GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2018-2019

Reinforced and Prestressed Concrete (E052413)

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 2018-2019

A (semester 1)	Dutch, English	seminar: practical PC room classes	5.0 h
		lecture	30.0 h
		seminar: coached exercises	25.0 h

Lecturers in academic year 2018-2019

Wan-Wendner, Roman	TW14	lecturer-in-charge

Offered in the following programmes in 2018-2019	crdts	offering
Master of Science in Engineering: Architecture (main subject Architectural Design and Construction Techniques)	6	A
Master of Science in Engineering: Architecture (main subject Urban Design and Architecture)	6	A

Teaching languages

Dutch, English

Keywords

concrete structures, reinforced concrete, linear elements, concrete mechanics, design concepts, execution aspects

Position of the course

The aim of the course is to give the students basic insights into the mechanical behaviour of reinforced concrete and to make them acquainted with the basic concepts and methods for the practical design of common structures in reinforced concrete (linear members). The course is based on the material aspects introduced in the course "Concrete Technology".

Contents

Reinforced concrete: introduction, principles for the organic calculation, basic principles of concrete mechanics, uniaxial compression and tension, simple bending, compound bending, shear and toriosn, deflections, reinforcement arrangement, detailing of reinforcement in disturbed regions.

Initial competences

Mechanics of Materials, Strength of Materials, Concrete Technology, Structural Analysis I

Final competences

1 Have insight in the general design philosophy of concrete structures in the framework of the semi-probabilistic safety format. Identify and characterize the relevant limit states.
2 Elucidate the interaction mechanisms between reinforcement and concrete (equivalent concrete section, bond, cracking, anchorage).
3 Substantiate the ultimate behaviour of linear reinforced concrete members (columns and beams) submitted to compression, bending, compound bending, shear and torsion by means of appropriate design models.
4 Selection of the dimensions of linear concrete members and calculation of the required reinforcement areas based on the internal forces in the ultimate limit state.
5 Assessmentof the load-bearing capacity of existing concrete structures by checking the relevant ultimate limit states.

6 Practical evaluation of concrete stresses, crack widths and deflections in the serviceability limit states.
7 Develop the moment-curvature relationship of reinforced concrete sections as a tool for the prediction of the deformation behaviour of linear elements including the time-dependent aspects.
8 Analyse the force transfer in disturbed regions by means of strut-and-tie models. Justify the proposed solution.
9 Detail the reinforcement in a practical way taking into account durability criteria, required anchorage and lap lengths and minimum and maximum reinforcement areas.
10 Apply an available software package for the basic design of linear concrete members.

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, seminar: practical PC room classes

Extra information on the teaching methods

The theory is taught during lecture sessions.
Seminars include mainly coached exercises and also practical PC room classes

Learning materials and price

Lecture notes in Dutch [about 20 Euro]

References

- "Structural ConcreteTextbook", fib Bulletins 51, 52, 53 and 54, fib, Lausanne
- Eurocode 2: Design of concrete structures - Part 1-1: general rules and rules for buildings (EN 1992-1-1), CEN, Brussels
- fib Model Code 2010, Volumes 1 & 2, fib Bulletins, fib Bulletins, 65 and 66, fib, Lausanne
- "Reinforced and Prestressed Concrete Design to EC2", E. Obrien, A. Dixon and A. Sheils, Spon Press
- "Bemessung im konstruktiven Betonbau", K.Zilch, G.Zehetmaier, Springer, 2006
- "Reinforced Concrete: mechanics and design", J.K. Wight, J.G. MacGregor, Pearson, 2012
- "Reinforced Concrete: a fundamental approach", E.G. Nawy, Pearson, 2009
- "Handboek praktisch wapenen", Betonvereniging, 2003

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, oral examination

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

Written examination, oral examination

Examination methods in case of permanent evaluation

Open book examination

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

End-of-term assessment:
1. Written exam open book (exercices)
2. Written exam closed book including oral explanation (theory)
Continuous assessments: evaluation of independently solved exercices (written) with the use of lecture notes. Frequency: 4

Calculation of the examination mark

End-of-term assessment, open book: 25%
End-of-term assessment, closed book: 50%
Continuous assessment (mean value of the 4 evaluations): 25%
Students who are legitimately absent at one or more continuous assessment sessions

should make the relevant evaluations at a different time. Unjustified absence gives rise to a **maximum total score of 7/20.**