



COURSE SYLLABUS **Basic FEM, 7.5 credits**

Grundläggande FEM, 7,5 högskolepoäng

Course Code: TGFK14	Education Cycle: First-cycle level
Confirmed by: Dean Nov 15, 2023	Disciplinary domain: Technology
Valid From: Jan 1, 2024	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 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.

Contents

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.

The teaching is conducted in English.

Prerequisites

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 Fail.

Registration of examination:

Name of the Test	Value	Grading
Individual Project [†]	4 credits	5/4/3/U
Individual Presentation	3.5 credits	U/G

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

Course literature

The literature list for the course will be provided 8 weeks before the course starts.

Compendium, basicfem.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