



Faculty of Health, Science and Technology
Mechanical Engineering

Syllabus

Solid Mechanics II for master students in engineering science

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| Course Code: | MSGC33 |
| Course Title: | Solid Mechanics II for master students in engineering science <i>Hållfasthetslära II för civilingenjörer</i> |
| Credits: | 7.5 |
| Degree Level: | Undergraduate level |
| Progressive Specialisation: | First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F) |

Major Field of Study:
MTA (Mechanical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2022-08-30, and is valid from the Autumn semester 2023 at Karlstad University.

Prerequisites

Registered for Mathematics, 30 ECTS credits, Mechanics, 15 ECTS credits, and Solid Mechanics, 7.5 ECTS credits, or equivalent

Learning Outcomes

Solid mechanics is a basic engineering subject of great importance to engineering applications. The field of solid mechanics studies the interplay between forces on a body (a design) and the deformations and stresses that arise in the body due to the forces. The design may be constructed in different

materials. The aim of the course is to clarify how designs and components should be dimensioned to ensure that they will perform the intended technical function in a safe manner.

Upon completion of the course, students should be able to:

- perform elastic stress analysis of rotation symmetric load cases
- determine the shear centre position of thin-walled beam cross-sections
- determine main stress and strain parameters
- use Mohr's circle for plane states
- use common methods for the analysis of crack growth, including cases of fatigue load
- determine stress intensity factor using the finite element method (FEM)
- give an account of and demonstrate Saint-Venant's principle (FEM)

Content

The course deals with basic multiaxial stress states for linear elasticity. Rotation symmetry field problems are treated for elastic cylinders and plates exposed to internal and external pressure, including rotating plates. The concept shear centre is covered, also for thin-walled non-symmetric beam cross-sections. The course introduces linear fracture mechanics and vibration analysis. Energy methods are introduced through Castigliano's theorem and the principle of minimum potential energy.

Reading List

See separate document.

Examination

Assessment is based on a written exam and hand-in assignments.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), U (Fail) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.