SE1025 FEM for Engineering Applications 6.0 credits

FEM för ingenjörstillämpningar

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 SE1025 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Language of instruction

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

Intended learning outcomes

The participant should after the course be able to:

- use the concept of stored elastic energy to analyze deformations and forces in elastic structures,
- identify the degrees of freedom and boundary conditions in a discrete elastic system and solve it using matrix methods,
- formulate the FE-equations using the weak form/principle of virtual work for problems that can be described by a differential equation and give a physical interpretation of the resulting components,
- use FEM to solve problems in solid mechanics, stationary heat conduction and other simple physical phenomena, limited to 1D or 2D,
- critically examine and evaluate the results from a FEM analysis and present these in a clear and correct fashion,
- use a commercially viable FEM-program to model and solve a problem in solid mechanics and a heat conduction problem and analyze the results.

Course contents

Introduction of energy methods, strong and weak formulation for analysis of boundary value problems. Approximating functions for the finite element method. One, two and three dimensional isoparametric elements. Formulation of FEM equations for elasto static and thermal problems. Constraints, Convergence and accuracy. Solution of problems by use of commercial FEM programs.

Specific prerequisites

Basic course in Solid mechanics SE1010, SE1020, SE1055 or the equivalent.

Course literature

G.R. Liu and S.S. Quek (2003) The Finite Element Method: A Practical Course. Butterworth-Heinman, Oxford
H. Lundh, Grundläggande Hållfasthetslära, KTH, Hållfasthetslära , 2013

Examination

- HEM1 - Home Work, 1.5 credits, grading scale: P, F
- LAB1 - Laboratory Work, - credits, grading scale: P, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, 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.

Other requirements for final grade

Written exam (TEN; 4,5 university credits)
Home assignments (HEM; 1,5 university credits)
Lab work (LAB; 0 university credits)

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.