



# SF1691 Complex Analysis 7.5 credits

## Komplex analys

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for SF1691 valid from Spring 2019

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

First cycle

## Main field of study

Technology

## Specific prerequisites

SF1672 Linear Algebra, SF1673 Calculus in One Variable and SF1674 Multivariable Calculus, or corresponding courses.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After the course the student should be able to

- Manipulate, interpret and use the basic concepts: complex number, analytic function, harmonic function, Taylor and Laurent series, singularity, residue, conformal mapping, meromorphic function.
- Relate different possible definitions of the term analytic function to each other and determine if a given function is analytic.
- Derive certain basic properties of analytic function, e.g. Cauchy's formula.
- Explain how analytic functions are used in connection to signals and systems. The focus is on the Laplace and Z-transform.
- Use conformal mapping to solve certain applied problems regarding heat conduction, electrical engineering and fluid mechanics. Especially, also use the Poisson kernel to solve boundary value problems for the Laplace equation.
- Use Taylor and Laurent expansions to derive properties of analytic and meromorphic functions.
- Compute integrals by means of residues.
- Analyze zeros and poles of meromorphic functions, classify singularities.

In order to receive a higher grade the student should also be able to

- Explain the theory of analytic functions and prove the most important theorems.

## Course contents

Meromorphic and analytic functions of one complex variable. Basic transcendental functions, harmonic functions.

Integration in the complex plane, Cauchy's theorem, Cauchy's integral formula and consequences thereof. Residues.

Taylor and Laurent series, zeros and poles, the principle of the argument.

Conformal mapping and applications.

## Course literature

The course literature is announced on the course webpage four week before the start of the course.

## Examination

- TEN1 - Exam, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.