

Course Specifications

Valid as from the academic year 2017-2018

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

Credits	6.0	Study time	180 h	Contact hrs	52.5 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	Dutch	seminar: coached	22.5 h
		exercises	30.0 h
		lecture	

Lecturers in academic year 2018-2019

Peña Peña, Dixan	WE16	lecturer-in-charge
Ciocchi, Maria-Cristina	WE16	co-lecturer

Offered in the following programmes in 2018-2019

Bachelor of Science in Physics and Astronomy	crdts	6	offering	A
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Teaching languages

Dutch

Keywords

Functions of several real variables, differential calculus, integral calculus

Position of the course

This course contributes to the objectives of the bachelor study program by offering a well-founded and at the same time widely applicable introduction to functions of two or three real variables. It consists entirely of 'broad basic knowledge', and it supplies knowledge and skills that are useful and often indispensable in many other domains. Students get gradually familiarized with the methods and the typical reasoning for mathematical analysis with several real variables. Completeness or depth has not been aimed at. Every single subject has been selected on the basis of its usefulness. For curves and surfaces, several plausible results are assumed or applied, often tacitly, on intuitive grounds. To some extent, the course 'Differential Geometry' may be complementary. The theory is inextricably linked to exercises aiming at self-activity.

Contents

Functions of several real variables. Sequences, limits, continuity, differentiability, C1 and C2 functions. Inverse function theorem, implicit function theorem. Line integral of a continuous scalar field and of a continuous vector field. Riemann integrals of functions of two and of three variables. Inverting the order of integration. Elementary standard transformations (polar coordinates, cylindrical coordinates, spherical coordinates). Surface integral of a continuous scalar field and of a continuous vector field. Green's, Gauss' and Stokes' theorem. Improper integral of the first and of the second type. Functions defined by proper and by improper integrals. Gamma and Beta functions. Stirling's formula for the Gamma function. Fourier integrals.

Initial competences

A working knowledge of elementary analysis of functions of one real variable, without differential equations, is assumed.

Final competences

The student should be able to assess an elementary (theoretical or practical) problem of real analysis in two or three variables, e.g. originating from physics, to reason about its solution, and to find a solution by the learned methods.

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

Extra information on the teaching methods

Theory: oral presentation supplemented with didactical applets.

Learning materials and price

Syllabus "Analysis II" (approximate cost price € 10.00), annually revised.

References

Apostol, Tom M. *Calculus. 2. Calculus of Several Variables with Applications to Probability and Vector Analysis*. 3rd print. New York (N.Y.): Blaisdell, 1965.

Apostol, Tom M. *Mathematical Analysis*. 2nd ed. Reading (Mass.): Addison-Wesley, 1974.

Rudin, W., *Principles of mathematical analysis*. McGraw-Hill, 1976.

Course content-related study coaching

Besides regular support by the officially appointed coaches, consultation hour and permanent availability before and after classes.

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 evaluation in two parts, theory and exercises. In the theory part, knowledge and skills acquired will be tested, as well as the ability to interconnect items. In the exercise part, the acquired skills will have to be applied. In view of the basic character of this course, emphasis will be on routine exercises.

Calculation of the examination mark

Periodic evaluation 100%.