EE 450- Electronic Product Design - 1 Hour
Required course

1. 2007-2008 Catalog description

Students work in teams to design, implement, test, and demonstrate an electronic product. The electronic product has stringent specifications emulating design in industry. The design process requires extensive documentation and a formal report. Prerequisites: EE332 with a minmum grade of C.

2. Prerequisites by topics:

Material taught in EE 332.

3. Textbook (s) and/or other required material

None

4. *Class Schedule:* One 6 hour lab session per week for 7 weeks

5. Topics Covered (Objectives influenced)

First-Week Product Design:

- Develop model for an actuator and/or sensor in the Simulink environment using parameters from data sheet (7 a)
- Comparison of experimental and simulation steady-state data (7 b)
- Transient response analysis of simulation model (7 b)

Six-Week Mini-Project (MP) Design:

- Design a microcontroller-based instrument or product to meet a set of specifications (7 c,d,e,f, g,h,i,j,k)
- Model the product in the Simulink environment (7 g,k)
- Design assembly or C-language program to meet specifications (7 d,k)
- Design microcontroller interfacing circuitry for external actuators or sensors to meet specifications (7 e,k)
- Design GUI using LCD and keypad of the microcontroller development system (7 d,k)
- Develop Preliminary and Executive Reports for the product (7 i,k)

6. *Contribution of course to meeting the professional component*

Engineering Science 20%, Engineering Design - 80%

7. *Course Outcomes (Program Outcome contributions): In learning the course topics, the student will attain the following outcomes.*

a. The student will develop a model for an actuator and/or sensor in the Simulink environment. (9A,B,C,D, F, G)
b. The student will compare simulation model data with experimental data. (9A,B,C,D, F, G)
c. The student will develop a system block diagram and a high-level software flowchart for the MP product. (9A,B,C,D, F, G)
d. The student will design interrupt-driven software for the MP product that is real-time critical. (9A,B,C,D, F, G)
e. The student will design interface circuitry for the microcontroller/actuator/sensor interface. (9A,B,C,D, F, G)
f. The student will implement and test the performance of their MP product and determine if it meets specifications. (9A,B,C,D, F, G)
g. The student will demonstrate the performance of their MP product and Simulink model to the instructor. (9A,B,C,D, F, G)
h. The student will complete a record of their analysis and design of the two products in a laboratory notebook. (9A,B,C,D, F, G)
i. The student will submit an Executive Report for their MP product design. (9A,B,C,D, F, G)
j. The student will analyze interface circuitry for high-volume production in regard to worst-case device conditions, product temperature range, power dissipation, and component reliability. (9A,B,C,D, F, G)
k. The student will follow the ECE Code of Conduct and interact appropriately with his/her lab partner and classmates (9G)

8. *Grading Policy:* The degree to which students attain the course outcomes is determined by the following grading policy.

1st Experiment (modeling): 10%
Electronic Product Design: 90%

Demonstration of work represents 33% of the course grade, laboratory notebook record is 49% of the course grade, and typed reports are 18% of the course grade. A grade of C corresponds to meeting the minimum competency required to understand course topics and meet course objectives.

9. *Relationship of course to program outcomes*

label	Program Outcomes (A Graduate from the program will:)	Contribution
A	demonstrate knowledge of the mathematical and scientific foundation of electrical engineering	Strong
B	demonstrate knowledge of and the ability to apply techniques and technology of electrical engineering	Strong
C	complete a design project sequence, culminating in a capstone project at or near the professional level	Strong
D	understand that acquisition of new knowledge is needed for success in the electrical engineering profession	Strong
E	meet Bradley's general education requirements which are based on the principles of liberal education	NA
F	have experience in communicating technical information and working on teams	Strong
G	understand the importance of professional and ethical behavior	Strong

10. Prepared by: Gary Dempsey 3/13/08