ECE 8803: Electricity Markets/Power System Economics

Spring 2015, Prof. Santiago Grijalva

Description: This course provides a comprehensive introduction to electricity markets and power system economics, including economic theory, market design, market models, and policy. The combined behavior of the physical system including the grid and the market is modeled in detail and simulated through software. Market interactions are simulated through auction and trading exercises. Emphasis is given to current trends: renewable energy integration, smart grid, consumer empowerment, and business models as drivers for emerging market architecture.

Pre-requisites: ECE4320 or ECON 3110 (microeconomics) or Utility Industry Experience.

Time and Place: MWF: 2-3, Location: Instructional Center 215
Instructor: Prof. Santiago Grijalva
e-mail: sgrijalva@ece.gatech.edu
Office Hours: Wednesday, 3 pm, Van Leer 284
Grading Policy: Homework (25%), Midterm (25%), Final (25%), Project: (25%)

Topics:
1. Electricity Industry Trends and Challenges for Markets
2. Review of Economic Theory and Electricity Supply and Demand
3. Markets and Risk Management
4. Electricity Market Architecture
5. Producer Participation: Strategy, Self-Scheduling
6. Introduction to Utility Regulation
7. Demand Response
8. Reserves Markets and Other Ancillary Services
9. Optimization Methods
10. Modeling the Grid
11. Sensitivities and Security
12. Software Simulation of the Grid
13. Methods of Economic Dispatch and Optimal Power Flow
14. Marginal Pricing Theory
15. Security Constrained Optimal Power Flow
16. Unit Commitment
17. Co-optimization of Energy and Reserves
18. Congestion Management
19. Emissions Dispatch and Carbon Trading
20. Investment and Asset Management
21. Oligopoly and Market Power Monitoring
22. Market Management Systems
23. Competition in Retail
24. Distribution System Operators
25. New Industry Business Models

Text: Instructor will provide full set of lecture notes

Supplemental References