



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Numerisk analys

Numerical Analysis

FMNF10, 6 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED F/Pi

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Compulsory for: E3

Elective Compulsory for: I3

Elective for: BME4, M4, N4, R4

Language of instruction: The course will be given in English

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 using computers forms a central part of the course.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to choose suitable computational methods to solve simple problems that occur in mathematical models in, e.g., electronics
- be able to construct computable approximations
- be able to independently implement and apply these algorithms.

Competences and skills

For a passing grade the student must

- be able to independently select and apply computational algorithms using a computer, and be able to evaluate both accuracy and relevance of the numerical results.

- report solutions to problems and numerical results in written form.
- write a logically well structured report in suitable terminology on the construction of basic mathematical methods and algorithms.
- write a well structured report in suitable terminology on the numerical solution of a mathematical problem.

Contents

Software for scientific computing, error analysis, computer arithmetic, condition number, systems of linear equations, the method of least squares, calculation of eigenvalues, solution of nonlinear equations using fixed point or Newton iterations, interpolation, ordinary differential equations, basic signal processing using FFT.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: Linear Algebra, Calculus in One Variable, Calculus in Several Variables, and experience of programming in MATLAB or Python/NumPy.

The number of participants is limited to: No

The course overlaps following course/s: FMNF05, FMN050, FMN011, FMN041, FMN081, FMN130, FMNF01, FMNN10

Reading list

- Sauer, T: Numerical Analysis, Second Edition. Pearson Education, 2013, ISBN: 9781292023588. Other printings of the second edition, with different ISBN-numbers, may also be used.

Contact and other information

Director of studies: Studierektor Anders Holst, Studierektor@math.lth.se

Course administrator: Studerandexpeditionen, expedition@math.lth.se

Teacher: Eskil Hansen, eskil.hansen@math.lth.se

Course homepage: <https://canvas.education.lu.se/courses/20368>