



LUND
UNIVERSITY

Faculty of Science

NUMA12, Numerical Analysis: Numerical Approximation, 7.5 credits

Numerisk analys: Numerisk approximation, 7,5 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2007-04-12 to be valid from 2007-07-01, autumn semester 2007.

General Information

The course is a compulsory course for first-cycle studies for a Bachelor of Science in mathematics.

Language of instruction: Swedish and English

Main field of studies

Mathematics

Depth of study relative to the degree requirements

G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students on completion of the course should have acquired the following knowledge and skills:

Knowledge and understanding

Mathematical models are most often described through systems of linear or non-linear equations. The student should be able to design computable approximations. Further the student should independently be able to implement and use these algorithms.

Skills and abilities

Student should independently be able to choose, implement and use computational algorithms on a computer and should be able to assess the relevance and precision of the results.

Judgement and approach

The student should during the course

- present solutions to problems and numerical results in written form.
- with adequate terminology, in a logical and well-structured manner, account for the design of basic numerical methods and algorithms.
- with adequate terminology, in an algorithmic and well-structured manner, account for numerical solutions of a problem in mathematical form.

Course content

The course consists of one subpart of 7.5 credits.

Systems of linear equations. The least squares method, orthogonal systems, L2-approximation. (Newton) iteration and order of convergence. Interpolation and quadrature. Discretization of boundary value problems for ordinary differential equations. The basic idea of the finite element method, the connection to L2-approximation and error estimates.

Course design

The teaching consists of lectures and computer exercises. Participation in computer exercises and other teaching associated with them is compulsory.

Assessment

Examination takes the form of written laboratory reports during the course and a written exam at the end of the course. For students who do not pass the regular exam, an additional exam is offered shortly afterwards.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

To pass the entire course, approved examination and computer exercises passed the same year as the course is given are required.

The final grade is based on the joint results of the computer exercises and of the examination.

Entry requirements

For admission to the course, general entry requirements and knowledge equivalent to the courses MATB15 Multivariable Analysis, 7.5 credits, and NUMA21 (alt NUM131) Tools of Computational Mathematics, 7.5 credits, are required.

Further information

The course may not be included in a higher education qualification together with NUM121 Numerical analysis: Numerics 1, 5p.

Subcourses in NUMA12, Numerical Analysis: Numerical Approximation

Applies from V08

0701 Numerical Approximation, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction