



*Course syllabus*

# Betong i livscykelperspektiv Concrete in a Life-cycle Perspective

**VBMN10, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED V

**Date of Decision:** 2023-03-21

## General Information

**Elective for:** V4-at, V4-ko

**Language of instruction:** The course will be given in Swedish

## Aim

Concrete is the world's most widely used building material. Concrete structures are expected to perform well during a very long service-life without unplanned maintenance. Consequently, good utilization of resources requires a selection of materials and structural design concept by considering the complete life-cycle of the building or structure.

The course is meant to give the student a deeper understanding of how the properties of concrete depend on the composition of the material, the curing during construction and why and how the performance changes during its service-life. The course is also meant to give the student an ability to express performance criteria on concrete, select material components and composition and predict the performance in various applications during its service-life.

## Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- well know and understand basic phenomena i fresh, hardening and hardened concrete
- understand the behaviour of concrete during production and normal use in various environments during the entire service-life

- be able to put the environmental consequences of cement and concrete into a larger perspective

#### *Competences and skills*

For a passing grade the student must

- have the ability to select concrete material and structural design concept in a life-cycle perspective and to assess the state of existing concrete structures
- be able to use the knowledge in advanced applications and to generalize it to completely new applications in buildings and structures.

#### *Judgement and approach*

For a passing grade the student must

After the course the student should have a clear picture of how to express performance criteria for concrete and how they can be fulfilled through selection of mix composition, production technology and maintenance measures, in a life-cycle perspective.

## Contents

A central part is the performance over time and again processes in concrete and structures during production and normal use in various environments. The effects of environmental actions, required space for movements, crack risk evaluation and durability are dealt with. Additionally, the selection of concrete constituents and composition to fulfil given performance requirements is included.

In small groups do the students cast different concretes and study its properties regarding for example heat development, strength, self-dessication and chloride penetration. The experiments are presented both written and orally.

## Examination details

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

**Assessment:** A written exam, student experiment written report and oral presentation and a presentation of a scientific paper.

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:** 0113. **Name:** Written Examination.

**Credits:** 5. **Grading scale:** TH. **Assessment:** Written examination

**Code:** 0213. **Name:** Laboratory Work.

**Credits:** 2,5. **Grading scale:** UG. **Assessment:** Laboratory Work

## Admission

#### **Admission requirements:**

- VBM012 Building Materials or VBM611 Materials Engineering or VBMA30 Building Materials or VBMA35 Building Materials

**Assumed prior knowledge:** VBMF05 Building Material Science AND VBK013 Structural Engineering OR VBKF15 Structural Engineering.

**The number of participants is limited to:** No

**The course overlaps following course/s:** VBM031

## Reading list

- Course book, Swedish and international papers.
- Fagerlund, G. 1992. Betongkonstruktioners Beständighet - En översikt. Cementa, Danderyd.

## Contact and other information

**Course coordinator:** Magnus Åhs, Magnus.Ahs@byggtek.lth.se

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**Course homepage:** <http://www.byggnadsmaterial.lth.se/utbildning/vbmn10>