

EEE598: Renewable Electric Energy Systems

Fall 2009

Instructor:	Bingsen Wang	Classroom:	ECG 335
Office:	ERC579	Lecture hours:	T, Th, 12:00–1:15pm
Office hours:	M, Th, 2:00-3:00 pm	Course webpage:	http://myasucourses.asu.edu
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Course Type: Lecture
Prerequisite: Open to EE graduate students. Basic understanding power electronics, electric machine, and control
Textbook: None. Handouts are available for selected topics.
Computer software: Proficiency in one of mathematical analysis tools such as Matlab, MathCAD or simulation software such as PSPICE, Saber, is assumed. Students are responsible for acquiring these skills if they are not already familiar with the engineering productivity tools.

Course Description

Due to ultimate energy supply constraints imposed by fossil fuel and ever increasing energy demand from consumers, renewable energy is attaining much more prominent position as a promisingly viable and necessary solution. This course covers the critical technical constituents that advance electrical utilization of renewable energy. The lecture topics are divided into two modules: electric power conversion and grid integration.

Course Outline

- Overview of Renewable Energy System
 - Big picture in energy supply and demand, need for more energy
 - Renewable energy sources (hydro, solar, wind, tidal, waves)
 - Cost and environmental impact
- Power Conversion
 - Solar cells technology (crystalline, amorphous) and characteristics
 - Wind turbine system configurations
 - Power converter topologies for solar and wind
 - Control of dc-dc converter and dc-ac inverters
 - Control of different types of generator-inverter systems
 - Fuel cell technology and characteristics and control
- Grid Integration
 - Grid-connected and off-grid PV systems
 - Compliance with power quality and safety code for solar and wind systems

- Wind and solar intermittency management (on technical side)
- Distributed Generation
- Microgrid

Assignments and Grading

Participation (10%): class or online.
Homework (20%): 3-5 homework problem sets will be distributed.
Research Project (70%): details will be provided elsewhere.

Expected Outcome

Upon completion of the course, the students will gain broad understanding of issues and solutions related to the power conversion and grid integration of electric renewable energy and in-depth understanding of the topic selected by students.