DN1212 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 DN1212 valid from Autumn 2009

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

An overlying goal of the course is the realisation of the necessity of numerical methods and programming techniques in order to simulate technological and scientific processes.

After completing this course, the students should be able to

- identify various mathematical problems and reformulate these in a way suitable for numerical treatment
- select a suitable numerical method for the treatment of the given problem
- motivate the choice of a method by describing its advantages and limitations
- select an algorithm leading to efficient computation, and implement this in a suitable programming language, e.g. Matlab
- present the results in a relevant and illustrative way
- provide an estimate of the accuracy of the results
- break down larger problems into subproblems, and write user functions for these
- utilize control- and datastructures
- handle files in various formats, both for input and output
- utilize standard functions from Matlab's library, for calculation, visualization and efficient programming
- write well-structured programs in the programming language.

Course contents

Fundamental computer concepts. Programming in a modern programming language for scientific computations (Matlab). Use of a graphic library. Problem solving by subdivision of the problem. Program structuring. Use of mathematics software for solving technical-mathematical problems, doing numerical experiments and presenting solutions. Basic concepts and ideas in numerical analysis: algorithms, computational cost, local linearization, iteration, extrapolation, discretization, convergence, stability. Reliability assessment: parameter sensitivity, experimental perturburations. Numerical methods for linear and nonlinear systems of equations, integrals, differential equations, interpolation. Model fitting with the method of least squares.

Course literature

To be announced at least 4 weeks before course start at course home page. Probably we will use P. Pohl: Grunderna i numeriska metoder, Teknisk Högskolelitt. S. Chapman: Matlab programming for engineers, Brooks/Cole, Thomson Learning. Material produced at the department.

Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB4 - Laboratory Works, 1.5 credits, grading scale: P, F
- LAB3 - Laboratory Works, 1.5 credits, grading scale: P, F
- LAB2 - Laboratory Works, 1.5 credits, grading scale: P, F
- LAB1 - Laboratory Works, 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 all the regulations of the code of honor at the School of Computer science and Communication apply, see: http://www.kth.se/csc/student/hederskodex/1.17237?l=en_UK.

Other requirements for final grade

Examination (TENl; 3 university credits).
Laboratory work (LAB1; 1.5 university credits), (LAB2; 1,5 university credits), (LAB3; 1,5 university credits), (LAB4; 1,5 university 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.