SF1518 Numerical Methods and Basic Programming 9.0 credits

Numeriska metoder och grundläggande programmering

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 SF1518 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 and programming techniques 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 form 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
- present the results on a relevant and illustrative way
- estimate the reliability of the results
- break down larger problem in manageable parts and write functions for these in the programming language
- use control and data structures
- handle files in different ways, both for input and output
- use functions from the library of the programming language (e g Matlab's library) for calculation, visualisation and efficient programming
- write well-structured programs in the programming language.

Course contents

Basic computer concepts. Programming in a modern programming language for technical calculations (Matlab). Using graphical 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 concepts 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

- LABA - Laboratory Works, 1.5 credits, grading scale: P, F
- LABB - Laboratory Works, 1.5 credits, grading scale: P, F

- LABC - Laboratory Works, 1.5 credits, grading scale: P, F
- LABD - Laboratory Works, 1.5 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.

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), (LABB; 1.5 credits), (LABC; 1.5 credits), (LABD; 1.5 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.