SE1021 Solid Mechanics, Basic Course with computation excercises 9.0 credits

Hållfasthetslära, grundkurs med beräkningsuppgifter

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

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

Establishment

Course syllabus for SE1021 valid from Autumn 2024

Grading scale

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

Education cycle

First cycle

Main field of study

Materials Science and Engineering,Mechanical Engineering

Specific prerequisites

SG1120 Mechanics I

Language of instruction

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

Intended learning outcomes

After completing Solid mechanics, basic course with computation exercises, the student should be able to:

– calculate stress and deformation states in structures based on one-dimensional models for slender bodies (bars, shafts, beams).

– use correct stress and strain calculations in two- and three-dimensional bodies and structures to design with respect to, either, deformation, plasticity, ultimate strength or fatigue life, or combinations of these.

– formulate and follow an appropriate solution strategy and present force diagrams as well as dimensionally correct and reasonable solutions for idealized engineering problems.

– derive differential equations that describe idealized engineering problems, and solve them analytically and/or numerically.

Course contents

The course shall provide knowledge of the basic concepts and principles of solid mechanics, knowledge of the mechanical properties of construction materials, knowledge of methods for solving technically important problems within solid mechanics, with particular application to differential equations. The course should provide the ability to independently apply the aforementioned knowledge during solution of practical problems.

- Uniaxial theory for normal and shear stress in elasticity, plasticity and thermoelasticity. Applications to trusses, torsion and bending. Fatigue design using handbook.

- Multiaxial stress theory in elasticity, incipient plasticity and thermoelasticity. Applications to planar problems, including axisymmetric cases.

– Derivation of differential equations within solid mechanics, solving them analytically and with MatLab.

Examination

- BER1 - Computation exercise, 1.5 credits, grading scale: P, F
- KON1 - Partial exam, 3.0 credits, grading scale: P, F
- LAB1 - Laboratory work, - credits, grading scale: P, F
- TEN1 - Written exam, 4.5 credits, grading scale: A, B, C, D, E, FX, 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.

Test writing and final exam will together examine the content of the course, except for the part on differential equations, which is examined with computational exercises. The laboratory work consists of a demonstration of a modern solid mechanics laboratory, its machinery and other equipment.

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.