Course Specifications
Valid as from the academic year 2020-2021

Design of Concrete Structures I (E711038)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size
(nominal values; actual values may depend on programme)
Credits 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2020-2021
A (semester 1) Dutch Gent seminar: coached exercises lecture 24.0 h 36.0 h

Lecturers in academic year 2020-2021
Vandedrinck, Frank TW14 lecturer-in-charge
Boel, Veerle TW14 co-lecturer

Offered in the following programmes in 2020-2021 crdts offering
Bachelor of Science in Engineering Technology (main subject Civil Engineering Technology) 6 A
Linking Course Master of Science in Civil Engineering Technology 6 A

Teaching languages
Dutch

Keywords
concrete, reinforced concrete, Ultimate Limit State, Serviceability Limit State, structural component

Position of the course
The aim of the course is to give the students:
- recommendations for the design and construction of reinforced concrete structures given by Eurocode 1 and Eurocode 2;
- insights into the mechanical behaviour of reinforced concrete, in order to develop skills with respect to the design of structural components in the limit states: beams, slabs, plate elements, girders and stairs.

Contents
I. Basics of Design
Co-operation steel/concrete; functions of the reinforcement;
Project management: designer's documents for construction as drawings, material characteristics, reinforcement lists, formwork, specifications and detailing for execution;
Actions on structures.

II. Basic Design Rules - Calculation Methods - Eurocode 1 and 2
Principles: Ultimate Limit States, Serviceability Limit States, design assumptions, representative values of material properties, representative values of the actions, strength, stress and strain, deformations, cracking; Beams: rectangular cross-sections, optimal height, minimal height, use and calculation of compressive steel, load capacity; Reinforcement bars: positioning, cutting, bending, joints, anchorages, durability aspects, cover; Flenc beams and concrete webs; Shear design: shear reinforcement by stirrups.

III. Applications
Continuous beams;
Plate elements: calculation method by Marcus.

Initial competences
Basic knowledge of Probability and Statistics;

(Approved)
Insight in the mechanical and technological properties of concrete and steel; Knowledge of principles of structural analysis (isostatic and hyperstatic structures, reactions, internal forces, deformations and displacements under loading); Final objectives of BOUWKUNDIGE REKENTECHNIEKEN I and II

Final competences

1. The student uses good insight in basic concepts of Probability and Statistics to determine representative values of material properties and relevant values and combinations of the actions on the structure.
2. The student executes a structural analysis, based upon a load accumulation throughout the whole structure.
3. The student designs the structural members such as beams, slabs, girders, stairs and corbels, by calculation in the limit states according to the prescriptions of European normalization (EC 1 and 2).
4. The student details the structural members with respect to the standards of reliability and durability (positioning of the reinforcement bars, concrete cover, suspension, anchorage, overlaps and bending).
5. The student determines the load capacity of given structural members.
6. After designing in the ultimate limit state, the student checks the serviceability, by calculating the stresses, and verifies some durability aspects such as the deformation and the crack width.
7. The student manages a simple reinforced concrete project, including the composition of the designer’s map for construction with drawings, material characteristics, reinforcement lists, formwork, specifications and detailing.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
This course unit cannot be taken via an exam contract

Teaching methods
Lecture, seminar: coached exercises, online lecture

Extra information on the teaching methods
Classroom and online lectures: 36h
Classroom problem solving sessions: 24h

Learning materials and price
Teacher’s manual: calculation schemes: digitally available for free.

References
See references handbook and teacher’s manual

Course content-related study coaching
1. Guidance and coaching by lecturer and assistants: Possibility to obtain individual explanation in case of any problem;
2. E-learning platform: Students can visit an electronic workspace for supplementary courseware and possible examination questions.

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Oral examination

Examination methods in case of periodic evaluation during the second examination period
Oral examination

Examination methods in case of permanent evaluation
Skills test

Possibilities of retake in case of permanent evaluation
examination during the second examination period is possible

Extra information on the examination methods
Theory: oral examination after written preparation;
Practice: written tests on design of reinforced concrete elements.

Calculation of the examination mark

(Approved)
Theory: 67%
Practice: 33%
The assessment and the final assignment of quotas of course components happens by means of the mathematical average according to the apportioned coefficients.

When the student does not participate in the evaluation of one or more components or the student scores less than 8/20 for one of the components, he/she can no longer pass the entire course unit. If the total score is a mark of ten or more out of twenty, then this is reduced to the highest failing mark.

Facilities for Working Students

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