Content

The course will cover the following topics:

**The classical problem of the calculus of variations**

- Pontryagin's maximum principle
- Necessary conditions of optimality (NCO)
- Dynamic programming and the Hamilton-Jacobi-Bellman equation
- Closed-loop form solution for LQ optimal control problems

**Solution methods**

- Analytical solution approach (type and sequence of arcs in optimal solutions)
- Indirect solution techniques
- Discretization approaches (control vector parameterization, orthogonal collocation)

**Optimization in the presence of uncertainty**

- Robust optimization
- Incorporation of measurements in the optimization framework
- Model predictive control and repeated optimization
- Measurement-based optimization via NCO tracking
- Applications from the domain of parameter estimation, dynamic processes, etc.

**Assessment methods**

Oral exam, written exam and project report.