



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Konstruktionsteknik

Structural Engineering

VBKF10, 6 credits, G2 (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: BI2

Language of instruction: The course will be given in Swedish

Aim

The course provides an introduction to building mechanics and structural engineering, with focus on the structural systems that are common in buildings. The student should gain insight and understanding for the requirements of structures in relation to load-bearing capacity, serviceability, and other design criteria. The student should after this course be able to analyze and design simple load-bearing structures and structural elements and understand how a building works with regard to all the different demands placed on it. The course is intended for students in the fire engineering programme and is in preparation for a course in "Fire protection systems" where structural systems will be designed for the case of fire.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- Be able to explain basic terms and connections within the subject.
- Be able to describe in principle how different structural systems/elements work.
- Be able to describe in principle the stress distribution caused by axial loading or bending in a beam.
- Be able to analyse the different parts of a building with regard to their load bearing function.
- Be able to describe in principle how building materials and load-bearing structures are

affected by fire.

- Be able to identify important loads that affect the building.
- Have an understanding for the various requirements placed on structures, and in the design of structural elements, which, in addition to structural safety, include, e.g., economy, aesthetics, indoor climate, as well as active and passive fire protection systems.

Competences and skills

For a passing grade the student must

- Be able to choose an appropriate model for analyzing simple structures.
- Be able to calculate section forces, stresses and deformations for different structural elements.
- Be able to analyze columns with regard to global buckling.
- Be able to design simple load-bearing elements with consideration of different types of loading and material properties.
- Be able to design different structural solutions for simple buildings with regards to the elements' properties.
- Be able to design structures with considerations of overall lateral stability.
- Be able to (in a written form) describe assumptions in the design process and (in written form) present the results of the design process.
- Be able to communicate with structural designers and others engaged in the building process.

Judgement and approach

For a passing grade the student must

- Be able to assess the assumptions that are used in the design process and assess their relevance.
- Be able to find and assess information based on achieved competence.

Contents

- Repetition: forces and moments, free body diagrams, stresses and strains.
- Bernoulli beam theory: section forces due to bending of a beam. Normal stress and shear stress due to bending of a beam. Statically indetermined beams.
- Column buckling.
- Principles of design, principles of safety, loads that affect buildings.
- Structural materials: steel, timber and concrete.
- Structural element types and behavior (beams, columns, frames, analysis of support conditions)
- (Global) lateral stability of structures.
- Design for bending moment, normal force and shear force.

As part of the course, some training in presentation techniques and CAD is provided.

Examination details

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

Assessment: Written short exam as well as graded assignments. The final grade in the course is based on the results of the written short exam and the graded assignment.

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: 0119. **Name:** Assignments.

Credits: 1. **Grading scale:** UG. **Assessment:** Assignments **Contents:** All course content

Code: 0219. **Name:** Short Exam.

Credits: 5. **Grading scale:** TH. **Assessment:** Written exam **Contents:** All course content

Code: 0319. **Name:** CAD.

Credits: 0. **Grading scale:** UG.

Admission

Assumed prior knowledge: VSMA15 Mechanics, basic course, VBMA25 Building Materials, VBFA05 Building Technology

The number of participants is limited to: No

The course overlaps following course/s: VBK013, VSMA05

Reading list

- Avd. för Konstruktionsteknik: Kompendium Konstruktionsteknik för Brandingenjörer. 2019. The literature can be downloaded from the course homepage.
- Isaksson et al: Byggkonstruktion. Studentlitteratur, 2020, ISBN: 9789144138558. Fourth edition.
- Avd. för Konstruktionsteknik: Regel- och formelsamling för kursen VBKF10. 2019. The equation book can be downloaded from the course homepage.

Contact and other information

Course coordinator: Eva Frühwald Hansson, eva.fruhwald_hansson@kstr.lth.se

Further information: Course homepage at canvas.education.lu.se. All registered students have access to the course homepage. Short information available at www.kstr.lth.se/utbildning.