LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Numerisk linjär algebra
Numerical Linear Algebra

FMNN01, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED F/Pi
Date of Decision: 2023-04-18

General Information

Elective for: BME4, F4, F4-bs, F4-bg, Pi4-bs, Pi4-bam, MMSR2
Language of instruction: The course will be given in English

Aim

The course provides theoretical understanding of some very useful algorithms. The course also provides hands-on experience of implementing these algorithms as computer code and of using them to solve applied problems. Upon completion of the course the student shall have substantially better and more useful knowledge of numerical linear algebra than students who only have completed a regular basic course in scientific computing. The course should also stimulate continued independent study.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- have demonstrated substantially better and more useful knowledge of numerical linear algebra than students who only have completed a regular basic course in scientific computing or linear algebra.

Competences and skills
For a passing grade the student must

- be able to implement algorithms for numerical linear algebra algorithms as computer code and to use them to solve applied problems.

Judgement and approach

For a passing grade the student must

- write logically well-structured reports, in adequate terminology, on weekly homework dealing with the construction and application of advanced algorithms in linear algebra.

Contents

The course is a follow-up to the basic course Linear Algebra. We teach how to solve practical problems using modern numerical methods and computers. Central concepts are convergence, stability, and complexity (how accurate the answer will be and how rapidly it is computed). Tools include matrix factorization and orthogonalization. The algorithms covered can, among other things, be used to solve such very large systems of linear equations as arise when discretizing partial differential equations, and to compute eigenvalues.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Oral 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: Basic course in numerical analysis and FMAF10 Applied Mathematics - Linear Systems. Experience of programming in Matlab or Python/NumPy.
The number of participants is limited to: No
The course overlaps following course/s: NUMA11, NUMB11

Reading list

- Trefethen, L.N. & Bau, D.: Numerical Linear Algebra. SIAM, 1997, ISBN: 978-0898713619.

Contact and other information

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