EE 4123 Design Project I - Electrical Power and Machinery

Lecture (Room: JAB 775B) **– Lab (LC 017):** Tuesdays from 11:00 to 1:50 AM

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Catalog Description: The purpose of DP1 is to provide students with a significant amount of background laboratory experience in their chosen area of concentration, **electrical power and machines in this case**, to have students begin their independent project work by finding an advisor and initiating the independent project work, to exercise their oral presentation and written communication skills, and to develop appreciation for the role in the design process of non-technical issues such as safety, reliability, esthetics, and ethics.

Credits: 3

Pre-Requisite: Completion of all junior-level technical courses, specifically EE3824**.**

Textbook: There is no official textbook, but a book in machinery is useful for the beginning of the class. All students already have: T. Wildi, "***Electrical Machines, Drives, and Power Systems***," Prentice-Hall, 2000 from EE3824.

Course Learning Outcomes:

1. At the end of the term the students will be aware of the safety and necessary protection when working with high voltage.

2. At the end of the term the students will be proficient with the power lab equipment instrumentation and measurements.

3. At the end of the term the students will have knowledge on how machines generate power; how it is transmitted and consumed.

4. At the end of the term the students will have planned and managed their project.

5. At the end of the term the students will have designed or modeled a power device or instrument.

6. At the end of the terms the students will have enhanced their writing and oral presentation skills.

Topics Covered

1. Safety and precautions with power (high-voltage and rotating) equipment and instrumentation
2. Synchronous machines theory and practice
3. DC machines theory and practice
4. Project planning and management
5. Technical writing and oral presentations
6. Engineers: functions, responsibilities to society and ethics

This course will rely heavily on the student's ability to apply the knowledge of mathematics, science and engineering learned in earlier courses. The application of that knowledge will be geared toward formulating and solving engineering problems in the area of electric power and machinery, and will involve significant design activity. The course will involve the use of modern engineering tools and significant laboratory and experimental activity. Issues of professional and ethical responsibility in the context of the engineering design project will be discussed in the recitation part of the course. The course will involve written reports and oral presentations.

Labs

Lab 1: Three-phase Transformers
Lab 2: Induction Machine (as Generator)
Lab 3: Synchronous Machine
Lab 4: DC Compound Motor

Grading (form teams of 2 people):

Mid-term Exam	30% - Open book
Lab (final) Exam	30% - You can use only your lab report
Project Report	30% - IEEE Format
Presentation	10% - Individual grade

In case of odd numbers, I would accept one team with three students or a student working alone (project expectations adjust accordingly).

Course Calendar

Session No.	DATE	Class Schedule
1	September 4, 2012	• Course outline, motivation, form groups, scope and expectations of projects, report and labs • Division of Sections for Lab (A and B) • Safety in lab • Electric Power Apparatus and Systems
2 3 4 5	September 11, 2012 September 18, 2012 September 25, 2012 October 2, 2012	Lecture Sessions: Construction and theory of synchronous and induction machines. Construction of transformers, capacitors and inductors. Overview of the entire power system from generation to transmission to distribution and all the way to the power supplies of electronic equipment. Lab Lecture.
5	October 2, 2012	**Mid-Term Exam**
6	October 9, 2012	Lab 1 for Section A Project Consultation Section B
	October 16, 2012	No class. Fall Break
7	October 23, 2012	Lab 1 for Section B Project Consultation Section A
8	October 30, 2012	Lab 2 for Section A Project Consultation Section B
9	November 6, 2012	Lab 2 for Section B Project Consultation Section A
10	November 13, 2012	Lab 3 for Section A Project Consultation Section B
11	November 20, 2012	Lab 3 for Section B Project Consultation Section A
12	November 27, 2012	Lab 4 for Section B Project Consultation Section A
13	December 4, 2012	Lab 4 for Section B Project Consultation Section A
14	December ??, 2012 (The day of the final exam)	**Reports Due and Final (Lab) Exam** (No extensions)

Steps for succeed in this class:

(1) Together with an advisor select an electrical power engineering problem to solve.

(2) Carefully design a project from beginning to end that will yield to a solution of the selected project. The idea is to become independent, but you can use your advisor to help.

(3) Obtain the solution of the problem.

(4) Write a report with your findings.

(5) Effectively present your results and conclusions.