



Faculty of Health, Science and Technology
Mechanical Engineering

Syllabus

Solid Mechanics I for Bachelor students in engineering science

Course Code:	MSGB44
Course Title:	Solid Mechanics I for Bachelor students in engineering science <i>Hållfasthetslära I för högskoleingenjörer</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

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

37.5 ECTS credits completed in an Engineering study programme plus registered for Mathematics, 15 ECTS credits, and 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 performed 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 linear static stress analysis

- for uniaxial loading in a bar, including temperature load and managing slack,
 - for plane framed structures, including temperature load and managing slack,
 - for axes and systems of axes exposed to torsional load,
 - for beams and systems of beams exposed to transverse load,
- and determine for the cases of load above if plastic deformation may occur.

Upon completion of the course, students should also be able to use common methods for analysing the following mechanisms of failure:

- buckling of beams
- multi-cycle fatigue

In addition, students are expected to perform basic linear elastic FE analyses for discs and plates, and through these give an account of:

- Saint-Venant's principle
- Stress concentration
- consequences of simplifications introduced by beam theory

Content

The course deals with linear stress analysis, including an introduction to the finite element method (FEM). The course also introduces structural mechanics models such as bar, torsional axis, beam and plate basics. The course covers the mechanisms of failure buckling and fatigue and how loads are limited by the yield point of the material.

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.