



## COURSE SYLLABUS **Basic FEM, 7.5 credits**

*Grundläggande FEM, 7,5 högskolepoäng*

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<b>Course Code:</b> TGFK14	<b>Education Cycle:</b> First-cycle level
<b>Confirmed by:</b> Dean Nov 15, 2023	<b>Disciplinary domain:</b> Technology
<b>Valid From:</b> Jan 1, 2024	<b>Subject group:</b> MT1
<b>Version:</b> 1	<b>Specialised in:</b> GIF
	<b>Main field of study:</b> Mechanical Engineering

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### **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 <sup>†</sup>	4 credits	5/4/3/U
Individual Presentation	3.5 credits	U/G

<sup>†</sup> 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](http://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