UNIVERSITY OF GOTHENBURG

DEPARTMENT OF MATHEMATICAL SCIENCES

MMA120 Functional Analysis, 7.5 credits

Funktionalanalys, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2018-06-25 to be valid from 2018-06-25, autumn semester of 2018.

Field of education: Science 100%
Department: Department of Mathematical Sciences

Position in the educational system

The course Functional Analysis, 7.5 higher education credits, is one of several single subject courses included in the two-year Masters Program in Mathematical Sciences. The course is also open for eligible students outside the program. It is further one of the courses in the post-graduate program in Mathematics.

The course can be part of the following programmes: 1) Mathematical Sciences, Master's Programme (N2MAT) and 2) Complex Adaptive Systems, Master's Programme (N2CAS)

Main field of studies	*Specialization*
Mathematics	A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

General entry requirements and the equivalent of the course *MMA110* Integration Theory.

Learning outcomes

On successful completion of the course the student will be able to:

- work with general normed spaces and Banach spaces, including various examples of such spaces,
- handle Lp spaces and their duals and use Hölders and Minkowskis inequalities,
- define and apply weak and weak* convergence,
- use basic Hilbert space theory,
- describe measures in light of the Riesz representation theorem.

Course content

The basic idea of functional analysis is to apply geometric methods to functions, which are regarded as points in an infinite-dimensional function spaces.

Contents: Norms, convergence and geometric objects in vector spaces. Lp spaces and Banach spaces. The Hahn-Banach theorem and Baire's theorem with consequences. Duality, weak and weak* convergence. Alaoglu's theorem. Hilbert spaces and orthogonality. The dual space of continuous functions. The Riesz representation theorem. Basic spectral theory of bounded linear operators.

Form of teaching

Language of instruction: English

Assessment

The examination consists of assignments to be handed in, and an oral or written examination. During the course, there may be optional assignments that give bonus points on the exam. Examples of such assignments are small written tests, labs, and oral or written presentations. Information about this is found on the course home page.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Course evaluation

The course is evaluated with an anonymous questionnaire and/or a discussion with the student representatives. The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

Additional information

For a list of course literature, see:
https://www.chalmers.se/sv/institutioner/math/utbildning/grundutbildning-goteborgs-universitet/kurslitteratur/Sidor/Kurslitteratur-i-matematik.aspx