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.