



Faculty of Health, Science and Technology  
Mechanical Engineering

## Syllabus

### Solid Mechanics II for Bachelor students in engineering science

<b>Course Code:</b>	MSGB45
<b>Course Title:</b>	Solid Mechanics II for Bachelor students in engineering science <i>Hållfasthetslära II för högskoleingenjörer</i>
<b>Credits:</b>	7.5
<b>Degree Level:</b>	Undergraduate level
<b>Progressive Specialisation:</b>	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 2021-03-02, and is valid from the Spring semester 2022 at Karlstad University.

#### Prerequisites

Mathematics for Engineers, 22.5 ECTS credits, Mechanics, 7.5 ECTS credits, Solid Mechanics, 7.5 ECTS credits, and Materials Engineering, 7.5 ECTS credits, or registration on the Mechanical Engineering programme or the Innovation and Design Engineering programme, 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 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

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

- use common methods for the analysis of crack growth, including cases of fatigue load
- determine stress intensity factors using the finite element method (FEM)

### **Content**

The course deals with basic multi-axial 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.

### **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.