



# FSE3111 Continuum Mechanics

## 12.0 credits

### Kontinuummekanik

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

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

### Establishment

Course syllabus for FSE3111 valid from Autumn 2018

### Grading scale

G

### Education cycle

Third cycle

### Specific prerequisites

A course in solid mechanics at the basic level is required. It is strongly recommended that the course participants also have some additional courses in solid mechanics such as material mechanics, theory of elasticity, theory of plasticity or continuum mechanics at the advanced level.

### Language of instruction

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

# Intended learning outcomes

After the course the students should

- be able to correctly apply advanced large deformation theories in modelling of structure-sand components
- be able to read and understand advanced scientific publications on material models for large deformations
- be confident with tensor analysis both in Cartesian and curvilinear coordinatesystems
- be able to apply and evaluate the most common stress, strain and deformation measures
- be able to model rubber like materials, for example soft tissuebiomaterials
- be familiar with different approaches for large strain plasticity
- understand finite element implementations for largedeformations

## Course contents

The course will give a thorough treatment of continuum mechanics for solid materials. Particular emphasis will be given to materials and structures that experience large deformations. Application areas are for example rubber like materials, soft tissue biomaterials and large plastic deformations in metallic materials. The lectures will address theoretical issues, which will be illustrated by simple examples. More advanced problems will be solved in homework assignments.

## Disposition

18 lectures (each 3 h)

## Course literature

- Holzapfel, G., Nonlinear Solid Mechanics, A Continuum Approach for Engineering, John Wiley & Sons, Ltd, 2000. Paperback: ISBN: 9780471823193
- Brannon, R., Curvilinear Analysis in a Euclidean Space, the text can be downloaded for free from the website [http:// imechanica.org/node/1551/](http://imechanica.org/node/1551/)

## Examination

- HEM1 - Home assignments, 6.0 credits, grading scale: P, F
- TEN1 - Written exam, 6.0 credits, grading scale: P, 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.

Five compulsory homework assignments and written examination.

## **Other requirements for final grade**

Passed homework assignments and written examination. The grades are pass or fail.

## **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.