

Mathematics II (E610005)

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 2)	Dutch	lecture	36.0 h
		seminar: coached	24.0 h
		exercises	

Lecturers in academic year 2018-2019

De Vos, Oriana	TW05	staff member
Audenaert, Pieter	TW05	lecturer-in-charge

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Engineering Technology (main subject Electromechanical Engineering Technology)	6	A
Bachelor of Science in Engineering Technology (main subject Electronics and ICT Engineering Technology)	6	A
Joint Section Bachelor of Science in Engineering Technology	6	A
Bachelor of Science in Industrial Design Engineering Technology	6	A
Bachelor of Science in Bioindustrial Sciences	6	A
Bachelor of Science in Chemical Engineering Technology	6	A
Bachelor of Science in Environmental Engineering Technology	6	A

Teaching languages

Dutch

Keywords

Functions of several variables, differential calculus, double integral, differential equations, geometry, linear algebra, diagonalization of matrices, eigenvalues and eigenvectors.

Position of the course

With this course we want to give the student the fundamentals of techniques and solution methods to solve a variety of engineering problems. We want them to be able to solve exercises even with a certain degree of abstraction. With this, the student must be able to understand scientific texts with mathematical derivations.

Contents

Linear algebra

- Matrices: definitions, calculation
- Determinants: definition, calculation techniques
- The inverse of a square matrix
- Linear equations: theorems, homogeneous linear systems
- Linear transformations
- Eigenvalues and eigenvectors: definition, calculation, theorems, diagonalization of a real symmetric matrix, applications

Geometry: lines and planes, relative position, angles, distances

Analysis

- Functions of several variables: partial derivatives of first and higher order, chain rule, total differential, gradient, tangent plane, extrema.
- Double integral: definition, calculation, Jacobian determinant and applications.
- Differential equations of first order: separable, exact, almost exact, linear with variable coefficients, linear with constant coefficients
- Linear differential equations of higher order: structure of the general solution,

applications

Initial competences

This course relies on some final competences of "Wiskunde I"

Final competences

- 1 To know the important properties and calculation methods concerning matrices. To have insight in the different possible solutions of a system of linear equations and to be able to find them using row reduction.
- 2 To be able to solve applications concerning eigenvalues and eigenvectors.
- 3 To have insight in the positions of planes and lines in space, to be able to find their equations and to find distances in space. To be able to classify quadratic surfaces.
- 4 To be able to give the mathematical and the physical interpretation of the partial derivatives, the total differential for functions of two variables.
- 5 To be able to use the chainrules and to be able to find the extreme values of a function of 2 variables.
- 6 To have the insight to calculate the volume and the surface area using double integrals.

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: coached exercises

Learning materials and price

- Syllabus in dutch on Minerva
- Presentations in dutch on Minerva

References

- Calculus, B. Thomas, Pearson
- Wiskunde voor het hoger technisch onderwijs, Lothar Papula, Academic Service
- Advanced Calculus, Murray R. Spiegel, Schaum's Outline Series
- Linear Algebra and its applications, Lay, Pearson
- Elementary Differential Equations, Boyce & Di Prima, Wiley

Course content-related study coaching

The lecturer can be asked questions immediately after the course, during the tutorial service or by appointment.

Evaluation methods

end-of-term evaluation

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

Written examination, oral 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

Preparation on paper eventually followed by oral explanation.

Calculation of the examination mark

First and second examination period: the examination mark = mark on the exam