

EECS 598 Special Topic – Fall 2019

Power System Markets and Optimization

Mondays and Wednesdays, 9:00-10:30am



Image from: https://commons.wikimedia.org/wiki/File:Wind_Turbines_and_Power_Lines,_East_Sussex,_England_-_April_2009.jpg

This course covers the fundamentals of electric power system markets and the optimization methods required to solve planning and operational problems including economic dispatch, optimal power flow, and unit commitment. The course will highlight recent advances including convex relaxations of the optimal power flow problem, and formulations/solutions to stochastic dispatch problems. Problems will be placed in the context of actual electricity markets, and new issues, such as incorporation of renewable resources and demand response into markets, will be covered. All students will conduct an individual research project.

Topics:

- Basic principles of electricity markets, price elasticity, market power
- Types of markets: capacity, energy, ancillary services, financial transmission rights, bilateral trading
- Economic dispatch, locational marginal prices, co-optimization of energy and ancillary services
- Optimal power flow, solution methods, convex relaxations
- Unit commitment, mixed integer programming
- Comparison of actual markets
- Robust and stochastic optimal power flow/unit commitment
- Incorporating renewable resources and demand response into markets
- Optimal infrastructure planning

Prerequisites: EECS 463 (or Permission of Instructor)

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