Course syllabus

Tillämpad FEM - projektkurs
Applied FEM - Project

MMTN35, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED M
Date of Decision: 2023-04-11

General Information

Compulsory for: MPRR2
Elective for: M4, MD4
Language of instruction: The course will be given in English

Aim

The FEM (Finite Element Method) is a widely used engineering tool which, for instance, is used during development of products and manufacturing methods. The aim with the course is to give the students knowledge and abilities to work with commercial FEM-program. The work is carried out on applied problems and includes collection of necessary input values and the interpretation of the received analytical results.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- from a given problem, be able to create a geometry model for FE-analysis.
- be able to formulate necessary material properties for a FE-model.
- be able to apply loads and boundary conditions on a geometry model for FE-analysis.
- in group, be able to analyse a real problem in order to collect necessary information for FE-modelling and FE-analysis.
- in group, be able to do an evaluation of the achieved results from a FE-analysis.
- in group, be able to document and describe an executed FE-analysis in a technical report.

- in a group, be able to give an oral presentation in order to describe an executed FE-analysis in front of a technically competent audience.

Competences and skills
For a passing grade the student must

- individually be able to work with a commercial FE-program in order to carry out FE-analysis.

Contents

The course is focused on the practical use of the finite element method (FEM) and deals only with elementary FEM theory. However central concepts and functions are discussed and explained. The FE-analyses are carried out with commercial FE-program. Different types of problems such as linear and non-linear static mechanical, thermal, dynamical (frequency/natural vibration) and magnetic flux problems are treated in the practical part of the course. The different types of problems are structured according to geometry, material, loads and boundary conditions in order to be represented in a FE-model. The procedures at and the quality aspects of the FEM calculations are discussed and verifications of the results are made for some analyses. One major project that treats some of the division's research areas is carried out and reported under the second half of the course. Besides working with FEM the project also gives the possibility to practice other disciplines such as to get into new fields of knowledge and both written and oral presentation.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Continuous examination during the course of compulsory moments such as written assignments, presentation assignments, guest lectures and one "modelling- and analyse" test which is carried out individually. If the "modelling- and analyse test" is not approved at the first occasion further occasions are given during the course. In the course a compulsory project is included. The project is marked according to both how the analytical work was carried out and how the results were presented in both written and oral form. To achieve even higher grades it is possible to do an optional exam during the course.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: FMAA05/FMAA01 Calculus in One Variable, FMA420/FMAB20 Linear Algebra, FMA430/FMAB30 Calculus in Several Variables and FHL013/FHLF15 Solid Mechanics, Basic Course.
The number of participants is limited to: No

Reading list

- Course material compiled by the department such as assignments and project information.

Contact and other information

Examinator: Professor Jinming Zhou, jinming.zhou@iprod.lth.se
Course coordinator: Andrii Hrechuk, andrii.hrechuk@iprod.lth.se
Course homepage: http://www.iprod.lth.se