



# FSE3122 FEM for Nonlinear Problems in Solid Mechanics 6.0 credits

FEM för ickelinjära hållfasthetsproblem

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

## Establishment

Course syllabus for FSE3122 valid from Autumn 2019

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Basic course in Solid Mechanics, e.g. SE1010, SE1020 or SE1055 or similar.

Basic course in FEM, e.g. SE1025 or similar.

Advanced course in Materials Mechanics, e.g. SE2126 or similar

## 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 participants should be able to

1. Demonstrate a theoretical understanding of non-linear continuum mechanics (KF2)
2. Solve a particular problem by application of appropriate solution methods and algorithms (KF2)
3. Describe the purpose, function, implication and limitation of modeling (KF2)
4. Combine and integrate different solution strategies to address more challenging problems (FF4)
5. Demonstrate a practical understanding in applying the FE method as demonstrated by solving typical structural problems (FF4)
6. Present, analyze and explain derived results in a clear and causal way

## Course contents

The course provides a systematic approach to solving problems in structural mechanics by discussing non-linear solid mechanics, variational principles, FE technology, solving sets of non-linear equations, constitutive modeling, and analyzing instabilities. Theoretical concepts are linked to numerical methods, towards solving problems in structural mechanics.

## Course literature

- Hand-outs
- Nonlinear continuum mechanics for finite element analysis. J Bonet and RD Wood. Cambridge University Press, 1997.
- The Finite Element Method. (7th edition) Zienkiewicz and Taylor, Butterworth-Heinemann, 2013.
- Nonlinear Finite Element Methods. Wriggers. Springer-Verlag Berlin Heidelberg. 2008.

## Examination

- HEM1 - Home assignments, 3.0 credits, grading scale: P, F
- TEN1 - Exam, 3.0 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.

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

## Other requirements for final grade

Approved home assignments and exam.

## 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.