

**SYLLABUS**

# **Complex analysis 7.5 credits M0054M**

**Komplex analys**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2021-02-17**

# Complex analysis 7.5 credits M0054M

## Komplex analys

### First cycle, M0054M

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Matematik	Mathematics

## Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and the courses Differential Calculus M0047M), Linear Algebra and Calculus (M0048M), Linear Algebra and Differential Equations (M0049M) and the course Multivariable Calculus (M0055M) or their equivalent.

## Selection

The selection is based on 1-165 credits.

## Course Aim

After completed course, the students should be able to:

- give an account of the definitions and properties for the elementary functions.
- give an account of the basic theory of analytic functions, with the important theorems like Cauchy's integral theorem, Cauchy's integral formula, Liouville's theorem, the identity principle etc.
- give an account of the maximum principle for analytic and for harmonic functions.
- solve Dirichlet's problem in simple domains using analytic functions and conformal mappings.
- give an account for the theory of power series and its connection with analytic functions.
- determine Taylor and Laurent series and give an account of the convergence.
- calculating integrals using the Residue theorem.
- give an account of the theory of conformal mapping. In particular Möbius mappings including cross-ratio and the symmetry principle.
- give an account of the argument principle and using it to determine the number of zeros in domain like the first quadrant.

## Contents

This course treats basic theory of analytic functions such as Cauchy-Riemann's equation, the elementary functions, integration in the complex plane, Cauchy's integral theorem, Cauchy's integral formula and its consequences, Taylor series, power series and Laurent series, the residue theorem, the argument principle, Rouché's theorem and conformal mappings.

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The teaching consists of lectures and tutorials. The main learning is achieved by home studies, mainly problem solving.

## Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. The course aims are examined by a written individual exam. Grading according to the scale G U 3 4 5.

## Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

## Overlap

The course M0054M is equal to M0012M

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Written exam	G U 3 4 5	7.5	Mandatory	A21	

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Last revised

by Head Faculty Programme Director Niklas Lehto 2021-02-17

## Syllabus established

by Niklas Lehto 2019-02-15