Complex Analysis

Komplex analys
6 credits

Programme course

TATA45

Valid from: 2025 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**
2024-08-28	First cycle	G2F
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 - International
- Master of Science in Industrial Engineering and Management
- 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

After completing the course, the student should be able to

- choose and apply methods to problems in all parts I-III of the course, as they are described in the course content
- present and justify solutions to tasks within the course content using relevant concepts and clear reasoning

Course content

Part I: Numbers, Functions and Images Complex numbers and functions. Limits, continuity and derivatives. Analytical and harmonic functions. Elementary functions. Conformal mapping, especially Möbius mapping.

Part II: Integrals and Series Complex curve integrals. Primitive functions. Cauchy's integral theorem and integral formula. The maximum principle. Numerical series and power series. Taylor and Laurent series. Zero points and singularities.

Part III: Residual calculus and the argument principle Residues and the residue clause. Integrals of trigonometric and rational functions. Fourier-type integrals. Indented contours and keyhole contours. The argument principle and Rouché's theorem.

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 for examination modules are decided in accordance with the assessment criteria presented at the start of the course.

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.