



# FSF3584 Preconditioning for Linear Systems 7.5 credits

## Förkonditionering för linjära ekvationssystem

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for FSF3584 valid from Spring 2019

## Grading scale

G

## Education cycle

Third cycle

## Specific prerequisites

This course is designed for PhD students in applied and computational mathematics, but it is suitable also for other PhD students with a background in computation with mathematical interests. The students are expected to have taken a basic and a continuation course in numerical analysis or acquired equivalent knowledge in a different way, and preferably also a course in matrix computations or numerical linear algebra, e.g., SF3580 and/or SF2524.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

A student which has passed this course should know

- which iterative methods are available for linear systems, and integration of preconditioning.
- how to apply and adapt convergence theory for the iterative methods.
- apply general preconditioners based on, diagonal, LU-factorization.
- apply problem specific preconditioners, such as domain decomposition, Schur-complement and adapted for partial differential equations such as Helmholtz problem.
- characterize the quality of a preconditioner experimentally and theoretically.

## Course contents

1. Iterative methods (Krylov methods, Gauss-Seidel methods)
2. Convergence theory (eigenvalues, pseudospectra, right-hand side dependence)
3. General preconditioners
4. Problem specific preconditioners

## Disposition

Lectures, seminar, problem solving, problem composition.

## Course literature

It will be announced on the course web page 3 weeks before course starts

## Examination

- INL1 - Assignment, 7.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

## Other requirements for final grade

Problems solved, posed, seminar presented and homeworks solved.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.