MF1064 Modelling and Simulation in Design and Product Realization 9.0 credits

Modellering och simulering i design och produktframtagning

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for MF1064 valid from Spring 2016

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Numerical calculation methods for derivation, integration, linear and non-linear equation systems and differential equations

Simple programming with for, if and while loops in Matlab

Basic geometric modelling in CAD of parts and assemblies

Draw free body diagrams with force and moment equilibriums

Dimension simple shapes considering stress and deformation

Create figures in Adobe Illustrator

Be able to run development projects in a structured way in a product realisation process

Be able to create physical models by means of manufacturing equipment such as model milling machines, 3D printers and laser cutters.

This is corresponds to the courses (and their entry requirements)

SF1523 Analytical and numerical methods for differential equations

MF1063 Materials in Design and product realisation

SG1140 Mechanics II

SE1020 Solid Mechanics

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to:

1. Carry out analyses of link mechanisms to achieve a desired movement

2. Carry out kinematic analyses of link mechanisms

3. Carry out force analyses for link mechanisms

4. Choose and dimension machine components such that they jointly result in a desired systems behaviour

5. Suggest design solutions for assembling machine components

6. Verify mathematical models and estimate fairness of the results of calculations and simulations

7. Document mathematical models and results from calculations and simulations in a technical report

Course contents

In the course, mechanisms will be designed and analysed, where the force and geometry analyses result in equation systems with at least ten unknown variables, so the equation

systems (both linear and non-linear) are easiest to solve numerically in Matlab. The force analyses result in loads on the product which can be used for following dimensioning with strength calculations. The force analyses also result in loads on machine components for subsequent design of these components.

CAD will be used as a design and analysis tool, e.g. for motion and FEM analyses.

The work is documented in technical reports that include force and geometry analyses, strength calculations and choice of components.

Course literature

To be determined later.

Examination

- INL1 - Hand in Exercises, 3.0 credits, grading scale: P, F
- PRO1 - Project, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Written Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.