

EE 394V New Topics in Energy Systems Distributed Generation Technologies

Meetings: Tuesdays and Thursdays from 12:30 to 2:00 PM in ENS 116

Professor: Alexis Kwasinski (ENS528, akwasins@mail.utexas.edu, Ph: 232-3442)

Course Home Page: <http://users.ece.utexas.edu/~kwasinski/EE394VDGFa08.html>

Office Hours: Tuesdays and Thursdays (2:30 – 4:00); or by appointment.

T.A.: To be announced in the future.

Prerequisites: Fundamentals of power electronics and power systems or consent from the instructor. Familiarity with at least one computer simulation software. Knowledge on how to browse through professional publications.

Reference Textbook(s): There is no required textbook. The reference textbook is:

G. Masters, *Renewable and Efficient Electric Power Systems*

In addition of the book, the course will use selected papers and articles from professional magazines as reference material.

Course Description: This is a graduate level course with two main goals. The first goal is to discuss topics related with distributed generation technologies. The second goal is to prepare the students to conduct research or help them to improve their research skills. **Topics included in the course are:** distributed generation and microgrids elements; microsources; energy storage; power electronics interfaces; dc and ac architectures; economics, operation, stabilization, and control; reliability aspects; grid interconnection, “smart” grids.

Schedule:

Thursday, August 28	Introduction. Course description. The electric grid vs. microgrids: technical and historic perspective.
Week 1 (begins September 1)	Distributed Generation units. Microturbines, reciprocating engines, wind generators, photovoltaic generators, fuel cells, and other technologies.
Week 2 (begins September 8)	Distributed Generation units. Microturbines, reciprocating engines, wind generators, photovoltaic generators, fuel cells, and other technologies.
Week 3 (begins September 15)	Distributed Generation units. Microturbines, reciprocating engines, wind generators, photovoltaic generators, fuel cells, and other technologies. <i>INTELEC 2008</i> .
Week 4 (begins September 22)	Energy Storage – batteries, fly-wheels, ultracapacitors, and other technologies.
Week 5 (begins September 29)	Energy Storage – batteries, fly-wheels, ultracapacitors, and other technologies.
Week 6 (begins October 6)	Power electronics interfaces: dc-dc, dc-ac, and ac-dc.
Week 7 (begins October 13)	Power electronics interfaces: dc-dc, dc-ac, and ac-dc.
Week 8 (begins October 20)	Power electronics interfaces: dc-dc, dc-ac, and ac-dc.
Week 9 (begins October 27)	Architectures: distributed and centralized. Dc and ac distribution systems. Stability and protections
Week 10 (begins November 3)	Controls: distributed, autonomous, and centralized systems. Operation.
Week 11 (begins November 10)	Economics. <i>IECON 2008</i> .
Week 12 (begins November 17)	Reliability issues

Week 13 (begins November 24) Grid interconnection. Issues, advantages and disadvantages both for the grid and the microgrid. Thursday 27: Thanksgiving holiday

Week 14 (begins December 1) Smart grids

Italics indicate weeks when the instructor will be attending conferences. Make-up classes will be scheduled during the semester.

Grading:

Homework: 25%

Project preliminary evaluation: 15%

Project report: 25%

Final exam: 25%

Class participation: 10%

Letter grades assignment: 100% – 96% = “A+”, 95% – 91% = A, 90% – 86% = A-, 85% – 81% = B+, and so on.

Homework:

Homework will be assigned approximately every 2 weeks. Making mistakes is part of the learning process. For this reason the lowest score for an assignment will not be considered to calculate the homework total score. However, all assignments need to be submitted in order to obtain a grade for the homework.

Project:

The class includes a project that will require successful students to survey current literature. The project consists of carrying out a short research project throughout the course. The students need to identify some study some topic related with the application of distributed generation technologies. The project is divided in two phases:

- 1) Preliminary phase. Due date: Oct. 9. Submission of references, application description, and problem formulation (1 to 2 pages long).
- 2) Final phase. Due date: Nov. 25. Submission of a short paper (the report), at most 10 pages long, single column.

Participation:

Participation points are assigned at instructor’s discretion based on the perceived attitude of individual students towards learning during the semester.

Final Exam:

The format of the final exam will be announced during the semester. The official date and time for the final can be found at <http://registrar.utexas.edu/schedules/089/finals/index.html>.

Disclaimers:

Although unlikely, this syllabus and course topics may change according to my judgment as to what is best for the class. Any changes will be declared in class.

General course schedule and administrative deadlines follow The UT Austin calendar, long session 2007-2008, which can be found at <http://www.utexas.edu/student/registrar/07-08long.html>.

Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (Video Phone) as soon as possible to request an official letter outlining authorized accommodations.