



COURSE SYLLABUS

Basic FEM Analysis, 7.5 credits

Grundläggande FEM-analys, 7,5 högskolepoäng

Course Code: TFMK19	Education Cycle: First-cycle level
Confirmed by: Dean Dec 4, 2018	Disciplinary domain: Technology
Valid From: Jan 1, 2019	Subject group: MT1
Version: 1	Specialised in: GIF
	Main field of study: Mechanical Engineering

Intended Learning Outcomes (ILO)

After completion of the course the student should:

Knowledge and understanding

- demonstrate knowledge of basic principles of the finite element method
- demonstrate comprehension of different types of finite elements, as well as their usefulness and suitability in different situations.

Skills and abilities

- demonstrate the ability to idealize, implement and solve realistic engineering problems using a commercial FEM software, and then interpret the result
- demonstrate the ability to describe workflow of solid mechanics engineering calculations
- demonstrating ability to independently program simple finite element programs.

Judgement and approach

- demonstrate the ability to make assessments with respect to different theoretical models and their limitations from a solid mechanics perspective.

Contents

The course contains the basic concepts needed for the implementation of FEM such as numerical integration, assembling and the concepts of weak and strong forms of a differential equation. From the solid mechanics elementary differential equation models are derived, e.g. Naviers equations for elasticity and Euler's beam equation.

The course contains the following:

- Basic FEM: Partial integration into one and several dimensions; strong and weak form of heat conduction in one and two dimensions; Galerkin's method; shape functions; numerical integration; isoparametric elements
- Theory of elasticity: Three-dimensional elasticity, planar tension and elongation; finite elements for elasticity
- Beam elements: the Euler-Bernoulli beam; strong and weak form; continuity of derivatives in

approximations

- Introduction to FEM in Solidworks and FEM in Matlab

Type of instruction

Lectures and computer exercises including hand in assignments.

The teaching is conducted in English.

Prerequisites

General entry requirements and completed courses in Multivariable Calculus, 7.5hp and Solid Mechanics, 6hp (or the equivalent).

Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Examination ¹	2.5 credits	5/4/3/U
Laboratory work	5 credits	U/G

¹ Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

Titel: Engineering Analysis with SolidWorks Simulation 2014

Författare: P. Kurowski

Förlag: SDC Publications

ISBN: 9781585038589

Compendium in electronic form

Matlab-tutorials

The literature is preliminary until one month before the course starts.