

# Course Specifications

From the academic year 2015-2016 up to and including the

## Fracture and Deformation Behaviour of Materials (E042740)

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	practicum	30.0 h
		guided self-study	30.0 h
B (semester 1)	English	practicum	30.0 h
		lecture	30.0 h

Lecturers in academic year 2018-2019

Kestens, Leo	TW08	lecturer-in-charge
Pirgazi, Hadi	TW08	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Bridging Programme Master of Science in Sustainable Materials Engineering</a>	6	B
<a href="#">Bridging Programme Master of Science in Materials Engineering</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering (main subject Maritime Engineering)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a>	6	B
<a href="#">Master of Science in Sustainable Materials Engineering</a>	6	B
<a href="#">Master of Science in Materials Engineering</a>	6	A

Teaching languages

Dutch, English

Keywords

Mechanical materials science, elasticity, plasticity, micromechanical mechanisms, forming, fracture mechanics

Position of the course

Teaching of basic knowledge and insight in the mechanical response of technically important materials on external loading or forming operations. Elastic, microplastic and plastic phenomena are treated. Students will not only acquire fundamental knowledge on the basic deformation and failure mechanisms, but also the basic instruments will be taught which are at the disposal of the materials science engineer for controlling the mechanical response. In addition to the above, basic forming operations will be discussed.

Contents

- Chapter 1 : Introduction
- Chapter 2 : Elastic behaviour of materials
- Chapter 3 : Single crystal plasticity
- Chapter 4 : Dislocation theory
- Chapter 5 : Strengthening Mechanisms
- Chapter 6 : Basic concepts fracture mechanics

- Chapter 7 : Constitutive material equations
- Chapter 8 : Forming Processes
- Chapter 9 : Mechanical tests

#### Initial competences

Basic science subjects, introductory materials science course

#### Final competences

- 1 Understand the basic deformation mechanisms of materials.
- 2 Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms.
- 3 Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials.
- 4 To designate elements in the material design that affect fracture behavior.
- 5 Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested.
- 6 To designate elements in the material design that affect fracture behavior.

#### 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, practicum

#### Learning materials and price

#### References

- G.E. Dieter, Mechanical Metallurgy, McGraw-Hill, 1989, ISBN 0-07-100406-8
- Mechanics and Materials, Ed. By M.A. Meyers, R.W. Armstrong, H. Kirchner,
- published by John Wiley & Sons, 1999, ISBN 0-471-24317-5

#### 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

Oral examination

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

Oral examination

#### Examination methods in case of permanent evaluation

Report

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

#### Extra information on the examination methods

During examination period: written open-book exam complemented with oral examination. During semester: graded lab sessions.

#### Calculation of the examination mark