

# Course Specifications

Valid as from the academic year 2017-2018

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

Offering	Language	Teaching Methods	Hours
A (semester 1)	English	seminar: coached exercises lecture	30.0 h 30.0 h
B (semester 1)	Dutch	seminar: coached exercises guided self-study	30.0 h 30.0 h

Lecturers in academic year 2018-2019

Caspeele, Robby TW14 lecturer-in-charge

Offered in the following programmes in 2018-2019

Programme	crdts	offering
<a href="#">Bridging Programme Master of Science in Civil Engineering</a>	6	B
<a href="#">Bridging Programme Master of Science in Civil Engineering</a>	6	A
<a href="#">Master of Science in Civil Engineering</a>	6	B
<a href="#">Master of Science in Civil Engineering</a>	6	A

Teaching languages

Dutch, English

Keywords

Critical load, post critical behaviour, buckling modes, flexural buckling, plate buckling, lateral torsional buckling, overturning of lifted beams, compression members

Position of the course

In the course "Metal Constructions" is taught how to design parts in steel structures (like plate girders and connections) so that the strength and stiffness conditions are fulfilled. In this course additional aspects, influencing the design, are treated. Not only the resistance of cross-sections must be verified but also the stability of the members of the supporting structure. Different cases of instability are considered like flexural buckling of compression members, flexural or flexural torsional buckling of members under compression and bending, plate buckling, flexural torsional buckling of beams.

Contents

- Potential energy: Conservative system of forces and elastic energy
- Principle of minimum potential energy: Determination of an equilibrium state, Method of Ritz
- Nature of the equilibrium state: Stable, unstable and indifferent equilibrium: Simple mechanical models, Post critical behaviour of a compression member, Beam on elastic foundation and cylinder, Plates, Failure modes of a frame, Influence of geometrical imperfections
- Second order effects in frames: P-Delta effect, Stability functions, Implications in the method of Gehler
- Compression members: Flexural buckling, Uniform built-up compression members, Members with bending and axial compression
- Lateral torsional buckling of plate girders
- Folding of plate girders and thin-walled box girders
- Classification of frames: Classification of frames

Initial competences

Having followed successfully the courses Analysis of Structures I and II, and Metal

Constructions.

#### Final competences

- 1 To understand and to be able to apply the theory of non linear behaviour of structures.
- 2 To perceive possible instabilities and being able to find out the nature of the equilibrium (stable, indifferent or unstable).
- 3 Being able to solve basic instability problems.
- 4 Being able to calculate the resistance of a structural element subjected to warping torsion, lateral torsional buckling, folding and excentric compression.
- 5 Being able to design a twofold compression member.
- 6 To be able to design and to calculate a frame taking into account geometrically non linear behaviour.
- 7 To understand the effect of imperfections on the behaviour of structures.

#### 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

Guided self-study, lecture, seminar: coached exercises

#### Learning materials and price

syllabus (15 euro)

#### References

- D. Vandepitte, Berekening van Constructies, (Deel I -1979, II-1980 en III-1981) , Story-Scientia Gent.
- [www.berekeningvanconstructies.be](http://www.berekeningvanconstructies.be)

#### Course content-related study coaching

The lecturer and assistants can be contacted before or after the lectures or exercise sessions, through e-mail or after making an appointment.

#### Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, open book examination, oral examination

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

Written examination, open book 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

During examination period: oral closed-book examination with written preparation (theory); written open-book examination (exercises). During semester: written exercises to be solved open-book.

#### Calculation of the examination mark

Special conditions: the end-of-term exam on theory has a weighting factor of 1/3 and the end-of-term exam on the exercises has a weighting factor of 4/9; the permanent assessment has a weighting factor of 2/9.