



Version 1
2021-11-02

Concrete and other cement based materials

AF3115, 7.5 ECTS credits

Year 2021/22

Description

Concrete technology is becoming more complex with new binder types. This is in much due to the environmental impact of cement production. The new trend is to mix different types with co-ground limestone, granulated blast furnace slag and different pozzolanas like fly ash and calcined clays.

This course gives a deep understanding of concrete as a composite material, its properties in the fresh, young and hardened states. The effects from the various basic materials are studied and also how these can be varied to produce concrete and other cement based materials with prescribed properties.

Content and Objectives

This course will give the basic knowledge and deepened insight in cement and cementitious systems. The course will also treat and discuss durability aspects related to cementitious systems and the relationship with environmental aspects. Moreover, it will give a deepened understanding of different cementitious systems, apart from normal concrete, e.g. shotcrete and injection grout and special concretes.

The major aim is to give deepened understanding of different cementitious systems and durability aspects to graduate students in civil engineering and material science.

- It will provide basic knowledge of how to treat and handle different types of concrete
- It will give a deepened knowledge of the interaction between environment and cementitious products and how to avoid degradation.
- It will give an understanding of the basics of life-time predictions and timing of degradation processes in existing structures.

Prerequisites

Academic knowledge in civil engineering or material sciences. A basic knowledge of chemistry is needed.



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Attendance

Last year MSc students, graduate students, researchers and professionals in concrete materials.

Course plan

The course will start in January/February 2022 and finish in May/June 2022. The following areas are included:

- Cementitious materials, hydration mechanisms, properties of aggregates, mix design and admixtures.
- The effects from each basic material on mixed concrete and other cement based materials.
- Cementitious materials co-operation with the environment.
- Durability, repair methods and life-time design.

Literature

Neville, A.M., *Properties of Concrete Technology*, 5th Edition, Prentice Hall, 2011.

Examination

Requirements for final grade (Pass) are participation in all seminars and lectures and a completed laboratory project. If absent from one or more lectures and seminars, a student can be given an extensive written assignment as substitute. For each of the seminars the student should be prepared to discuss the relevant course topics and make a minor presentation for the group of students and teachers. Some seminars may be online via Zoom.

Course organisation

The course is administrated by KTH, with participating teachers and lectures from RISE, Chalmers, KTH, LTH and LTU. The course is free of charge for graduate (doctoral) students from the university divisions connected to the Graduate school of Sveriges Bygguniversitet in Structural Engineering and to other divisions and organizations participating with teachers to the course.

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