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 Optimizaton, 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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.