

# Engineering Systems Design

Programme course

6 credits

Tekniska system

TMHP03

Valid from: 2017 Spring semester

**Determined by**  
Board of Studies for Mechanical  
Engineering and Design

**Date determined**  
2017-01-25

## Main field of study

Mechanical Engineering

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Aeronautical Engineering, Master's Programme
- Design and Product Development
- Mechanical Engineering, M Sc in Engineering

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Three years of studies in mechanical engineering

## Intended learning outcomes

The course is aimed at tools and methods for systems engineering and design. The course should give an ability to use different methods for engineering design later in projects with industrial applications. After the course the student should be able to:

- Understand the dynamics of innovation
- Formulate requirement specifications
- Apply methods for functional decomposition, requirements management, and concept generation
- Apply morphological matrix for concept selection
- Generate models based on statistical data regarding relations between different system/component characteristics
- Produce sensitivity analysis of a system and be able to draw conclusions regarding robustness and the degree of coupling.
- Apply "failure mode analysis" FMEA, and "fault tree analysis", FTA.

## Course content

The lectures deals with systematic design tools, including requirement specification, problem formulation, functional analysis, koncept generation, configuration methodolog, morphological matrices, axiomatic design, design structure matrix (DSM), QFD, sensitivity analysis, robustness, statistical methods of existing products to find initial relations for dimmensioning, estimation of power, force, torque and weight, and volume. In addition, methods for system safety such as "faliure mode effect analysis", FMEA, and "fault tree analysis" FTA are dealt with.

## Teaching and working methods

Lectures and group exercises

## Examination

UPG1	Exercises	2 credits	U, 3, 4, 5
TEN1	Written examination	4 credits	U, 3, 4, 5

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för ekonomisk och industriell utveckling

## Director of Studies or equivalent

Peter Hallberg

## Examiner

Petter Krus

## Course website and other links

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

### **Additional literature**

#### **Compendia**

P Krus, Design Analysis and Synthesis

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).