

Course Specifications

From the academic year 2017-2018 up to and including the

Mathematics: Analysis (C003966)

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

Credits	6.0	Study time	180 h	Contact hrs	60.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	Dutch	seminar: practical PC room classes	15.0 h
		seminar: coached exercises	15.0 h
		lecture	28.75 h
		demonstration	2.5 h

Lecturers in academic year 2018-2019

Van Daele, Marnix	WE02	lecturer-in-charge
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Offered in the following programmes in 2018-2019

Bachelor of Science in Chemistry	crdts	offering
	6	A

Teaching languages

Dutch

Keywords

Mathematics, analysis

Position of the course

To teach the mathematics and its techniques which are necessary in the different courses of the bachelor of science in chemistry program. Basic scientific skills (analytical thinking, critical reflection, problem solving, data gathering and processing, etc) are further developed during this course.

Contents

In Mathematics: analysis, we further develop the computer skills of students. In particular, we focuss on a numerical Python-based package within the Sage environment. In the first weeks, we start this PC-training with topics from the course Mathematics:algebra.

The contents of this course:

- MacLaurin-series and Taylor-series
- Ordinary differential equations: linear equations of first order, linear equations of higher order with constant coefficients; Sturm-Liouville equations
- Partial differential equations: some specific equations of parabolic, hyperbolic and elliptic type. Separation of variables.
- Vector analysis: line integrals; Green's theorem; gradient, divergence, curl and laplacian
- Fourier analysis: Fourier-series and Fourier-integrals; the Fourier transform; convolutions; relation with Laplace transform and the Laplace-transform for solving linear ordinary differential equations; DFT: the discrete form of the Fourier-transform and FFT: the Fast-Fourier-transform
- Operators; eigenvalues and eigenfunctions; the delta-function as eigenfunction of the position operator

Initial competences

The mathematical background of the incoming students varies from 3 or 4 hours to more than 6 hours. For some students, most of the topics are already known, for some students a lot of topics are new.

Final competences

The student is able to translate a mathematical problem into a formula, to select the

proper mathematical technique and to solve the problem.

The student is able to solve mathematical problems by hand and by making use of symbolic and numerical packages.

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

Demonstration, lecture, seminar: coached exercises, seminar: practical PC room classes

Learning materials and price

Lecture notes (in Dutch), exercises and solutions in printed and/or electronic form. The printed version costs about 10 €. Also Sage-worksheets and Python-programs are used. All the material is available via the electronic learning environment Minerva. Each student disposes of their own computer.

References

E. Mendelson, F. Ayres, Schaum's Outline of Calculus, Mc Graw-Hill Trade, 1999.
M.R. Spiegel, J.J. Schiller, R.A. Srinivasan, A. Srinivasan, Schaum's Outline of Probability and Statistics, Graw-Hill Trade, 2000.

Course content-related study coaching

Exercise classes

Individual coaching by lecturer/assistant : consultation by appointment

Interactive coaching via Minerva

Evaluation methods

end-of-term evaluation

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

Written examination, open book examination

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

Written examination, open book examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Written (open book form for exercises and closed-book form for theory)

Evaluation of the knowledge and insight in basic concepts and the ability to apply these concepts in problem cases.

Calculation of the examination mark

Theory (50 %) and exercises (50 %)