



Faculty of Technology and Science
Mathematics

Syllabus

Course Approval

The syllabus was approved by the Faculty Board of Technology and Science on 20 September 2007, and is valid from the Autumn semester of 2007 at Karlstad University.

Course Code: MAGB18

Introduction to Analysis, 7.5 ECTS Credits

(Grundläggande analys, 7.5 Swedish credit points)

Degree Level: Bachelor

Progression Level: B

Language of Instruction

The language of instruction is Swedish or English.

Prerequisites

Single Variable Calculus EA2 (MAGA02) and Elementary Algebra (MAGA03)

Major Field of Study

Mathematics

Aims

Upon completion of the course the student should be able to prove and use the following theorems:

- Existence of supremum and infimum, the Nested Intervals Theorem
- Convergence of monotone sequences
- Bolzano-Weierstrass' lemma, the Cauchy criterion
- The equivalence between Cauchy's and Heine's definitions of limits of functions
- Root localization theorem, Intermediate value theorem
- The boundedness theorem, Max/min theorem
- The uniform continuity theorem
- The mean value theorem
- Taylor's theorem
- Riemann's criterion for integrability, integrability of continuous functions and monotone functions
- Fundamental theorem of calculus
- Continuity, integrability and differentiability of the limits of sequences of functions
- Weierstrass' M-test (uniform convergence test)

Course Content

Real numbers, completeness axiom. Bounded sets, supremum and infimum. Convergence of sequences and Cauchy's criterion. Limits and continuity, uniform continuity, continuous functions on intervals. Monotone functions, inverse of a function. Differentiation, mean value theorem, integration, the fundamental theorem of calculus. Numerical series, series of functions, sequences of functions and uniform convergence.

Reading List

See separate document.

Examination

Examination is in the form of a written exam. The number of examination opportunities for earning a Pass grade is limited to three per academic year.

Grades

One of the grades U (Fail), G (Pass), or VG (Distinction) or one of the grades U (Fail), 3 (Pass), 4 (Pass not without distinction), or 5 (Pass with distinction) 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 assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

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

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