



EECS 498 Special Topic Grid Integration of Alternative Energy Sources

**Wednesday and Friday, 8:30-10:30am
Winter 2011**

The course will present a variety of alternative energy sources, along with energy processing technologies that are required for power system connection. System integration issues will be addressed, with consideration given to impacts on current power system design philosophies and operating principles. Topics will be covered at a level suited to establishing a broad understanding of the various technologies, and of the associated system implications. NREL's HOMER package will be introduced, and used in the analysis and optimization of alternative energy systems.

Syllabus:

1. Power systems: basic concepts, system operation.
2. Wind power: principles of wind energy extraction, electromechanical energy conversion, characteristics of wind turbines, voltage regulation.
3. Power electronic converters: switches, diodes, basic converter topologies.
4. Photovoltaic (PV) cells: energy conversion principles, electrical modeling, optimal power extraction.
5. Fuel cells: electrochemistry, construction, balance of plant.
6. Energy storage technologies.
7. Design of renewable energy systems using HOMER.
8. Plug-in electric vehicles: local and large-scale grid impacts, vehicle-to-grid concepts.

Prerequisites: EECS 215 or 314 (or Permission of Instructor).

Course Director: Prof Ian Hiskens, Electrical Engineering and Computer Science.
For additional information contact <hiskens@umich.edu>.