FSE3141 Failure of Materials 9.0 credits

Brotteorier

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FSE3141 valid from Spring 2017

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Basic course in solid mechanics (for instance SE1010, SE1020 or SE1055 or similar), continuum/material mechanics course (for instance SE2126 or similar) and course on finite element methods (FEM) (for instance SE1025 and SE2119 or SE1025 and SE2860).

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the student should be able to

1. describe the fundamentals of modeling of important failure modes in metals, fiber-based materials and biomaterials,
2. describe the purpose, function, implication and limitation of failure modeling,
3. implement a failure model into FE software,
4. apply tools to verify and validate failure models and their implementation,
5. combine and integrate different solution strategies to address a failure modeling problem,
6. extract key phenomena from experimental observations and turn them into a failure model, and
7. discuss the published literature on failure modeling in the field of solid mechanics.

Course contents

The course discusses the physical background and provides the foundation of modeling of failure in different types of materials. Failure models are developed within a theoretical mechanical framework and their numerical implementation into FE software is also discussed.

Disposition

The course consists of 6 parts. Each part includes 2 or 3 lectures and one homework assignment. The course parts are as follows:

1. Fundamentals of failure modelling
2. Metals
3. Ageing
4. Fibre-based materials
5. Biomechanics
6. Fatigue

Course literature

- Hand-outs, scientific papers
- Classical text books on the subject
- User and theory Manuals for a FE-package

Equipment

Commercial FE-program

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The exmination consists of 6 homework assignments to be solved individually.

Other requirements for final grade

In order to achieve the course grade pass, the student must have achieved the grade passed in all the 6 homework assignments.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.