

Continuum Mechanics

Programme course

6 credits

Kontinuumsmekanik

TMHL41

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

- Mechanical Engineering, M Sc in Engineering
- Mechanical Engineering, Master's programme

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

Linear algebra, mathematical analysis, basic mechanics.

Intended learning outcomes

The aim of the course is to give the student a basic understanding of the relations which are needed to analyse a continuous media subjected to finite deformations. After the course the student should be able to

- define motion, velocity and acceleration using spatial and material descriptions,
- define and justify important strain and stress measures for finite deformations,
- state the conservation laws for mass, momentum and energy and from these derive the equations of continuity and motion, and the first law of thermodynamics, respectively,
- define the properties of isotropic and anisotropic linear elastic materials, and
- define a hyperelastic material.

The course is fundamental for further studies in Solid Mechanics and in Fluid Mechanics.

Course content

- Mathematical fundamentals
- Stress analysis
- Displacement and strain
- Motion
- Fundamental laws (conservation laws)
- Linear elasticity
- Energy and variational principles

Teaching and working methods

Lectures, training classes and one project task.

Examination

TEN1 Written examination 6 credits U, 3, 4, 5

A passed voluntary project work gives 2p, which can be included in the written examine result.

Grades

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

Other information

Supplementary courses: The finite element method, advanced course, Advanced course i material mechanics, Project course in Solid Mechanics

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Peter Schmidt

Examiner

Kjell Simonsson

Course website and other links

Education components

Preliminary scheduled hours: 46 h

Recommended self-study hours: 114 h

Course literature

T. Maze and G. Maze: Continuum mechanics for engineers, 2nd edition, CRC Press, Boca Raton 1999 alternativt A.J.M. Spencer: Continuum mechanics, Dover Publications, New York, 2004

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.