# AF2213 Steel and Timber Structures 7.5 credits

## Stål- och träbyggnad

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for AF2213 valid from Spring 2014

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Built Environment

## Specific prerequisites

For students not registered on a KTH programme:

150 university credits (hp) including the courses Structural Mechanics and Structural Engineering equivalent to at least 3·times 7,5 ECTS points. and documented proficiency in English corresponding to English B.

For students registered on a KTH programme:

SG1801 Byggnadsmekanik grundkurs,

AF1005 Byggkonstruktionslära grundkurs

AF2003 Structural Engineering, Advanced Course

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

The overall goal of the course is to give detailed knowledge about analysis and design of common structural elements of steel and timber. After having passed the course the student should be able to:

- Calculate the bending and axial resistance of steel beams with regard to local as well as global instabilities
- Explain the effect of shear and patch loading on the resistance of steel beams
- Calculate the resistance of common bolted connections for steel structures
- Explain the static behaviour of different types of welded joints in steel structures
- Calculate the load bearing resistance of beams subjected to lateral torsional buckling
- Understand specific problems related to the design of thin walled steel beams, especially the interaction between local buckling, distortional buckling and global buckling
- Perform adequate design calculations for straight, tapered and curved beams of glued laminated timber (glulam)
- Understand how large holes and notches influence the shear resistance of timber beams
- Perform design calculations for nailed and bolted connections in timber structures
- Understand how instabilities such as flexural and lateral torsional buckling influence the resistance of timber beams
- Perform design calculations for elements made of wood based panels, especially with regard to buckling
- Understand the theory of partial composite action for beams made of timber, possibly in combination with other materials such as steel

## Course contents

Design calculations are, within the steel part of the course, carried out according to Eurocode 3. The calculations deal with such things as:

- Local buckling for ordinary steel profiles
- Bending resistance of ordinary steel profiles
- Design of steel columns with regard to flexural column buckling

- Design of steel beams with regard to shear and patch loading
- Bolted joints, analysis and design
- Welded joints, analysis and design
- Design of steel beams with reference to lateral torsional buckling
- Technology of thin walled steel profiles, especially instability problems

Design calculations are, within the timber part of the course, carried out according to Eurocode 5. The calculations deal with such things as:

- Moment and shear force resistance of glulam beams having straight, tapered and curved shapes
- The influence of large holes and notches in timber beams
- Design of timber joints in which mechanical connectors such as nails and bolts are used
- Design of timber beams and columns sensitive for flexural buckling and lateral torsional buckling
- Design of timber beams having flanges of timber and webs of wood based panels
- Design of stressed skin elements have flanges of wood based panels
- Design of beams made of two different materials where we have partial composite action between the parts

## Course literature

Delar av modulpaketet "Att konstruera med stål"

- Modul 5 Cross-sectional resistance
- Modul 6 Stability of column and beams
- Modul 7 Cold-formed profiles and sheeting

Inom kursens trädel används en bok med titeln "Design of timber structures" från SWEDISH WOOD. Användning av annan litteratur är möjlig.

## Examination

- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Exercises, 3.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

TEN1 Written exam 4.5 credits

ÖVN1 Exercises 3 credits

## Other requirements for final grade

All parts need to be passed.

The final grade depends only on the examination results.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.