ECE 588: Electricity Resource Planning
CRN 39252

Fall 2018
Professor G. Gross

4052 ECE Building **gross@illinois.edu** **217 244-6346**

Time: 8:00 a.m. – 9:20 a.m. Tuesdays and Thursdays

Room: 2013 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 related to the course outline. Homework assignments are not corrected but solutions are posted. Grading is based on the midterm exam, the presentation and the Final Exam.

Final Exam is scheduled for 7:00 – 10:00 p.m. on Thursday, December 20, 2018 in Rm. 2013 ECEB.