DN1240 Numerical Methods, Basic Course II 6.0 credits

Numeriska metoder, grundkurs II

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 DN1240 valid from Autumn 2009

Grading scale

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

Education cycle

First cycle

Main field of study

Mathematics,Technology

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

Basic concepts and ideas: algorithm, local linearization, iteration, extrapolation, discretization, convergence, stability, condition.

Reliability assessment: parameter sensitivity, experimental perturbations, precision.

Numerical methods for: linear systems of equations, nonlinear equations and systems of equations, interpolation, model-fitting with the method of least squares, optimization, quadrature, differential equations.

The application of mathematical software in the solution of scientific and engineering problems, numerical experimentation, and the presentation of final results.

The course contents and teaching may vary somewhat between the programs; more detailed information will be given at http://www.nada.kth.se/kurser/kth/2D1240.

Specific prerequisites

For single course students: completed upper secondary education including documented proficiency in Swedish corresponding to Swedish B, English corresponding to English A. Furthermore: 15 hp in mathematics and 6 hp in computer science or programming technics.

Course literature

To be announced at least 4 weeks before course start at course web page. In 08/09: M.T. Heath: Scientific Computing, an introductory survey, McGraw Hill and material produced at the department.

Examination

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

A written examination (TENl; 3 university credits.).
Computer assignments (LABA; 1,5 university credits.).
Computer assignments with oral and written presentation (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.