Complex Analysis

Komplex analys
6 credits

Programme course

TATA45

Valid from: 2024 Spring semester

Determined by	**Main field of study**	
Board of Studies for Electrical Engineering, Physics and Mathematics	Mathematics, Applied Mathematics	
Date determined	**Course level**	**Progressive specialisation**
2023-08-31	First cycle	G2X
Revised by	**Disciplinary domain**	
	Natural sciences	
Revision date	**Subject group**	
	Mathematics	
Offered first time	**Offered for the last time**	
Autumn semester 2007		
Department	**Replaced by**	
Matematiska institutionen		

Course offered for

- Master of Science in Industrial Engineering and Management
- Master of Science in Industrial Engineering and Management - International
- Master of Science in Applied Physics and Electrical Engineering - International
- Bachelor's Programme in Mathematics
- Master of Science in Applied Physics and Electrical Engineering
- Master of Science in Engineering Mathematics

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
UPG1	Optional Assignments	0 credits	U, G
UPG2	Optional Assignments	0 credits	U, G
UPG3	Optional Assignments	0 credits	U, G

The optional assignments may give bonus points on the written examination.

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 could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- 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.

Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

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.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.