Department of Mathematics
(incl. Math. Statistics)

Stockholm University

Syllabus

for course at advanced level

Fourier Analysis
Fourieranalys

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	MM7044
Valid from:	Autumn 2021
Date of approval:	2021-01-11
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Mathematics/Applied Mathematics
Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This syllabus was approved by the Board of Science at Stockholm University on 11/1/2021.

Prerequisites and special admittance requirements

For admission to the course, knowledge is required equivalent to Mathematics III - Foundations of Analysis, 7.5 credits (MM5021).

Also required is knowledge equivalent to Swedish upper secondary course English B.

Course structure

Examination code	Name	Higher Education Credits
HELA	Fourier analysis	7.5

Course content

The course covers:
- Fourier series and Fourier integrals in one variable: pointwise convergence, convergence in L^2, summation of Fourier series and integrals, Parseval's and Plancherel's theorems.

- Fourier series and Fourier integrals in several dimensions: Fourier analysis in higher dimensions and on discrete abelian groups

- Fourier Analysis of analytic functions: Hardy functions on the unit disc, Paley-Wiener theorem, Hardy functions and filters.

Applications are chosen from the following topics: heat equation, string equation, isoperimetric inequality, Laplace equation on the unit disc or a half plane, Szegős theorem.

Learning outcomes

After the course the student should be able to

-- formulate central definitions and theorems within the topic of the course,
-- apply and generalize theorems and methods within the topic of the course,
-- describe, analyze and formulate basic proofs within the topic of the course.

Education
Instruction consists of lectures and exercises.

The course is offered in English.

Forms of examination
a. The course is examined as follows: Assessment takes place through written exam. For grade A and B, assessment takes place through written exam and oral exam. The examination will be conducted in English.

The examiner can decide on adapted or alternative examination formats for students with disabilities.

b. The course has no compulsory instruction.

c. Grading: The course's final grade is set according to a seven-point criterion-referenced scale:
A = Excellent
B = Very good
C = Good
D = Satisfactory
E = Adequate
Fx = Failed, some additional work is required
F = Failed, much additional work is required

d. The course's grading criteria are handed out at the start of the course.

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. There is no possibility to improve the grade Fx 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 of the course syllabus and revisions of the required reading.

Limitations
The course may not be included in a degree together with the course Fourier Analysis (MM8003).

Misc
The course is part of the Master's programme in Mathematics, but may also be taken as a separate course. The course is given in cooperation with KTH Royal Institute of Technology.

Additional recommended knowledge before starting the course is Mathematics III - Ordinary Differential Equations, 7.5 credits (MM5026) or the equivalent.

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.