

M11 – STOCKHOLM
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*Control and Optimization
of Autonomous Power Systems*



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Abstract of the course

The electric power system is currently undergoing a period of unprecedented changes. Centralized bulk generation based on fossil fuel and interfaced with synchronous machines is substituted by distributed generation based on renewables and interfaced with power converters. Accordingly, the entire operation of power systems is undergoing several major paradigm shifts spanning decentralized device-level control, distributed coordination of energy sources, and real-time system-level optimization. In this course, we give a tutorial introduction to new and emerging thrusts in analysis, control, and optimization of future, smart, and cyber-enabled power systems. The solutions that we present tap into some recent methodological advances in control and optimization, with a focus on scalable and distributed solutions, multi-agent decision problems, feedback control for real-time optimization, (almost) model-free design,

Topics:

- Power system modeling, dynamics, & stability analysis
- Decentralized control of power converters & synchronous generators
- Real-time control of distribution networks and microgrids
- Feedback strategies for power balancing and frequency regulation
- Autonomous power system operation for congestion relief