

# Models of Mechanics

Programme course

6 credits

Mekanikmodeller

TMMS11

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Mechanical  
Engineering and Design

**Date determined**

2017-01-25

**Offered for the last time**

Autumn semester 2020

## Main field of study

Mechanical Engineering

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Mechanical Engineering, M Sc in Engineering
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mechanical Engineering, Master's programme
- Applied Physics and Electrical Engineering - International, 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

Basic courses in mathematics and mechanics.

## Intended learning outcomes

From a theoretical point of view the course makes clear that different theories of mechanics, like particle mechanics, rigid body mechanics, linear elasticity, thermal energy transport, viscous and inviscid fluids, beam theory, pipe flow, etc, all have a common basis consisting of a few universal ideas.

From a practical point of view the student is given access to a toolbox of mathematical models that can be used in analysis and design of industrial products as well as in understanding natural phenomena.

The course is unique in its focus on generality and brings together several traditional disciplines in the same frame.

One of the goals of the course is to give practise in technical/scientific writing and modelling.

## Course content

The universal laws of mechanics: Euler's laws, conservation of mass.  
The basic models of mechanics: discrete, one-, two- and three-dimensional. Special models for beams, linear elasticity, rigid bodies, trusses, viscous and inviscid flow and flow in pipes. A general mathematical structure for equilibrium problems.  
Introduction to numerical tools.

## Teaching and working methods

Lectures, exercises and home assignments

## Examination

ANN1      Written assignments                      6 credits                      U, 3, 4, 5

Home assignments. Paper on a particular mechanical model with application and exemplifying numerical solution. The paper is evaluated using grades not pass, 3 and 4. To obtain grade 5 an oral or written exam is required.

## Grades

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

## Other information

Supplementary courses: Structural Optimizatøn, Multibody Dynamics and Robotics, Computational Fluid Dynamics, Biomechanics, Fluid Systems and Transmissions, Continuum Mechanics, Finite Element Methods, Models of Materials, Mechanical Engineering Design, Vehicular systems

## Department

Institutionen för ekonomisk och industriell utveckling

## Director of Studies or equivalent

Peter Schmidt

## Examiner

Anders Klarbring

## Course website and other links

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

### **Additional literature**

#### **Books**

Klarbring, A, (2006) *Models of Mechanics*

## 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).