# FEL3370 Mathematical Methods in Signals, Systems and Control 8.0 credits

**Mathematical Methods in Signals, Systems and Control**

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

## Establishment

## Grading scale

G

## Education cycle

Third cycle

## Specific prerequisites

The course is open to all graduate students. (no prerequisite courses)

## Language of instruction

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

## Intended learning outcomes

After completing this course, the student will be able to follow the derivations and subtleties of a number of results available in publicaitons in Electrical Engineering, and to eventually contribute to the underlying theories of this field.

## Course contents

Introduction: Inner product spaces; Normed spaces; Hilbert and Banach spaces; Orthogonal expansions; Least squares estimation; Dual spaces; Contraction mappings/ Banach fixed point theorem; Linear operators and adjoints; Optimization of functionals; Application to H infinity control theory.

## Disposition

- Lectures
- Homework exercises
- Final project (presentation on selected topics by the participants)

## Course literature

N.Young. **An Introduction to Hilbert Space**. Cambridge University Press 1988

Some excellent complements are:

E.Kreyszig. **Introductory Functional Analysis with Applications**. Wiley 1989

D.G. Luenberger. **Optimization by Vector Space Methods**. Wiley 1969

## Examination

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.

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

## Other requirements for final grade

80% on weekly homework exercises and 20% project (analysis of a reserach paper, preferably related to the student´s own research, and a 15 minutes presentation of the main ideas/ results of such paper)

## 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.