Course syllabus

Numerisk analys
Numerical Analysis

FMN011, 6 credits, G2 (First Cycle)

Valid for: 2016/17
Decided by: Education Board B
Date of Decision: 2016-03-29

General Information

Main field: Technology.
Compulsory for: D3
Elective for: C4
Language of instruction: The course will be given in English on demand

Aim

The aim of the course is to teach basic computational methods for solving simple and common mathematical problems using computers and numerical software. This includes the construction, application and analysis of basic computational algorithms. Problem solving with computers is a central part of the course.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

• be able to construct computable approximations of mathematical models which are common in science and engineering.
• be familiar with numerical algorithms to handle the above approximations.
• be able to independently implement and apply such algorithms, using mathematical software, e.g. Octave or Matlab.

Competences and skills
For a passing grade the student must

• be able to independently select and apply computational algorithms and implement them on a computer.
• be able to evaluate both accuracy and relevance of numerical results.
• report solutions to problems and numerical results in written form.

Judgement and approach
For a passing grade the student must

• write a logically well structured report in suitable terminology on the construction of basic mathematical models and algorithms.
• write an well structured report in suitable terminology on the numerical solution of a mathematical problem.

Contents
Error analysis, numerical methods for systems of (non-) linear equations, the least squares method, polynomial interpolation, splines, Bezier curves, numerical integration, computation of eigenvalues. Discrete Fourier transforms, discrete cosine transforms.

Examination details
Grading scale: TH
Assessment: The grade is based on homework reports and a written exam.

Admission
Required prior knowledge: FMA420 Linear Algebra, FMAA01/05 Calculus in One Variable, FMA430 Calculus in Several Variables, and experience with MATLAB.
The number of participants is limited to: No
The course overlaps following course/s: FMN041, FMN050, FMN081, FMNF01

Reading list

Contact and other information
Course coordinator: Anders Holst, Studierektor@math.lth.se
Course coordinator: Carmen Arevalo, carmen@maths.lth.se
Course homepage: http://www.maths.lth.se/na/courses/FMN011