



FAG5131 Inertial Navigation and Kalman Filtering 7.5 credits

Tröghetsnavigering och Kalman filtrering

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 FAG5131 valid from Spring 2015

Grading scale

Education cycle

Third cycle

Specific prerequisites

FAG5129 Theory of Errors

FAG5130 Satellite Based Positioning

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, students should be able to

- apply Kalman filtering and smoothing for solving navigation and surveying problems using GNSS and inertial sensors
- assess error sources for inertial navigation
- compute navigation solution (position, velocity and orientation) based on data from inertial sensors and GNSS positions
- identify limitations of INS
- analyze and evaluate the precision of position, velocity and orientation determined by integrated navigation systems (INS + GNSS + other sensors)

Course contents

- random processes: random constant, random walk, white noise, Gauss-Markov process
- Kalman filtering and smoothing
- inertial sensors (accelerometers and gyroscopes), principles and error sources
- mechanisation and navigation equations for inertial navigation
- INS initialisation and alignment
- INS error dynamics
- Integration of INS with GNSS and other sensors

Course literature

Jekeli, Ch. (2001); Inertial Navigation Systems with Geodetic Applications. Walter de Gruyter, Berlin, New York.

R. G. Brown and P. Y. C. Hwang, "Introduction to Random Signals and Applied Kalman Filtering", Wiley, 1992

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.

Written report

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.