



GÖTEBORG UNIVERSITY

Faculty Board of Science

MMA120 Functional Analysis

7.5 higher education credits

Second Cycle

This syllabus is the binding document.

1. Confirmation

The syllabus was confirmed by the Department of Mathematical Sciences on June 15, 2007 to be valid from July 1, 2007. Field of education: Science. Responsible department: Mathematical Sciences.

2. 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.

3. Entrance qualifications

The prerequisite for the course Functional Analysis is the equivalent of the course MMA110 Integration Theory.

4. Course content

The basic idea is to apply geometric methods to functions and function spaces. A function is considered as a point in a vector space of infinite dimension. Norms, convergence and geometric objects like balls are introduced in these vector spaces. Typical examples are L_p spaces and also Hilbert spaces. Some important results are the Hahn-Banach theorem and Baire's theorem with consequences. Duality, weak convergence and Alaoglu's theorem are presented. Then an important part of the course is devoted to measures and the Riesz representation theorem in a locally compact Hausdorff space.

5. Learning outcomes

After completing the course, the student will be able to

- work with general normed spaces and Banach spaces, and with several examples
- handle L_p spaces and their duals and use Hölder's and Minkowski's inequalities and

interpolation

- understand and apply weak convergence
- use basic Hilbert space theory
- understand measures in the light of the Riesz representation theorem

6. Required reading

List of required reading enclosed.

7. Assessment

An examination will be given at the end of the course. A student who has failed a test twice has the right to change examiner, unless weighty arguments can be invoked. For this, the student must send a written request to the board of the department.

8. Grading scale

The grades are Fail (U), Pass (G), and High Pass (VG).

Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week after the start of the course.

Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

9. Course evaluation

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

10. Additional information

The language of instruction is English unless all involved are Swedish speakers.