Complex Analysis

Programme course

6 credits

Komplex analys

TATA45

Valid from: 2018 Spring semester

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

Date determined

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2F

Course offered for
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mathematics, Bachelor's Programme
- Physics, Bachelor´s Programme
- 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

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)