Complex Analysis

Programme course

6 credits

Komplex analys

TATA45

Valid from: 2020 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2019-09-23

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2X

Course offered for
- Master of Science in Applied Physics and Electrical Engineering - International
- Master of Science in Applied Physics and Electrical Engineering
- Bachelor's Programme in Mathematics
- Bachelor's Programme in Physics and Nanoscience
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Linear Algebra and Calculus in ona and several variables or equivalent. Vector calculus is recommended but not necessary.

Intended learning outcomes

The course will give basic proficiency in one-variable complex analysis required for subsequent studies. After completing this course, students should

- be able to define and explain basic concepts such as analytic function och harmonic function, and discuss connections between these function classes
- be familiar with the elementary functions and their properties
- be able to classify different types of singular points and discuss their characteristic properties
- be able to formulate and use central results in complex analysis such as the Cauchy-Riemann equations, the Cauchy integral theorem and formula and their applications, the maximum principle, Taylor and Laurent expansions of analytic functions, the residue theorem and its applications, the argument principle and how to use it
- know the fundamental properties of linear fractional transformations and how to use them in conformal mapping.

Course content

Complex numbers. The notion of analytic function. Elementary functions. Complex line integrals. Cauchy's integral theorem and formula. Taylor and Laurent series. Residue calculus. The argument principle. Linear fractional transformations.

Teaching and working methods

Lectures and lessons.

Examination

TEN1	Written examination	6 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Fourier analysis, Complex analysis second course

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Matematiska institutionen

Director of Studies or equivalent

Jesper Thorén

Examiner

Lars Alexandersson

Course website and other links

http://courses.mai.liu.se/Lists/html/index-amne-tm.html

Education components

Preliminary scheduled hours: 60 h
Recommended self-study hours: 100 h

Course literature

Books

Compendia

Lars Alexandersson, TATA45 Komplex analys (kompendium)