ECE 588: Electricity Resource Planning  
CRN 39252

Fall 2016  
Professor G. Gross

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244-6346

Time:  8:00 a.m. – 9:20 a.m.  Tuesdays and Thursdays
Room:  4026 ECE Building
Prerequisite:  Math 415, ECE 313 and ECE 476 or consent of instructor
Co-requisite:  ECE 530
Text Books:  none; notes prepared by the instructor; current papers in the literature
Office Hours:  11:00 a.m. – 12:00 p.m.  Tuesdays, Thursdays, 4052 ECE Building

Course Syllabus

1. Overview of resource planning: basic principles and processes; relationship with other planning and operations functions; effects of uncertainty.
2. Reliability evaluation: basic models of loads and resources; continuous transition Markov process and discrete state characterization; reliability indices and criteria; effective capacity; computational schemes.
3. Reliability worth: basic economic considerations; the value of service concept; customer surveys; computations
4. Multi-area reliability: model for the interconnection system; maximum flow principles; state space decomposition; Monte Carlo simulation.
5. Production costing: models of loads and resources for probabilistic simulation; multi-state and multi-block units; energy limited plants; storage plants; time-dependent units; expected emission calculations; computational procedures.
6. Marginal costing: basic concepts of short-run marginal energy and marginal capacity costs and schemes for their evaluation.
7. Supply-side planning: optimal resource mix determination; optimal capacity expansion; mathematical programming framework; long-run marginal costs; sensitivity analysis.
8. Demand-response resources: the role of loads in electricity markets and the impacts on planning: the notion of price-responsive load and demand elasticity; demand response resources; characteristics of demand-side programs; economic considerations; assessment of impacts.
9. Integrated planning: framework for consistent assessment of supply and demand-side resources; incorporation of uncertainty; least cost planning; internalization of environmental externalities; mathematical programming formulation.
10. Impacts of competitive environment on planning decisions: the risk issues, the effects of various financial and spot markets; assessment of the worth of assets; application of financial tools in planning.

Papers of interest will be reviewed and discussed. Students will form teams to undertake the study and preparation of a presentation on a topic selected from the course outline. Grading is based on the homework assignments, the midterm exam, the presentation and the final exam.

Final exam is scheduled for 1:30-4:30 p.m. on Friday, December 16, 2016 in Room 4026 ECEB.