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

- have obtained hands-on experience of implementing linear algebra algorithms as computer code and of using 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). Other 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: Graded weekly homework. Oral exam on these at the end of the course.

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

Required prior knowledge: Basic course in numerical analysis, FMAF05 Mathematics - Systems and Transforms. Experience of Matlab-programming.
The number of participants is limited to: No

Reading list


Contact and other information

Director of studies: Studierektor Anders Holst, Studierektor@math.lth.se
Course coordinator: Claus Führer, claus@maths.lth.se
Course administrator: Patricia Felix Poma de Kos, patricia.felix_poma_de_kos@math.lth.se
Course homepage: http://www.maths.lth.se/na/courses/FMNN01