

## COURSE SYLLABUS

### Basic FEM, 7.5 credits

*Grundläggande FEM, 7.5 högskolepoäng*

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Course Code: TGFK14	Education Cycle: First-cycle level
Confirmed: Sep 29, 2025	Disciplinary domain: Technology
Valid From: Jan 19, 2026	Subject group: Mechanical Engineering
	Specialised in: G1F First cycle, has less than 60 credits in first-cycle course/s as entry requirements
	Main field of study: Mechanical Engineering

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## Intended Learning Outcomes (ILO)

On completion of the course the student shall:

### Knowledge and understanding

- demonstrate comprehension of the basic principles of the finite element method
- display knowledge of the various types of finite elements and material models and their usefulness and suitability in different situations.

### Skills and abilities

- demonstrate skills to idealize, implement and solve realistic engineering problems in a commercial FE-software and interpret the results
- demonstrate the ability to explain the workflow of FE analysis.

### Judgement and approach

- demonstrate the ability to assess and estimate the agreement between a theoretical model and a real load-case
- demonstrate the ability to assess the plausibility of a simulation result.

## Content

The aim of the course is to combine theory and application regarding Finita Element Analys.

The course includes the following elements;

- Deriving the equations for elasticity, force equilibrium, geometric relations, material relations, principal stress.
- Theory on governing differential equations and methods of discretization.
- Idealization, choice of models, loads, boundary conditions, simplifications, meshing, solution strategies, visualization of results and post-processing.
- Implementation of a numeric solver in both 1D and 2D using Matlab.
- Analysis with commercial software packages, heat problems, solid mechanics, contact, large deformations, plasticity, material models, frequency analysis, buckling and dynamic loading.

## Type of instruction

Lectures, computer exercises, labs, project and presentation of results.

Language of instruction is English.

## Entry requirements

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

## Examination and grades

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

Registration of examination:

Name of the Test	Value	Grading
Individual Project <sup>1</sup>	4 credits	5/4/3/U
Individual Presentation	3.5 credits	G/U

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

## Course literature

Please note that changes may be made to the reading list up until eight weeks before the start of the course.

Compendium, fea.ju.se

Referencelitterature:

Title: Concepts and Applications of Finite Element Analysis

Author: R.D. Cook, D.S. Malkus, M.E. Plesha, R.J. Witt

ISBN: 9780471356059

Titel: Introduction to the Finite Element Method

Författare: Niels Ottosen, Hans Petersson

ISBN: 9780134738772