



# FSF3572 Approximation Theory

## 7.5 credits

### Approximationsteori

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 FSF3572 valid from Autumn 2018

### Grading scale

P, F

### Education cycle

Third cycle

### Specific prerequisites

A Master degree including at least 30 university credits (hp) in Mathematics (including differential equations and numerical analysis).

### Language of instruction

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

### Intended learning outcomes

After completing this graduate course the students will be able to understand and use basic methods and theory for numerical function approximation. In particular, the student should

- be able to use and analyze the basic methods for polynomial approximations (interpolation, least squares, piecewise approximations, Hermite interpolation)
- understand and use the theory of convergence (Weierstrass) and best approximations for continuous functions as well as error estimates for smooth functions
- understand and use the theory of stability and conditioning for polynomial approximation methods, including its relation to interpolation points via Lebesgue constants
- understand and use the theory of orthogonal polynomials and Gauss quadrature methods
- have a good understanding of a couple of current topics in approximation theory, with a deeper knowledge of at least one of them.

## Course contents

The first part of the course mainly considers polynomial approximations and discusses issues related to convergence, accuracy, stability and complexity. The second part introduces various current topics in the field, such as wavelets, radial basis functions, sparse grid approximations and sparse L1 approximations.

## Course literature

To be announced at least 4 weeks before course start at course home page.

## Examination

- INL1 - Assignments, 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.

Homework problems and a project.

## Other requirements for final grade

Homework assignments and a final project should be completed to pass the course.

## 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.