SF1543 Computer Science and Numerical Methods, Basic Course 7.5 credits

Datalogi och numeriska metoder, grundkurs

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

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

Establishment

Course syllabus for SF1543 valid from Autumn 2013

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

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 are needed to make reliable and efficient simulations of technical and scientific processes based on mathematical models.

On completion of the course, the student should be able to

- identify different mathematical problems and reformulate them in a way that is appropriate for numerical treatment
- choose appropriate numerical method for treatment of the given problem
- explain choice of method by accounting for advantages and limitations
- choose an algorithm that implies efficient calculations and implement it in a programming language, suited for calculations e.g. Matlab
- estimate the reliability of the results
- use functions from the programming language library for efficient calculations and visualisation
- apply computer science for the solution of practical problems.

Course contents

Basic ideas and concepts: algorithm, local linearisation, iteration, extrapolation, discretisation, convergence, stability, condition.

Estimation of reliability: parameter sensitivity, experimental perturbation calculation, precision.

Numerical methods for: linear systems of equations, nonlinear equations and systems of equations, interpolation, model adaptation with the least squares method, optimisation, integrals and differential equations.

Using mathematical software to solve engineering mathematical problems, make numerical experiments and present efficient algorithms.

Course literature

G Eriksson: Numeriska algoritmer med Matlab, CSC/Nada 2002.

Examination

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

· LABA - Laboratory sessions, 1.5 credits, grading scale: P, F

· LABB - Laboratory sessions, 3.0 credits, grading scale: P, F

· TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

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

Other requirements for final grade

An examination (TEN1; 3 credits)
Laboratory assignments (LABA; 1.5 credits)
Individual programming assignment (LABB; 3 credits)

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.