

**SYLLABUS**

# **Design for fire and robustness 6 credits S7010B**

**Brandutsatta konstruktioner**

**Course syllabus admitted: Autumn 2014 Sp 1 - Autumn 2015 Sp 2**

**DECISION DATE  
2014-02-04**

# Design for fire and robustness 6 credits S7010B

## Brandutsatta konstruktioner

### Second cycle, S7010B

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	U G#	Brandteknik	Building Technology

### Main field of study

Civil Engineering

## Entry requirements

Fire protection courses S0003B and S0004B

## Selection

The selection is based on 30-285 credits

## Examiner

Milan Veljkovic

## Course Aim

The aim is to understand the main principles for the design of structural elements (beams and columns) of various construction materials: steel, wood and concrete at normal temperature and in fire exposed situations using analytical approach. Students should understand the background to the Eurocode design models and to be able, by certain specified conditions (loads and fire classes) choose an economical solution for fire exposed structural elements of concrete, wood or steel. They should be able to critically evaluate experiments with current analytical methods and estimate bearing resistance of the tested columns. One of the goals is to show the possibilities and limitations of existing design models for different materials. This will insure requirements for independent work as a civil engineer of Fire technology.

## Contents

The lectures deal with the design of fire exposed building elements and buildings in accordance with Eurocodes. A critical description of the regulatory framework should be focusing on current research questions that will lead to improvement of design standards. Design verification at room temperature and in fire situations in different stress states (tension, compression bending and shear) will be presented with a number of numerical examples. Various construction materials and fire safe solutions will be discussed. A number of numerical examples will be used to illustrate the differences between the structural elements made of different materials. At least three compulsory assignments will be prepared during the course. A comprehensive task consists of experiments in fire furnace and its evaluation using design methods according to the Eurocodes will be prepared in a group. The experimental results and evaluation should be written in the form of a technical report. Unprotected column fire resistance should be analyzed with respect to inbuilt equivalent CO<sub>2</sub> per kN of load bearing resistance. The report should be written in groups, 3-5 students. Presentation of various construction details will be discussed and "The best practices" details of buildings of different materials will be provided. Design methods are explained with focus to increase robustness of the structure.

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Lectures, numerical examples, a comprehensive lab exercise and consultations.

## Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Approved assignments and the laboratory report are required to pass the course. Grading: Passed or not passed.

## Literature. Valid from Autumn 2014 Sp 1

- Jean-Marc Franssen J.M., Vila Real P., Fire Design of Steel Structures, ECCS, Publication 302, ISBN 978-92-9147-099-0.
- Buchanan A. H., Structural Design for Fire Safety, John Wiley and Sons, Chichester 2003.
- ASCE Manual, Performance-Based Design of Structural Steel for Fire Conditions, American Society of Civil Engineers, 2009.
- Lennon T., Moore D.B., Wang Y.C., Bailey G.G., Designer's Guide to EN 1991-1-2, EN 1992-1-2, EN 1993-1-2 and EN 1994-1-2, Thomas Telford, 2006.
- Access Steel website ([www.access-steel.com](http://www.access-steel.com)).

## Course offered by

Department of Civil, Environmental and Natural Resources Engineering

## Items/credits

No items/credits available

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Syllabus established

by Eva Gunneriusson 2014-02-04