GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2016-2017

Mathematics A (E707005)

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 2016-2017

A (semester 1)	lecture	36.0 h
	lecture: plenary exercises	24.0 h

Lecturers in academic year 2016-2017

Ghysels, An	TW17	lecturer-in-charge
Tonesi, Cristina	TW05	co-lecturer

Offered in the following programmes in 2016-2017	crdts	offering
Linking Course Master of Science in Electrical Engineering Technology (main subject Automation)	6	A
Linking Course Master of Science in Electrical Engineering Technology (main subject Electrical Engineering)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology (main subject Electronics Engineering)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology (main subject ICT)	6	A
Linking Course Master of Science in Civil Engineering Technology	6	A
Linking Course Master of Science in Chemical Engineering Technology	6	A
Linking Course Master of Science in Electromechanical Engineering Technology	6	A
Linking Course Master of Science in Information Engineering Technology	6	A
Linking Course Master of Science in Land Survey Engineering Technology	6	A

Teaching languages

Dutch

Keywords

Complex numbers, analytical geometry, linear algebra, real functions of one variable, differential calculus, indefinite integral, parametric and polar equation of a curve, Riemann integral, function of more than one variable, differential calculus, double integral, vector analysis, line integral.

Position of the course

The aim of the course is to provide insight into the theory and practice of essential mathematical concepts and methods related to complex numbers, 3-dimensional analytic geometry, linear algebra, limits, differential and integral calculus and vector analysis.

The treated subjects are primarily chosen in function of the study. The student learns how to use and apply the different concepts and methods in a responsible way and how to solve straightforward problems in an accurate way using pen and paper.
Furthermore the course aims to develop the problem solving analytical capacities of the student and his ability to phrase results in a scientific and rigorous manner.

Contents

Complex numbers: polar representations, calculation rules, Euler’s formula, n-th roots, applications.

Three dimensional analytic geometry: planes and lines, distances and angles between them.
Matrices an determinants: calculation-rules.
Linear transformations.
Eigenvectors and eigenvalues: definitions, calculation, theorems, diagonalisation of a real symmetric matrix, applications.
Functions of one variable: limits.
First and higher order derivative and differential: definitions, calculation rules, theorems and applications.
Parametric and polar equation of a curve.
Indefinite integrals: integration methods.
Riemann integral: definition, improper integral, calculation and applications.
Function of more than one variable: introductory concepts.
Differential calculus: partial derivatives and differential, definitions, theorems.
Applications such as gradient, tangent plane and tangent line.
Double integral: definition, calculation, Jacobian determinant and applications.
Vector analysis: gradient, divergence, curl and laplacian: calculation rules and applications.
Line integral: definition, calculation, applications.
Green's theorem and corollaries.

Initial competences

Contents of 'Wiskunde -Voorbereiding tot het schakelprogramma voor Professionele Bachelors' en 'Basiskennis Wiskunde voor schakelstudenten'.

Final competences

1 The student has to be able to apply theoretical and practical mathematical insights correctly to engineering exercises and problems.
For instance:
- The student must know the mathematical concepts listed in the content and must be able to relate them to their applications.

2 The student has to be able to think critically, creatively as well as scientifically in order to reason correctly in the domain of mathematics.
For instance:
- The student has to be able to rephrase theoretical aspects from the learning content in a correct and critical manner.
- The student has to be able to interpret solutions within the learning content in a critical way and has to be able to track potential errors.

3 The student has to be able to apply scientific-disciplinary insights concerning complex numbers, analytical geometry, linear algebra and analysis to scientific or engineering problems independently.
For instance:
- The student has to be able to analyse and to solve independently practical problems within the learning content in an adequate manner.

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, lecture: plenary exercises

Extra information on the teaching methods

During the lectures the concepts are introduced and made clearer by examples and applications.
During the coached exercises the students are further trained using standard and similar exercises.

Learning materials and price

Lecture notes in Dutch.
Costs: ca 10€

References

Kléténik D., Problèmes de géométrie analytique, Editions de Moscou
Lothar Papula, Wiskunde voor het hoger technisch onderwijs, Academic Service.
Murray R. Spiegel, Advanced Calculus, Schaum's Outline Series.

Seymour Lipschutz, Marc Lipson, Schaum’s Outline Series of Linear Algebra.

Course content-related study coaching

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

Written examination

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

PE1 and PE2: written, closed-book examination.

NPE: written closed-book evaluation.

If unlawful absence for NPE: score NPE = 0.

Calculation of the examination mark

First examination period:
end score = 1/4*score NPE + 3/4*score PE1

Second examination period:
end score = Maximum(score PE2 ; 1/4*score NPE + 3/4*score PE2)
In other words, the NPE only contributes to the end score of the second examination period when this has a positive effect on the student's end score.

Remark:
If the score of PE1 is 7/20 or less, then the given end score will be at most 9/20 in the first examination period.
Similarly, if the score of PE2 is 7/20 or less, then the given end score will be at most 9/20 in the second examination period.