Reg No: MSGB31/20221

Faculty of Health, Science and Technology
Mechanical Engineering

Syllabus

Solid Mechanics for Engineering Science I for Master students in engineering science

Course Code:	MSGB31
Course Title:	Solid Mechanics for Engineering Science I for Master students in engineering science *Hållfasthetslära I för civilingenjörer*
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)
TKA (Engineering Physics)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2021-02-17, and is valid from the Spring semester 2022 at Karlstad University.

Prerequisites
Mathematics, 15 ECTS credits, and registered on the course 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 elastic-plastic 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

Upon completion of the course, students should also be able to use common methods for analysing the following mechanisms of failure:
- buckling of beams
- crack growth including fatigue load
- high-cycle fatigue

In addition, students should be able to
- perform basic FE analyses

and through these analyses give an account of
- Saint-Venant's principle
- Stress concentration
- consequences of simplifications introduced by beam theory

Content
The course deals with linear and elastic-plastic stress analysis for uniaxial stress, including inhomogenous stress states. The course also introduces structural mechanics models such as bar, torsional axis, and beam. The course covers the mechanisms of failure buckling, crack growth, and fatigue as well as stress concentration factor, and the basics of the finite element method.

Reading List
See separate document.

Examination
Assessment is based on a written exam, laboratory work, and a hand-in report.

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.