

# Syllabus

for course at advanced level

**Advanced Complex Analysis**  
**Avancerad komplex analys**

**7.5 Higher Education  
Credits**  
**7.5 ECTS credits**

<b>Course code:</b>	MM7026
<b>Valid from:</b>	Spring 2020
<b>Date of approval:</b>	2019-09-30
<b>Department</b>	Department of Mathematics (incl. Math. Statistics)
<b>Main field:</b>	Mathematics/Applied Mathematics
<b>Specialisation:</b>	A1F - Second cycle, has second-cycle course/s as entry requirements

## Decision

This syllabus was approved by the Board of the Faculty of Science at Stockholm University on 2019-09-30.

## Prerequisites and special admittance requirements

Admission to the course requires knowledge equivalent to the courses

- Mathematics III Foundations of Analysis 7.5 credits (MM5021); - Mathematics III - Complex analysis 7.5 credits (MM5022);
- English B/English 6 or equivalent.

## Course structure

Examination code	Name	Higher Education Credits
HELA	Advanced Complex Analysis	7.5

## Course content

The course covers: Generalisations of Cauchy's integral formula, analytic continuation, normal families and the Riemann mapping theorem, special classes of conform maps, complex differential equations, and by the teacher for each course instance chosen applications, where the applications can be chosen among:

- Hardy spaces
- Boundary behavior of analytic functions
- Riemann-Hilbert problems
- Harmonic functions and harmonic measure
- Infinite products of analytic functions

## Learning outcomes

After the course, students are expected to be able to

- formulate and prove theorems on analytic functions, for instance Cauchy's generalised integral formula and the Riemann mapping theorem,
- use and analyse conformal maps,
- account for the theory of analytic continuation and for properties of solutions to complex differential equations,

- use the above mentioned skills in selected applications.

### **Education**

Instruction consists of lectures.

### **Forms of examination**

a. The course is examined as follows: Knowledge assessment takes the form of written exam.

b. Grades are assigned according to a seven-point goal-related grading scale:

A = Excellent

B = Very Good

C = Good

D = Satisfactory

E = Sufficient

Fx = Fail (more work required before credit can be awarded)

F = Total fail

c. The grading criteria will be distributed at the beginning of the course.

d. To be awarded a pass, a minimum of grade E is required.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed, unless there are special reasons to the contrary. Such requests should be made to the department board. Under normal circumstances, the course includes at least three examination opportunities per academic year the course is offered. For the academic years that the course is not offered, at least one examination opportunity is offered.

f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides on the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination opportunity.

### **Interim**

Students may request that the examination be conducted in accordance with this course plan even after it has ceased to be valid. However, this may not take place more than three times over a two year period after course instruction has ended. Requests must be made to the departmental board. The provision also applies in the case of revisions to the course plan.

### **Misc**

This course is offered as part of the Master's Programme in Mathematics and as a separate course.

### **Required reading**

The required reading is decided by the departmental board and published on the Department of Mathematics' website at least 2 months before the start of the course.