EECE 042
Spring 2000

EECE 042: Circuits Laboratory 2

Course Description:
Circuit design, construction and test skills are expanded to include diode circuits and transistor amplifiers as well as passive and active filters. Emphasis is placed on DC, AC and transient response of circuits containing passive and active devices.

Prerequisites: EECE 011 with a minimum grade of C and EECE 041 with a minimum grade of C
Corequisites: EECE 010 and EECE 012

Course Materials:
Required: James W. Nilsson and Susan A. Riedel, Introduction to PSpice Manual for Electric Circuits using OrCad Release 9.1, Prentice-Hall, Upper Saddle River, NJ 2000.
James W. Nilsson and Susan A. Riedel, Electric Circuits, 6th edition, Prentice Hall, Upper Saddle River, NJ 2000. (current text used in EECE 012).
Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 7th edition, Prentice Hall, Upper Saddle River, NJ 1999. (current text used in EECE 010).
Supplies: EECE Tools Kit, EECE Cable Kit, experimenter's breadboard (proto board), needlenose pliers
Optional: Computer Software:
OrCad Demo, release 9.
Byron S. Gottfried, Spreadsheet Tools for Engineers, WCB McGraw-Hill, Inc. 1998.

Course Goals:
- Reinforce student knowledge of electrical and electronic circuits with hands-on experiments.
- Reinforce student ability to construct circuits.
- Reinforce students knowledge of the basics of electronic test equipment measurement skills.
- Introduce students to the various circuit components, including rectifier diodes, signal diodes, zener diodes, LEDs and BJTs.
- Introduce students to the use of the circuit simulation program, PSpice (with Capture CIS and Probe).

Course Objectives:
By the end of this course, you should....
- Be able to use the circuit simulation program, PSpice (with Capture CIS and Probe).
- Be able to use proper circuit construction techniques with an experimenter's breadboard.
- Be able to use a DMM, power supplies, function generators and oscilloscopes as appropriate to the experiments.
- Be able to build and test various circuit networks.
- Be able to design various circuit networks, including (but not limited to) RLC networks, power factor correction networks, simple integrators and differentiators, simple passive filters as well as a simple zener regulated power supply.
- Be able to choose standard component values to allow circuits to function per desired specifications.

- Be able to use the World Wide Web to track down device data sheets.
- Understand something about the physical construction of transformers.
- Understand the I-V characteristics of diodes and transistors.
- Be able to monitor the proper functioning of a simple transistor amplifier.

Course Topics:
Lab 1: PSpice Fundamentals - A Self-Paced Learning Experience
Lab 2: Lab Procedures Review and Steady State Response
Lab 3: Steady State Response 2: Designing Reactive Circuits
Lab 4: Steady State Response 3: Maximum Power Transfer
Lab 5: Steady State Response 4: Power Factor Correction
Lab 6: Transformers and the Dot Convention
Lab 7: Diode Discovery 1: Rectifier applications and LEDs
Lab 8: Diode Discovery 2: Zener Regulated Power Supply Design and Digital Logic Gates
Lab 9: Transistor Discovery
Lab 10: Laplace Transforms-Integration and Differentiation
Lab 11: Passive Filters
Lab 12: Active Filters

Class Schedule: 1 - 50 minute lecture, 1 - 110 minute laboratory equivalent to 2 credits

Contribution to Professional Component: Engineering Science 70%
Engineering Design 30%

Contribution to Program Objectives: partial fulfillment of Criterion 3 objectives A, B, C and K

Prepared by: Susan C. Schneider March 20, 2000
Course Coordinator: Susan C. Schneider

Last modified: July 13, 2000

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ABET Objectives,
Assessment Instruments, and
Assessment Criteria

(A) An ability to apply knowledge of mathematics, science, and engineering:
Student competence will be judged based on performance on the preparation for each lab, the performance in laboratory as well as the answers to post laboratory questions.
Minimum competence will be assessed as an average of 70% on any individual lab (grade of C) as well as an average of 70% overall for the course.

(B) An ability to design and conduct experiments, as well as to analyze and interpret data
Most experiments have sections on data analysis and interpretation of results.
See above for assessment criteria.

(C) An ability to design a system (sic) to meet desired needs:
Several experiments require the students to "design" circuits by choosing component values to meet or exceed specifications.
See above for assessment criteria.

(K) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
By the end of this lab, students will have begun to master circuit construction, the use of DMMs, power supplies, function generators as well as oscilloscopes. In addition, students will be familiar with (and comfortable with) the use of PSpice (with Capture CIS and Probe) to simulate circuit behavior.
See above for assessment criteria.

Evaluation of Objective Attainment - Continuing Course Review

At the end of each semester, instructors of this course will submit a short written report to the Course Coordinator for EECE 042 which

a) discusses their perceptions of student knowledge and ability to apply the listed prerequisites (see item A above), and
b) provides qualitative and quantitative information which discusses the attainment of objectives listed above for EECE 042.

The Course Coordinator will review these reports with the instructors and in consultation with the instructors recommend modification and/or enhancements to the objectives and criteria as needed. The recommendations will be forwarded to the EECE Undergraduate Committee for approval.

Last modified: July 13, 2000