

## Mathematic Models (E001160)

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

Credits	3.0	Study time	90 h	Contact hrs	30.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	Dutch	seminar	15.0 h
		lecture	15.0 h

Lecturers in academic year 2018-2019

Constales, Denis	TW16	lecturer-in-charge
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Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Preparatory Course Master of Science in Materials Engineering and Master of Science in Sustainable Materials Engineering</a>	3	A
<a href="#">Preparatory Course Master of Science in Textile Engineering</a>	3	A

Teaching languages

Dutch

Keywords

Mathematical models in applications, differential equations, boundary conditions, modelling of sources

Position of the course

Mathematical models play a prominent role in engineering. Mathematical modelling lies at the heart of most current technological innovations and has become a fundamental tool in many applications. The main goal of this course is to make students familiar with basic physical principles for derivation of a mathematical model. The mathematical description of many applied models is coupled with differential equations: ordinary (ODEs) and partial (PDEs), which express some fundamental principles (e.g., motion, conservation laws).

Contents

- linear regression
- rotation of a rigid body
- couple of forces, moment
- signals, causal linear system, transfer function
- wavelets and wavelet filters
- mathematical modeling using PDEs
- convection-diffusion-reaction problems
- vector-fields models
- modelling of sources in PDEs
- harmonic oscillator
- vibrating string and membrane

Initial competences

Mathematical analysis: functions of one and more variables, integrals and derivatives.  
Linear algebra: vector calculus.

Final competences

Understanding and mastering of standard mathematical approaches in modeling for some basis problems arising from engineering.

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

Learning materials and price

Lecture notes (Dutch/English). Cost: +/- 10 EUR.

References

K.Eriksson, D. Estep, C. Johnson, Applied Mathematic: Body and Soul [Volume 1, 2 and 3], Springer, 2004.

Course content-related study coaching

- individual coaching by appointment
- interactive coaching via Minerva: Forum (students among themselves, students - lecturer)

Evaluation methods

end-of-term evaluation

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

Written examination with open questions

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

Written examination with open questions

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

written examination with open questions (theory closed book, exercises open book (class notes)

Calculation of the examination mark