



DEPARTMENT OF MATHEMATICAL SCIENCES

MMG600 Real Analysis, 7.5 credits

Reell analys, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2017-03-15 to be valid from 2017-03-15, spring semester of 2017.

Field of education: Science 100%

Department: Department of Mathematical Sciences

Position in the educational system

The course is taken during the fourth semester of the Mathematical program, but can also be taken as a freestanding course. The course is for specialised study in the main field of mathematics according to the degree requirements for bachelor's degree.

The course can be part of the following programme: 1) Bachelor's Programme in Mathematics (N1MAT)

Main field of studies

Mathematics

Specialization

G2F, First Cycle, has at least 60 credits in first-cycle course/s as entry requirements

Entry requirements

General entry requirements and knowledge equivalent to 60 credits in Mathematics, including the courses *MMG200 Mathematics 1*, *MMG300 Multivariable analysis* and *MMG400 Linear Algebra II*.

Learning outcomes

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

- define, and show good understanding of, the basic concepts of the course, especially regarding set topology, convergence and continuity in metrical spaces, and

differentiability

- demonstrate especially good knowledge of the properties of $\mathbb{R}^n$ with regard to the above concepts, as well as the supremum property and uncountability
- formulate and use the theorems in the course and be able to prove some of them
- carry out theoretical arguments and proofs using the methods and ideas in the course.

Course content

The aim of the course is to give an increased familiarity with the concepts, methods and ideas that dominate real analysis and hopefully serve as an exciting introduction to more advanced analysis. The course includes:

- The real numbers - construction with Cauchy sequences
- Cardinality - countability and uncountability
- Set topology in metrical spaces - compact and connected sets, the Heine-Borel theorem
- Sequences and Cauchy sequences in metrical spaces, completeness
- Continuity, uniform continuity in connection with compact and connected sets, and Urysohn's lemma
- Function sequences - uniform convergence, the Weierstrass approximation theorem
- The normed space of linear operators
- Differentiability
- Contractions and fixed points
- The inverse and implicit function theorems

Form of teaching

Language of instruction: Swedish

Assessment

The examination consists of a written examination at the end of the course. 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 for the current course instance is given via the course homepage.

A student who has not passed the regular examination is offered additional examinations. A student has the right to a change of examiner after failing twice on the same course, if it is practically possible. A request for change of examiner should be written and sent to the department.

Grades

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

Course evaluation

Course evaluation is done with a questionnaire and/or a meeting with student representatives.

Additional information

The course syllabus of MMG600 was originally established to apply from 01/09/2008 and was revised 09/12/2009.