Division of Electrical and Computer Engineering
EE 4000: Modeling and Analysis of Smart Power System, Fall 2013

Lecture: *TTh 9:00-10:20*
Subject: Basic principles of smart power system modeling and analysis in steady state operation including, components modeling, network modeling, renewable e energies, power-flow solutions, and symmetrical and unsymmetrical faults.

Instructor: Shahab Mehraeen, PhD, smehraeen@lsu.edu
Office: PTF 3106-C, Phone: 578 5538.
Office Hours: Wed, 10:00 - 12:00am.

Teaching Assistant:
Office:
Office hours:

References: "Design of Smart Power Grid Renewable Energy Systems," Ali Keyhani, John Wiley, 2011 and "Power Systems analysis," J.J. Grainger and W.D. Stevenson, McGraw-Hill Inc., 1994.

Specific course information
Catalog description: analysis of power systems with penetration of renewable energy systems, renewable systems and smart grid design considerations, load flow algorithm, symmetrical and unsymmetrical fault analysis.

Prerequisites by topics: Introduction to power systems, EE 3410

Lectures: The course is offered in two lectures sections. Lectures will be based on notes and handouts provided by the instructor. Therefore, attendance at lectures and your attention is very important.

Assignments are due one week from the date they are assigned in the beginning of the class. If assignments are turned in late, 50% will be deducted from the assignment grade. Assignments later than two weeks are not accepted. There are no make-up quizzes and final exam. If you have an excused absence on the mid-semester exam (illness or death in the immediate family or LSU sponsored activity), then there could be a make-up exam. Calculators can be used only at numerical problems. Students can gain **activity points**, in a quize scale, for questions answered during lectures. Any concerns regarding mid-semester exams and quizzes have to be notified to me in one week time after you received the graded quiz or exam. Reservations regarding the final exam have to be notified to me by **December 7, 12:00am.**

Social media and other policies
1. DO NOT USE CELL PHONE OR OTHER MEDIA TO RECEIVE OR CALL PHONES OR E-MAILS DURING THE ACTIVE CLASS/LAB TIME.
2. Students are responsible for familiarizing themselves with policies and procedures such as PS-22 (Student Absence from Class) and code of student conduct (http://saa.lsu.edu/code-student-conduct), especially "misconduct" Section 8.
Not applied to this course (3. Follow safety instructions for working in the laboratory. Always use common sense)

Approach in regards to safety considerations.

Lecture Grades will be based upon the following components:

(a) Quizzes.....	5p
(b) Assignments.....	20p
(c) One Midsemester Exams …….……..	30p
(d) Class Activities ……..	5p
(d) Final Exam (Comprehensive)	40p
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Total.....	100p

Total grades will be assigned as follows:

$90 \leq p \leq 100$: grade A
$80 \leq p < 90$: grade B
$70 \leq p < 80$: grade C
$60 \leq p < 70$: grade D

Grades may be affected by curving at the instructor's discretion.

Specific goals of the course

Specific outcome of instructions: The course should provide students with a basic knowledge on renewable energy sources modeling, smart grid, basic inverter and converter design for renewable energies, loadflow, and fault analysis including symmetrical and unsymmetrical faults.

Topics:

1. Background on power grids
2. Modeling converters in micro grids
3. Smart power grid systems
4. Solar energy in micro grid
5. Wind energy in micro grid
6. Load flow analysis of power grids
7. Power grid fault studies

Explicit goals using student outcomes (Criterion 3):

The course contributes to these outcomes	Explanation
1- An ability to apply knowledge of mathematics, science, and engineering	Students work through homework assignments where such concepts are essential
2- An ability to design a system, component, or process to meet desired needs	Student work on assignments where they need to obtain ratings of components in the power system. In addition, they learn about the renewable energy sources and their geographical and power availabilities
4- An ability to function on teams	Students perform classroom activities in groups of two or three
5- An ability to identify, formulate, and solve engineering problems	Students perform classroom activities and assignments that involve fault analysis in power systems
11- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	The course provides a basic understanding of the operation of smart power systems components so that students are prepared for advance courses and engineering practice in power systems and renewable energy
12- An ability to apply knowledge of probability and statistics, mathematics through differential and integral calculus, basic science, and engineering science necessary to analyze and design complex electrical and electronic devices, and systems containing hardware and software components	Concepts of, electrodynamics, three-phase circuits, complex numbers, and renewable energy sources are utilized to discuss the course subjects