GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2018-2019

Introduction to Strength of Materials (E042012)

Course size (nominal values; actual values may depend on programme)

Credits	4.0	Study time	120 h
Contact hrs	30.0 h		

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	Dutch	demonstration	1.25 h
		seminar: coached exercises	13.75 h
		lecture	15.0 h

Lecturers in academic year 2018-2019

De Belie, Nele	TW14	lecturer-in-charge

Offered in the following programmes in 2018-2019	crdts	offering
Bachelor of Science in Engineering: Architecture	4	A
Preparatory Course Master of Science in Engineering: Architecture (main subject Architectural Design and Construction Techniques)	4	A
Preparatory Course Master of Science in Engineering: Architecture (main subject Urban Design and Architecture)	4	A

Teaching languages

Dutch

Keywords

strength of materials, stress, strain, material characteristics, tension, compression, bending, shear, torsion, buckling

Position of the course

To enable the students to calculate structural elements under common load situations, using simple methods based on fundamental laws of elasticity. This implies calculation of stresses, deformations, and dimensions of cross sections.
An important goal is to adopt the engineering-technical way of thinking and to learn to analyse a complex problem by dividing it into solvable units. In this way an important base is laid for later technical engineering courses and for design-related problem solving (e.g. concerning dimensioning of structural elements)

Contents

- Meaning of strength theory: Introduction, Stresses and internal forces, Properties of materials, Mechanical properties of metal, concrete and wood
- Basis of calculation: Basic hypotheses, Fundamental laws of elasticity, Criteria of strength, Safety criteria, Surface stress
- Tension and compression: Axial tension and compression, Multi-axial tension and compression
- Bending: Sheer bending, Uniaxial bending, Biaxial bending, Combined bending and tension/compression
- Shear: Shear stresses in bending, Shear stresses in joints
- Torsion
- Buckling

Initial competences

Basic principles of statics, basic mathematics (systems of equations, goniometry, geometry, differentials and integrals), basic knowledge of probability and statistics (normal distribution, mean, standard deviation)

Final competences

1 To know the important concepts related to strength of materials.
2 To understand the importance of equilibrium for calculation of elements under load.

3 To be able to deduce the relation between load, shear force and moment.
4 Stresses and strains can be calculated for simple construction elements under direct tension or compression, multi-axial tension or compression, simple bending, biaxial bending, combined bending and tension/compression, buckling, torsion.
5 The effect of temperature can be evaluated for elements with restricted expansion or multi-material cross sections.
6 Optimal dimensioning of elements under a load combination can be performed.
7 Shear and moment diagrams can be drawn for elements subjected to bending.
8 Systematically analyse a problem by seperation into partial problems.
9 Reduce / simplify problems to enable to solve them with known methods.
10 Be aware of analogies between different laws.

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

Demonstration, lecture, seminar: coached exercises

Learning materials and price

Course notes (in Dutch)

References

- Hanaor, A. (1998). Principles of structures. Blackwell Science, Oxford, 182 p. ISBN: 0-632-04262-1.
- Hibbeler, R.C. (2012). Sterkteleer. Pearson education Benelux, Amsterdam. ISBN: 978-90-430-2450-1.
- Megson, T.H.G. (1996). Structural and stress analysis. Elsevier Butterworth-Heineman, Oxford. ISBN: 0-340-63196-1.

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Written examination

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

Written examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

During examination period: written closed-book exam; written open-book exam

Calculation of the examination mark

Exam regarding theory (closed book) and regarding excercises (open book) each count for 50% of the total