SF1668 Mathematical and Numerical Analysis I 10.0 credits

Matematisk och numerisk analys I

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SF1668 valid from Autumn 2019

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Basic requirements.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course a student should be able to

- use concepts, theorems and methods to solve, and present the solution of, problems in those parts of mathematical and numerical analysis described by the main contents of the course;
- use MatLab to solve problems in those parts of numerical analysis described by the main contents of the course; and
- read and understand mathematical text;

in order to

- develop a good understanding for basic mathematical concepts in one-variable calculus and be able to use these concepts for mathematical modeling of engineering and scientific problems; and
- develop skills to illustrate central concepts with a computer, solve applied problems with MatLab and visualize and present results in a clear manner.

Course contents

Function, graph of a function. Elementary functions, the unit circle, trigonometric formulas and equations, exponential and logarithm functions, power laws, logarithm laws. Limits, standard limits, continuity. Derivative, rules of differentiation and applications: extreme value problems, graphing, inequalities. Taylor's formula with error estimation. Numerical solutions of nonlinear equations with the fixed point method and Newton's method. Linear differential equations with constant coefficients and their applications. Numerical solutions of linear differential equations using Euler's method. Riemann integral, primitive function, substitution, integration by parts, partial fractions, geometric and other applications, generalized integrals. Numerical computation of integrals with the trapezoid rule and Simpson's rule. Something about series. Problem solving by breaking down a problem into parts. The use of mathematical software to solve engineering and mathematical problems, conduct numerical experimentation and present solutions. Basic concepts and ideas in numerical methods: algorithms, computational cost, local linearization, iteration, discretization, convergence, stability.

Course literature

Announced no later than 4 weeks before the start of the course on the course web page.

Examination

- LAB2 - Lab Assignments, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Lab Assignments, 2.0 credits, grading scale: P, F

Based on recommendation from KTH’s coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The examiner decides, in consultation with KTHs Coordinator of students with disabilities (Funka), about any customized examination for students with documented, lasting disability.The examiner may allow another form of examination for re-examination of individual students.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.