GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2016-2017

Mathematics III (E701036)

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

Credits 3.0	Study time 90 h	Contact hrs	36.0 h

Course offerings and teaching methods in academic year 2016-2017

A (semester 1)	Dutch	lecture	24.0 h
		lecture: plenary	12.0 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
Bachelor of Science in Civil Engineering Technology	3	A
Bachelor of Science in Chemical Engineering Technology	3	A
Bachelor of Science in Electronics and ICT Engineering Technology	3	A
Bachelor of Science in Electromechanical Engineering Technology	3	A
Bachelor of Science in Information Engineering Technology	3	A

Teaching languages

Dutch

Keywords

Vector calculus, line integrals, differential equations, integral transform, series.

Position of the course

The aim of this course is to provide insight in some basic concepts and mathematical tools related to vector calculus, differential equations, integral transforms and series. The subjects are chosen primarily to answer the needs of a course in engineering.

Contents

Vector analysis: derivative and integration of vector functions; gradient, curl, divergence, laplacian: properties, calculus and applications.
Line integrals: definition, computation, applications, Green’s theorem and corollaries, conservative vector fields and potentials.
Laplace transform: introductory concepts, existence, calculus rules, computation using tables of Laplace transforms, delta function, convolution, poles, inverse Laplace transform. Application to linear differential equations with constant coefficients, discontinuous right hand side and initial conditions.
Series: notions of convergence, criteria of convergence.
Series of functions: general concepts, Taylor series, Fourier series and applications.

Initial competences

Complex numbers, limits, differentiation and integration techniques, vector operations.

Final competences

1 Basic knowledge of fundamental concepts of vector analysis.
2 Basic knowledge of line integrals, how to compute them and Green's theorem.
3 Having acquired insight in the Laplace transform and its applications. Being able to solve linear DE with constant coefficients and discontinuous right hand side.
4 Having acquired insight in the convergence of numerical and function series. Being able to construct Taylor-and Fourier series.

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 main concepts and related results are introduced and illustrated with examples and applications.
During the class/coached exercises the students are trained to solve basic problems related to the techniques taught in the lectures.

Learning materials and price

Lecture notes in Dutch are available.

References

Frank Ayres Jr., Differential Equations, Schaum’s Outline Series.
Lothar Papula, Wiskunde voor het hoger technisch onderwijs, Academic Service.
Murray R. Spiegel, Schaum's Outline of Laplace Transforms.
Murray R. Spiegel, Advanced Calculus, Schaum’s Outline Series.

Course content-related study coaching

Personal coaching by the lecturer after the lecture 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

Evaluation methods PE1 and PE2:
written, closed-book examination (with the use of table of Laplace transforms).

Evaluation method NPE:
written, closed-book evaluation (with the use of table of Laplace transforms).

If the student is unlawfully absent: marks 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.