



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Projekt i system, reglering och maskininlärning

Project in Systems, Control and Learning

FRTN70, 7,5 credits, A (Second Cycle)

Valid for: 2021/22

Faculty: Faculty of Engineering, LTH

Decided by: PLED F/Pi

Date of Decision: 2021-04-23

General Information

Main field: Machine Learning, Systems and Control.

Elective Compulsory for: MMSR1

Elective for: C4, D4, E4, F4, Pi4

Language of instruction: The course will be given in English

Aim

The aim of the course is to establish and develop the student's knowledge of automatic control or machine learning in the form of a practical project. The project contains several of the typical phases in an engineering project: modelling, identification or learning, analysis, synthesis, and computer implementation.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- have improved his/her basic knowledge and skills of control and/or machine learning.
- have developed new knowledge and skills within the area of the project.

Competences and skills

For a passing grade the student must

- be able to perform several of the phases in a typical engineering project: modelling, identification or learning, analysis, synthesis, computer implementation, documentation and presentation.

- present the results in both written and oral form.
- give feedback on other students' work.
- show the ability for teamwork and collaboration in project form.

Contents

Modelling is often an important and time consuming part of an industrial project. It is also important to describe the fundamental limitations given by the dynamics in sensors and actuators and by measurement noise and actuator limitations, or by limitations in the training data. The course projects are typically performed on real model processes available at the department. In some cases the experiments are done at another department or in industry. The design is first developed for a mathematical model. Software tools are used during the modelling, design, and simulation, and during the implementation. Some examples of model processes that may be used in the projects are inverted pendulums, model helicopters, quadruple tank processes, and industrial robots.

Project meetings are held regularly during the course. In the project the students must search for knowledge and information independently. In some cases regular seminars or guest lecturers are included in the course. The projects results and experiences are reported both in written and oral form.

Examination details

Grading scale: UG - (U,G) - (Fail, Pass)

Assessment: Accepted project, completed within the stipulated deadlines.

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

Admission requirements:

- EDAN95 Applied Machine Learning or EXTQ40 Introduction to Artificial Neural Networks and Deep Learning or FMAN45 Machine Learning or FRTN50 Optimization for Learning or FRTN65 Modelling and Learning from Data or FRTN75 Learning-Based Control
- FRTF05 Automatic Control, Basic Course or FRTF25 Introduction to Machine Learning, Systems and Control

The number of participants is limited to: 30

Selection: Completed university credits within the program. Priority is given to students enrolled on programmes that include the course in their curriculum. Among these students priority is given to those in the master's programme in Machine Learning, Systems and Control, for whom the course is compulsory.

Reading list

- Åström, KJ: Reglerteori, Almqvist & Wiksell 1976 or Glad, T, Ljung, L: Reglerteknik - grundläggande teori, Studentlitteratur, 1989.
- Material provided by the department.

Contact and other information

Course coordinator: Kristian Soltesz, kristian.soltesz@control.lth.se

Director of studies: Anton Cervin, anton.cervin@control.lth.se

Course homepage: <http://www.control.lth.se/course/FRTN70>

Further information: A student who has been offered a seat in the course must confirm his/her participation within a week, or else the seat will be offered to the next student according to the selection criteria.