



Faculty of Health, Science and Technology
Mathematics

Syllabus

Functional Analysis

Course Code:	MAAD08
Course Title:	Functional Analysis <i>Funktionalanalys</i>
Credits:	7.5
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has only first-cycle course/s as entry requirements (A1N)

Major Field of Study:
MAA (Mathematics)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2019-02-20, and is valid from the Autumn semester 2019 at Karlstad University.

Prerequisites

Mathematics 90 ECTS credits, and upper secondary level Swedish 3 or B or Swedish as a second language 3 or B, and upper secondary level English 6 or A, or equivalent

Learning Outcomes

Upon completion of the course, students should be able to:

- verify axioms and determine the completeness of metric spaces and normed spaces,
- determine boundedness and compactness of linear operators,
- determine the norms of certain types of bounded linear operators,
- apply the Arzela-Ascoli theorem on compact embeddings of Sobolev spaces,
- apply the reasonings and techniques used in proving theorems to solve a given set of problems,
- prove and apply a given sample of the central theorems covered in the course,

- demonstrate understanding by combining the use of concepts, theorems, and experiences from examples, by seeing analogies and by making generalizations.

Content

The course includes the following components:

- metric spaces,
- linear normed spaces, Banach and Hilbert spaces,
- linear functionals and the Riesz representation theorem,
- bounded linear operators,
- the main principles of Banach spaces,
- dual spaces and weak convergence,
- adjoint operators,
- compact operators,
- the Arzela-Ascoli theorem, Sobolev spaces, the Rellich-Kondrachov compactness theorem.

Reading List

See separate document.

Examination

Examination is in the form of a written exam.

The number of examination opportunities is limited to three per academic year.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Fail (U), Pass (G), or Distinction (VG) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.