Infra Informatics - Optimization Methods, 2.0 credits

Infrainformatik - Optimeringsmetoder, 2.0 hp

Third-cycle education course

6FITN65

Department of Science and Technology

Valid from: First half-year 2024

Approved by
The Board of PhD Studies

Approved
2025-03-26

Registration number

Entry requirements

Admitted as a doctoral student.

Specific information

The course aims to

- give an overview of a variety of optimization methods, their history and applicability,
- discuss methodology, tools, and practices for applied optimization research,
- present optimization-based research projects within Infra Informatics

Learning outcomes

After completing the course, participants should be able to:

- describe and categorize various optimization methods,
- describe and discuss the suitability, possibilities, and limitations of different optimization methods in relation to certain problem settings,
- identify, select, and plan the necessary steps for conducting a successful optimization-based research project,

describe and suggest optimization-based research within Infra Informatics.

Contents

The following topics will be covered (in varying depth):

- Optimization methodology
- Mathematical programming, historic development, theoretical base, model types and approaches
- Optimal control, dynamic programming, non-linear modelling approaches
- Heuristics, search, constraint programming
- Algorithms, data science, complexity
- Logic, satisfiability, proving, machine learning
- Tools, solvers, modelling, and programming languages

Educational methods

The course is given during VT2 each year. The schedule consists of

- A half-day startup meeting, presenting the common framework for the whole course and first lectures on the course topics.
- Two full day seminar days, with lectures on the course topics and presentations by senior researchers at KTS about projects where optimization has been applied.
- An individual homework assignment.
- A half-day final meeting, with student presentations and discussions.

Examination

Responsible for the Optimization Methods course is Tomas Lidén.
The examination for the Optimization Methods course consists of:

- Mandatory participation in the four seminar occasions
- Conducting, documenting, and presenting an individual assignment

Examiner for the course is Mats Janné.

Grading

Two-grade scale

General information

The course is mandatory for all doctoral students in Infra Informatics. It is also open to doctoral students in other fields.

To register for the course, contact the course coordinator and Mats Janné.