EE 693K, Spring 2013
Smart Grids and Renewable Energy Integration

Lectures: MW, 10:30am–11:45am (tentative), Holmes 241

Instructor: Matthias Fripp, Holmes 446, Phone: 956–3795, E-mail: mfripp@hawaii.edu

Office Hours: to be announced; until then, e-mail me to make an appointment

Textbooks:
- *The Smart Grid: Adapting the Power System to New Challenges* (Synthesis Lectures on Power Electronics), by Math H.J. Bollen
- *Smart Grid: Integrating Renewable, Distributed & Efficient Energy,* edited by Fereidoon P. Sioshansi
- Both textbooks will be available from the campus bookstore, and are also available online (via subscription) at http://www.safaribooksonline.com/ . An electronic version of the Bollen textbook is also available from http://dx.doi.org/10.2200/S00385ED1V01Y201109PEL003
- Additional papers will be assigned during the term.

Grading:
Homework and Paper Presentation: 30%
Project: 30%
Mid-term Exam: 15%
Final Exam: 25%

Lectures will focus on presenting the context, motivation and intuition for the main concepts, but you will need to complete the readings and homework assignments to develop your understanding and build analytical expertise.

Most readings will come from the two textbooks. I will also assign additional papers that go into more technical detail. Each student will be expected to present one of the additional papers to the class at some point during the semester. The paper presentations will be given equal grading weight to one homework assignment.

There will be 8–10 homework assignments during the semester, mostly modeling and analysis projects designed to assess the ideas presented in the readings.

Students will complete a group or individual project on a subject of their choosing. Students will present their research topic to the class around the middle of the semester, and then present their findings to the class late in the semester. A paper describing the work and findings will be due on the last day of class.

There will be an in-class midterm and final exam. The exams will be closed-book, closed-notes.

# of hours (approx.)	**Topic**
3	Introduction: electricity network, smart grid, participants, challenges
6	Challenges to the electric power system: renewable energy integration, energy efficiency, electrification of heating and transport, new market arrangements, reliability and power quality, network congestion
6	Network-based solutions: high-voltage DC (HVDC), flexible AC transmission (FACTS), network interconnection, storage, active distribution networks
8	Participation by network users: performance standards, targeted curtailment
12	Market incentives: electricity market design on various time scales, tariff designs for demand response, “smart” behavior of various customer classes
6	Looking forward; market designs to transform the system.