Engineering Design Optimization, 7.5 credits

Engineering Design Optimization, 7.5 hp

Third-cycle education course

6FIEI38

Department of Management and Engineering

Valid from: Second half-year 2023

Approved by
Head of Department

Approved
2021-06-03

Revised by
Head of Department

Revised
2023-11-13

Registration number
IEI-2023-00593

Specific information

Please note that this is a translation of the official syllabus in Swedish. In the event of any differences, the Swedish document takes precedence.

Learning outcomes

The participant should after the course:

- Be able to formulate design problems as optimization problems.
- Be able to handle optimization problems with several conflicting objectives
- Understand the function and explain the difference between different optimization methods, e.g. Gradient Based search, the Complex method and Genetic Algorithms
- Use optimization methods to solve real life engineering problems
- Use optimization methods together with different types of simulation models

Contents

- Engineering Design and Optimization- How can optimization support the design process?
- Optimization methods – from traditional gradient based methods to non-gradient methods such as the Complex method, Genetic Algorithms and Particle Swarm Optimization.
- Multi-objective optimization – How to handle problems with several conflicting objectives.
- Handling of constraints via penalty functions.
- Surrogate Models – How to use Design of Experiments and Surrogate Models to reduce the optimization time.
- Post optimal analysis – How to choose a solution from a large pool of optimal solutions
- Application examples where modeling, simulation and optimization are used to solve real world industrial problems.

Educational methods

The course consists of lectures and computer exercises during three workshops in Linköping, as well as individual project work. The scheduled time is approximately 40 hours.

Examination

Presenting an optimization project with an application of your choice, including an oral presentation and a written report.

Grading

Two-grade scale

Course literature

A list of recommended literature will be provided by the course coordinator at the start of the course.

General information

The course takes into account equal conditions and aims to make use of the resources that students with different backgrounds, life situations and skills add to the education
Bibliography and schedule are determined in a different order
Course evaluation must be done by the course coordinator after each course opportunity. The results of the course evaluation must be communicated to the participants and the postgraduate education council at IEI.