



## **EECS 498 Special Topic Grid Integration of Alternative Energy Sources**

**Mondays & Wednesdays 8:30-10:30am, 1303 EECS  
Winter 2015**

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.

### **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: basic converter operation and 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); Graduate students need permission of instructor.

Course Director: Prof Johanna Mathieu, Electrical Engineering and Computer Science.  
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