



**LUNDS UNIVERSITET**  
Lunds Tekniska Högskola

*Course syllabus*

# **Strukturmekanik**

## **Structural Mechanics**

**VSMA11, 7,5 credits, G1 (First Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED V

**Date of Decision:** 2023-03-21

### **General Information**

**Compulsory for:** IBYI2, IBYV2

**Language of instruction:** The course will be given in Swedish

### **Aim**

The aim of the course is to give an introduction to structural mechanics with application to simple types of structures that are common in buildings and infrastructure.

The course is intended as basic general knowledge for a BSc in Civil Engineering and to give necessary prerequisites for further studies in geotechnical engineering.

### **Learning outcomes**

#### *Knowledge and understanding*

For a passing grade the student must

- Be able to explain basic concepts and relations within structural mechanics, such as, force, moment, equilibrium, stress, strain and stress-strain relationship.
- Be able to describe the fundamental shape of the stress distribution caused by axial load, bending or torsion in a beam.
- Be able to describe phenomena causing fracture in line-shaped structural elements under axial, bending or torsion loading.

#### *Competences and skills*

For a passing grade the student must

- Be able to calculate section forces, stresses and deformations for bars, trusses, beams, simple frames, shafts and simple composite structures.

- Be able to analyse columns with respect to buckling and second order theory.
- Be able to present a clear written solution to a problem (given data, assumptions, calculations, results, conclusions).

### *Judgement and approach*

For a passing grade the student must

- Be able to assess the reasonableness in an obtained result.

## Contents

The course starts with a discussion of the concepts of force, moment, free-body diagrams and equilibrium, with application to trusses, and introduction of the concepts stress and strain:

- Free-body diagrams and equilibrium. Trusses. Stress, strain and stress-strain relationships.

After that follows a comprehensive treatment of Bernoulli-Euler's beam theory:

- Section forces in beams. Normal stress and shear stress for elastic bending of beams. Plastic bending of beams. Deflection of beams. Statically indeterminate beams.

Finally, some further subjects within structural mechanics are introduced:

- Columns; buckling and second order theory. Torsion of circular cross sections.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** One hand-in assignment, one laboratory assignment and written examination.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

### Parts

**Code:** 0121. **Name:** Written Examination.

**Credits:** 5. **Grading scale:** TH. **Assessment:** Written examination. **Contents:** The entire course content.

**Code:** 0221. **Name:** Hand-in Assignments.

**Credits:** 2,5. **Grading scale:** UG. **Assessment:** Approved hand-in and laboratory assignments. **Contents:** Hand-in assignment and laboratory assignment.

## Admission

**Assumed prior knowledge:** Calculus (FMA645 or FMAA50) and Mathematics, Linear Algebra (FMA656 or FMAA55)

**The number of participants is limited to:** No

**The course overlaps following course/s:** VSMA20, VSMA05, VSMA10

## Reading list

- Heyden, S., Dahlblom, O., Olsson, A., Sandberg, G.: Introduktion till

strukturmekniken. Studentlitteratur, 2017, ISBN: 9789147084609.

## **Contact and other information**

**Course coordinator:** Susanne Heyden, [susanne.heyden@construction.lth.se](mailto:susanne.heyden@construction.lth.se)

**Course coordinator:** Henrik Danielsson, [henrik.danielsson@construction.lth.se](mailto:henrik.danielsson@construction.lth.se)

**Course homepage:** <http://www.byggmek.lth.se/utbildning/kurser>

**Further information:** One teaching session might be given in Lund. Travel cost is payed by the student.