AF2004 Concrete and Steel Structures 7.5 credits

Concrete and Steel Structures

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 AF2004 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

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 concrete. After having passed the course the student should be able to:

- Explain the effect of shear and patch loading on the resistance of steel beams.
- Explain the static behaviour of different types of welded joints in steel structures.
- Understand how fatigue can affect the load bearing resistance of structural elements in steel.
- Explain how torsion of thin walled steel sections is carried.
- 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, distorsional buckling and global buckling.
- Calculate the load bearing resistance of integrated structures consisting of a concrete slab interacting with an underlying beam of steel or concrete.
- Explain the theoretical background to the yield line theory and the strip method for the analysis of reinforced concrete slabs.
- Calculate the load bearing resistance of rectangular reinforced concrete slabs on walls according to the yield line theory, table method and strip method.
- Calculate the load bearing capacity of rectangular reinforced concrete slabs on columns according to the strip method.
- Explain punching of a concrete slab on a column.
- Explain the causes of cracking of newly cast, coarse concrete structures and being able to asses the risk of crack formation and to recommend actions for crack reduction.
- Explain cracking strength, residual strength, ductility index and the residual strength factor.
- Explain the modes of action of bonding shotcrete, rock anchored shotcrete and shotcrete arches.
- Explain the mode of action of a shotcrete drain.
- Calculate the load bearing resistance of bonding shotcrete and rock anchored shotcrete in some simple cases.

Course contents

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

- Composite structures of concrete and steel
- Concrete slabs
- Coarse concrete structures
- Fibre concrete and shotcrete

Course literature

Will be announced at the beginning of the course.

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.

Other requirements for final grade

Passed written exam (4,5 cr)
Passed exercises (3 cr)

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.