



Course syllabus

Numerisk analys Numerical Analysis

FMNF05, 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: D3

Elective for: C4

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 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 able to describe 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.
- write a logically well structured report, using suitable terminology, on the construction of basic mathematical models and algorithms.
- write an well structured report, using 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, the Discrete Fourier transform.

Examination details

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

Assessment: The final grade is based on a written examination and possibly on optional assignments. In case there are optional assignments that may influence the grade, information about this will be given at the start of the course. Any merit points on optional assignments are only valid till the end of the academic year, i.e. for the scheduled exam and the two following re-sit opportunities. Students who do not hand in solutions to the assignments may still obtain the highest grade provided they do well enough at the examination.

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: FMAB20 Linear Algebra, FMAB65 Calculus in One Variable B1, FMAB70 Calculus in One Variable B2, FMAB30 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: FMN041, FMN050, FMN081, FMNF01, FMN011, FMNF10, FMNF15

Reading list

- Sauer, T: Numerical Analysis, 2nd edition. Pearson Education, 2013, ISBN: 9781292023588. Other printings of the second edition, with different ISBN-numbers, may also be used.

Contact and other information

Course coordinator: Anders Holst, Studierektor@math.lth.se

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

Teacher: Andreas Langer, Andreas.Langer@math.lth.se

Course homepage: <https://canvas.education.lu.se/courses/20366>

Further information: During the course there are some optional assignments. Students who hand in solutions will receive feedback.