DN1214 Numerical Methods, Basic Course 6.0 credits

Numeriska metoder, grundkurs

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

Establishment

Course syllabus for DN1214 valid from Autumn 2008

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 with the course is the realization of the necessity of numerical methods in order to simulate technological and scientific processes based on mathematical models.

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 programming language, suitable for scientific computing, e.g. Matlab
- present the results in a relevant and illustrative way
- provide an estimate of the accuracy of the results
- utilize standard functions from e.g. Matlab's library for calculation, visualization and efficient programming

Course contents

Fundamental ideas and concepts: algorithm, computational cost, local linearization, iteration, recursion, interpolation, extrapolation, discretization, convergence, stability, condition.

Reliability: parameter sensitivity, perturbation analysis.

Numerical methods: linear and non-linear systems of equations, differential equations, initial-value and boundary-value problems, curve fitting: interpolation and the method of least squares.

Course literature

To be announced at least 2 weeks before the course starts at the web page for the course . Probably P. Pohl: Grunderna i numeriska metoder, Teknisk Högskolelitt.

Examination

- LAB2 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - 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.

Other requirements for final grade

A written examination (TEN1; 3 university credits)
Computer assignments (LABA; 1,5 university credits)
Computer assignments (LABB; 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.