Analysis I (C003574)

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

Credits 6.0   **Study time 180 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	Dutch	Gent	lecture
			seminar

Lecturers in academic year 2024-2025

Vindas Diaz, Jasson	WE16	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bachelor of Arts in Moral Sciences	6	A
Bachelor of Arts in Philosophy	6	A
Bachelor of Science in Mathematics	6	A

Teaching languages

Dutch

Keywords

Functions of a real variable, differential calculus, integral calculus

Position of the course

This course contributes to the goals of the bachelor study program by offering a well-founded and at the same time widely applicable introduction to functions of one real variable. 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 typical methods and the reasoning for mathematical analysis. Exhaustive completeness has not been aimed at. Every single subject has been selected on the basis of its usefulness, and all treated results come with proofs. The content of the proofs is mathematical rigorous, but often rephrase into informal words. The theory is intrinsically linked to exercises aiming also at self-activity.

Contents

Rational, real and complex number fields. Limits of functions. Continuity, Bolzano, Weierstrass and Heine theorems. Differentiability. Mean value theorem. Monotonicity. l'Hospital's rule. C1 functions. Higher order derivatives. Lower integral, upper integral, (Riemann) integral. Darboux criterion. Fundamental Theorems of Calculus I and II. Integration by parts, change of variables. Taylor formula with an integral as remainder.Primitives. Exponential function, power functions, hyperbolic functions; logarithmic and inverse hyperbolic functions. Sine, cosine, tangent and their inverses. Practical integration techniques. Real sequences, Bolzano-Weierstrass theorem. Complex series, Cauchy, d'Alembert and Raabe convergence rules. Cauchy's integral test. Leibniz' rule for alternating series. Improper integrals. Uniform convergence of sequences and series, Weierstrass M-test. Complex power series. Convergence disc, termwise differentiation and integration, Abel's limit theorem. Taylor series. Binomial series.

Initial competences

Final objectives of secondary education.

Final competences

The student should be able to assess an elementary (theoretical or practical) problem of real analysis in one variable to reason about its solution, and to find a

solution via 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

Seminar, Lecture

Extra information on the teaching methods

Theory: oral presentation supplemented with didactical applets.

Study material

Type: Syllabus

Name: Syllabus "Analyse I"
Indicative price: € 10
Optional: no
Language : Dutch
Number of Pages : 192
Oldest Usable Edition : Syllabus "Analyse I" Editie 2022-2023
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

Apostol, T. M. Calculus I. One-variable calculus, with an introduction to linear algebra. 2nd ed. New York (N.Y.): Blaisdell, 1967.
Apostol, Tom M. Mathematical Analysis. 2nd ed. Reading (Mass.): Addison-Wesley, 1974.
Rudin, W., Principles of mathematical analysis. McGraw-Hill, 1976.
Spivak, M., Calculus. London: Benjamin, 1973.

Course content-related study coaching

Besides regular support by the appointed lecturers, consultation hours and permanent availability before and after classes.

Assessment moments

end-of-term assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

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 different subjects. In the exercise part, the acquired skills will have to be applied.

Calculation of the examination mark

Periodic evaluation 100%.