SE2126 Material Mechanics 9.0 credits

Materialmekanik

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

Establishment

Course syllabus for SE2126 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Specific prerequisites

SE1025 FEM for engineering applications or the equivalent.
SE1025 can be read in parallel with SE2126 during the first reading period in the autumn.

Language of instruction

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

Intended learning outcomes

The rapid development of new materials leads to a demand for more advanced descriptions of the mechanical behavior of different materials at different length scales. Furthermore, numerical tools, such as the finite element method, also enable the use of such complicated material (constitutive) models when solving mechanical problems. The course aims to provide the student both with theoretical and practical knowledge about a large number of constitutive models relevant for a variety of different materials.

After the course the student should be able to

- apply three dimensional material models for anisotropic elasticity, non-mechanical strains, plasticity, viscoplasticity, creep, viscoelasticity, damage development in analytic estimates and in finite element calculations
- judge the practical applicability of the presented material models.
- understand the coupling between micro mechanical modelling and three dimensional material models.
- by use of finite element calculations or in analytic estimates be able to determine the stiffness for laminates, particle composites and materials with micro cracks and materials with periodic microstructure.
- estimate stresses and strain in inclusions.

Course contents

The practically most important material models for mechanical calculations are presented. Consequences for finite element calculations are discussed for every material model. The properties if the material models are as well analyzed by simplified analytic methods.

Course literature

Gudmundson, P. Material Mechanics, KTH Hållfasthetslära, 2004.

Gudmundson, P. Material Mechanics Exercises with Solutions, KTH Hållfasthetslära, 2004.

Handbok och formelsamling i Hållfasthetslära, KTH Hållfasthetslära, 1998.

Examination

- ÖVN1 - Assignments, 1.5 credits, grading scale: P, F
- TEN2 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F

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.

Other requirements for final grade

Written exam (TEN2; 4,5 university credits)
Passed homework (ÖVN1; 1,5 university credits)
Laboratory (LAB1; 3 university credits)

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.