



Course syllabus

Strukturmekanik Structural Mechanics

VSMA20, 6 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: IBYA2

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 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 structural engineering and 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.

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: VSMA05, VSMA10, VSMA11

Reading list

- Heyden, S., Dahlblom, O., Olsson, A., Sandberg, G.: Introduktion till strukturmekaniken. Studentlitteratur, 2017, ISBN: 9789144084060.

Contact and other information

Course coordinator: Susanne Heyden, susanne.heyden@construction.lth.se

Course coordinator: Henrik Danielsson, 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 paid by the student.