EE 331 - Junior Laboratory I - 3 Hours
Required course

1. 2007-2008 Catalog description

The student performs top-down design and analysis of analog and digital electronic circuits. Integral to the design work is the use of software programs and software simulation packages are used to verify their designs. In addition, students develop hardware and software troubleshooting and testing skills. The design experience culminates in a multi-week task that requires the students to integrate information from EE 205, EE 206, and EE 303 to synthesize a multi-faceted, specification driven project. Prerequisites: EE 206 with a minimum grade of C; EE or EEC major. Corequisites: EE 303, EE 365.

2. Prerequisites by topic

a) Basic skill in the use of DMMs, power supplies, signal generators, and oscilloscopes for the performance of electrical measurements.
b) Fundamentals of circuit theory.
c) Fundamentals of theoretical and experimental frequency response methods.
d) Fundamentals of digital design including the use of a hardware description language
d) Familiarity with the MATLAB ®, PSpice ®, and digital simulation software packages.

3. Textbook and/or other required material

Experimental handouts supplied as needed

4. Class Schedule: One 50 minute lecture session per week and one 6 hour lab session per week for 14 weeks

5. Topics Covered – Labs completed (Objectives influenced)

- Measurement review lab [1 wk] (7a,b,c,h,i)
- MATLAB and SIMULINK [1 wk] (7b,c,h,i)
- System ID [2 wks] (7a,b,c,h,i)
- VHDL Design Project [3 wks] (7a,b,d,f,h,i)
- Op Amps [1 wk] (7a,b,c,e,f,h,i)
- Active Filters [1 wk] (7a,b,c,e,f,g,h,i)
- Diodes [1 wk] (7a,b,c,e,h,i)
- Analog Design Project [3 wks] (7a,b,c,e,f,g,h,i)
- Pulse Amplitude Modulation [1 wk] (7a,b,c,e,h,i)

6. Contribution of course to meeting the professional component

Engineering Science 40%, Engineering Design - 60%

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

a. The student will use laboratory equipment to analyze circuit behavior to verify or improve theoretical designs (9B,C,D)
b. The student will effectively use the simulation software packages MATLAB ®, PSpice ®, and Quarttus ® for analysis and design (9B,C,D)
c. The student will analyze circuits, systems and signals in the time and frequency domains (9A,B,C,D)
d. The student will design, implement and test a digital system to meet required specifications (9B,C,D)
e. The student will analyze, design, implement and test circuits containing electronic devices (9A,B,C,D)
f. The student will apply appropriate design methodology for labs and projects (9A,B,C,D)
g. The student will understand the effects of statistical variations in component parameters based on design simulations using PSPICE (9A,B,C,D)
h. The student will gain experience in communicating technical information in written format (9F)
i. 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. Grades will be based on the results of all regular laboratory experiments/projects (including preliminary theoretical analysis). All experiments will be graded on a 100 point basis and assigned a percent grade. Each experiment/project is weighted as follows

which is based on the number of weeks for the lab or project.
Measurement Review Lab : 10%
MATLAB and SIMULINK: 10%
System ID: 20%
VHDL Design Project: 30%
Op Amps: 10%
Active Filters : 10%
Diodes: 10%
Analog Design Project: 30%
Pulse Amplitude Modulation: 10%

The final course grade will be assigned based on the student's weighted course percent divided by 1.4 as follows:

Course Percent	Final Grade
100-90	A
90-80	B
80-60	C
60-40	D
<40	F

9. Relationship of course to program outcomes

Label	Program Outcomes (A Graduate from the program will:)	Contribution
A	have knowledge of the mathematical and scientific foundation of electrical engineering	Strong
B	have 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*: Brian Huggins 6/11/08