

Mechanical Material Modelling (E042910)

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

Credits 3.0 Study time 90 h Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2019-2020

A (semester 1)	English	project	15.0 h
		lecture	15.0 h

Lecturers in academic year 2019-2020

Van Paepegem, Wim	TW11	lecturer-in-charge
Verleysen, Patricia	TW08	co-lecturer

Offered in the following programmes in 2019-2020

	crdts	offering
Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	3	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	3	A
Master of Science in Sustainable Materials Engineering	3	A

Teaching languages

English

Keywords

modelling, mechanics, material behaviour, plasticity, damage mechanics

Position of the course

The course "Modelling of mechanical material behaviour" is taught in the last Master year in Engineering, option Mechanical Construction. The course provides the student with the basic knowledge of modelling of mechanical material behaviour, more specifically damage mechanics, linear visco-elasticity and plasticity.

Contents

- Damage mechanics: Introduction, Experimental observation of damage, Damage evaluation in the design phase, Damage modelling, Size-effect and localization
- Visco-elasticity: Introduction, Linear elasticity and viscosity, Linear visco-elasticity
- Plasticity: Plasticity, Plasticity with hardening, Anisotropic plasticity

Initial competences

The following courses should be followed: - Mechanics of Materials - Mechanics of Structures

Final competences

- 1 recognize the different types of distributed damage in brittle materials
- 2 be able to discuss the different methods of damage evaluation in the design phase
- 3 be able to discuss the three major categories of damage modelling
- 4 be able to judge the relevance and applicability of the standard methods for visco-elasticity and plasticity
- 5 be able to apply the visco-elastic models of Maxwell and Kelvin-Voigt to simple cases of creep and relaxation
- 6 be able to apply the yielding criteria of von Mises and Tresca to plasticity of isotropic steel

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, project

Extra information on the teaching methods

Classroom lectures; Classroom problem solving sessions; Projects

Learning materials and price

English syllabus.

References

Course content-related study coaching

Use of electronic study environment, possibility for personal explanation after appointment

Evaluation methods

end-of-term evaluation and continuous assessment

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

Report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

During examination period: written closed-book exam. Second chance: written closed-book exam.

During semester: graded project reports.

Calculation of the examination mark

Special conditions: The weight factors are as follows: * 50% for the project report for partim "Damage mechanics" * 50% for the theory examination for partim "Plasticity and visco-elasticity".