

ECE 592-074

Data Analytics for Power Engineering

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Objective or Description: This course is designed to introduce analytical techniques used in the electric utility industry. The course will help students understand the applications of descriptive, predictive and prescriptive techniques on the volumes of data available from advanced measurement devices and other sources to support the operations of the utility industry. The students are expected to have a basic understanding of power system analysis principles. The course covers predicting electric customer consumption behavior, analytics in system modeling and simulation, trends in operations and planning optimization, and analytics in reliability and maintenance planning.

Prerequisites: ECE 451: Power System Analysis or ECE 550: Power System Operation and Control.

Textbook: None.

Topics: In the first half of the course, we focus on data analytics: introduction to analytics; introduction to SAS; basics of statistical learning; load forecasting; customer analytics techniques; techniques for parameter estimation, event detection, and fault location. In the second half of the course, we focus on optimization: review of optimization techniques; analytics in reliability and maintenance planning; generation capacity planning; transmission and distribution operations and planning. In the end of the course, we discuss some case studies: trading of financial transmission rights; data analytics of virtual bidding.

Grading: Class participation: 10%; assignments (about 5): 20%; first take-home exam 1: 20%; second take-home exam: 20%; term project: 30%. SAS and OpenDSS are the main computational tools for homework, exams and projects.

Cross-listing in other departments: None.