SF1519 Numerical Methods and Basic Programming 9.0 credits

Numeriska metoder och grundläggande programmering

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

Establishment

Course syllabus for SF1519 valid from Autumn 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed course SF1625 Calculus in one variable.

Language of instruction

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

Intended learning outcomes

A general aim with the course is to give the student the understanding that numerical methods and programming techniques are needed to make reliable and efficient simulations of technical and scientific processes based on mathematical models.

- For a general formulation of a technical or scientific problem: be able to identify and classify the mathematical subproblems that need to be solved, and reformulate them to be suitable for numerical treatment.
- Be able to choose, apply and implement numerical methods to produce a solution to a given problem.
- Be able to use concepts in numerical analysis to describe, characterize and analyze numerical methods and estimate the reliability of numerical results.
- Be able to clearly present problem statements, solution approaches and results.
- Be able to use basic control and data structures of the programming language used in the course to solve problems.

Course contents

Basic computer concepts. Programming in a modern programming language for technical calculations (Matlab). Using graphics routines. Problem-solving through division into sub problems. Program structuring. Using mathematical software to solve engineering mathematical problems, make numerical experiments and present solutions. Basic ideas and concept within numerical methods: algorithms, computational cost, local linearisation, iteration, extrapolation, discretisation, convergence, stability. Estimation of reliability: parameter sensitivity, experimental pertubation calculation. Numerical methods for linear and non-linear systems of equations, integrals, differential equations, interpolation, the least squares method.

Course literature

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

Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LABD - Laboratory Work, 1.5 credits, grading scale: P, F
- LABC - Laboratory Work, 1.5 credits, grading scale: P, F
- LABB - Laboratory Work, 1.5 credits, grading scale: P, F
- LABA - Laboratory Work, 1.5 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.

In this course, the code of honour of the school is applied,
see: http://www.sci.kth.se/institutioner/math/avd/na/utbildning/hederskodex-for-studenter-och-larare-vid-kurser-pa-avdelningen-for-numerisk-analys-1.357185

The examiner decides, in consultation with KTHs Coordinator of students with disabilities (Funka), about any customized examination for students with documented, lasting disability.

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.