

# Syllabus

for course at advanced level

**Advanced Real Analysis I**

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**7.5 Higher Education**

**Credits**

**7.5 ECTS credits**

<b>Course code:</b>	MM8037
<b>Valid from:</b>	Autumn 2013
<b>Date of approval:</b>	2013-08-23
<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 2013-08-23.

## Prerequisites and special admittance requirements

Admission to the course requires knowledge equivalent to at least 90 credits in mathematics, including the course Foundations of Analysis 7.5 credits (MM7001). English B/English 6 or equivalent.

## Course structure

Examination code	Name	Higher Education Credits
HELA	Advanced Real Analysis I	7.5

## Course content

The course covers measure theory, integration and functional analysis, integration of measurable functions (Lebesgue integrals), convergence theorems, product measure, Fubini's theorem, Banach spaces including the LP spaces and fundamental theorems on linear operators and functionals. Applications are found in Fourier analysis, ergodic theory, probability theory, Sobolev spaces and partial differential equations.

## Learning outcomes

After the course, students are expected to:

- \* be able to use concepts in measure theory
- \* be able to state and prove theorems in measure theory
- \* be able to describe Banach spaces and prove basic theorems in operator theory
- \* be able to use the above methods in applications

## Education

Instruction consists of lectures and exercises.

## Forms of examination

a. The course is examined as follows: Knowledge assessment takes the form of written assignments as well as a written and oral 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 and the assignments must be satisfactorily completed.
- e. Students who fail an ordinary examination are entitled to sit additional examinations as long as the course is offered. There is no restriction on the number of examinations. Examinations also include other obligatory elements of the course. Students who have passed an examination may not resit it in order to achieve a higher grade. Students who have failed on two occasions are entitled to request the appointment of a different examiner for the next examination. Any such request must be made to the departmental board. The course has at least two examinations for each academic year in the years in which instruction is provided. Intervening years include at least one examination.
- f. There is no facility to improve grade Fx up to a pass grade in this course.

### **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.

### **Limitations**

This course can be included in a degree alongside at most one of the courses Integration Theory 7.5 credits (MM8001) and Functional Analysis 7.5 credits (MM8009).

### **Misc**

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

### **Required reading**

Course literature is decided by the departmental board and described thereafter in an appendix to the course plan.