DFE (Design for the Environment)
- Report writing and oral presentation

Teaching and working methods

The course lasts throughout the spring semester and is organized in a series of lectures and two compulsory projects. The lecture series, focusing first study period, introduces and explains the parts of the design methodology from a theoretical perspective. The theoretical part is examined by a written examination. The design assignments are implemented in practice in small groups of 4-5 students in parallel with the lectures. The first project focuses on concept generation and is relatively open in terms of choice of solutions. This task will result in a very simple demonstration prototype. The second task is focused on the redesign of an existing concept and will go all the way to a fully working function prototype. The prototype will be manufactured using IEI's mechanical workshop. Thus, the task also includes layout and detail engineering as well as the development of drawings which are important elements in the engineering work. The first task should be presented in a report. The second task is recognized by submissions during the project and a final oral presentation.

Examination

PRA1	Project assignment and conceptual design	2 credits	U, G
PRA2	Project assignment, detailed design	3 credits	U, G
KTR1	Theory test	1 credits	U, G

Grades are given as "Fail" or "Pass".

Grades

Two-grade scale, U, G

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Peter Hallberg

Examiner

Jonas Detterfelt

Education components

Preliminary scheduled hours: 50 h

Recommended self-study hours: 110 h

Course literature

Liedholm, Ulf, "Systematic concept development" (compendium), LIU-IKP-R-1077, Linköping University, 1999 (this compendium is available via the course room in LISAM for registered students.) Other literature may be announced and made available through LISAM.