



Course syllabus

Faculty of Technology

Department of Building Technology

4BY067 Teknisk modellering - bärverksanalys, 7,5 högskolepoäng

Analysis of Structures, 7.5 credits

Main field of study

Civil Engineering

Subject Group

Building Technology

Level of classification

Second Level

Progression

A1N

Date of Ratification

Approved by Faculty of Technology 2014-10-02

The course syllabus is valid from autumn semester 2015

Prerequisites

Algebra and analysis corresponding to 22.5 credits and 7.5 credits in Structural Mechanics or Mechanics of Materials, or the equivalent.

Objectives

After completing the course the student is expected to be able to

- derive differential equations for bar and beam deformation and one-dimensional heat conduction
- analyze systems of resilient supports, trusses and framework by the matrix displacement method
- analyze problems in heat conduction, pipe circulation, diffusion and electric circuits by the matrix displacement method
- analyze constructions with regard to instability phenomena
- analyze constructions with linear-elastic as well as elastic-ideal-plastic material behaviour
- analyze beams on resilient supports
- utilize symmetries, constraints and static condensation in structure analyses
- use computers and advanced calculation programs creatively to perform the above analyses
- assess the suitability and limitations of various models and the reasonability of calculated results in structural mechanics analyses.

Content

The course comprises the following elements:

- Revision of matrix algebra
- Derivations of differential equations for bar and beam deformation as well as one-dimensional heat conduction
- Analyses of systems of resilient supports, trusses and framework by the matrix displacement method
- Analyses of problems of heat conduction, pipe circulation, diffusion and electric circuits by the matrix displacement method
- Analyses of constructions with regard to instability phenomena
- Analyses of non-linear behaviour in constructions due to non-linear material connections
- Analyses of beams on resilient supports
- Analyses of structures where symmetries, constraints and static condensation are utilized in the solution
- Training in using computers and advanced calculation programs to perform the above analyses.

Type of Instruction

The teaching consists of lectures, exercises and laboratory work.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The assessment of student performances is usually written and takes place during special examination periods. The assessment may also be based on submitted reports of laboratory work and exercises.

Course Evaluation

A written course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The course evaluation will be filed at the department.

Credit Overlap

This course cannot be part of a degree in combination with another course in which the content fully or partly correspond to the content of this course: 4BY066 Analysis of Structures, 7,5 hec.

Other

The course will be given in English if there are international students.

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Required reading

O. Dahlblom, K.-G. Olsson, K. Persson, *Bärverk - modellering och analys, Structural Mechanics*, LTH, Lund, 2010 or later 300 pages.

P.-E. Austrell m fl., *CALFEM – A finite element toolbox, Version 3.4 Structural Mechanics*, LTH, Lund, 2004. 200/250 pages.