ECE 3872 – Electrical Engineering Laboratory III
Spring 2002

2000-2002 Catalog Data:  ECE 3872: Electrical Engineering Laboratory III. Prerequisites: ECE 3772 & ECE 3813. Electronic analog circuit design, simulation, construction, debugging and measurement of circuit performance quantities using advanced instrumentation techniques; circuit reliability theory; independent design skills development; and technical writing.

Prerequisites:  ECE 3772 & ECE 3813.

Textbooks:  Instructor published Lab III manual.

References:  Classroom handouts for each weekly laboratory experiment.
MIL-HDBK-217F, Reliability Theory

Course Objectives:  Lab III has four main objectives. Electronic analog circuit design theory is emphasized, with students building various circuits including transistor amplifiers, oscillators and timer circuits, and various type of semiconductor switching circuits. The ideal laboratory experience is to find close agreement between design predictions, simulation results and actual measurements. Reliability theory is developed using the parts count and parts stress methods. Independent design capability is developed through a semester long design project with prescribed performance, cost and reliability constraints. Technical writing skills are practiced in developing a complete lab report for each of the weekly experiments, and a proposal and formal report on the project.

Coordinator:  Dr. Ronald J. LaSpisa, Visiting Associate Professor, School of Electrical and Computer Engineering

Topics:  Weekly experiments vary each semester to support the design project. In Spring 99, the design project was a Digital Voice and Music Link. The following experiments were performed:

1.  Lab Skills Review and Instrumentation Familiarization
2.  Use of the Digital Storage Oscilloscope and Applications
3.  555 Timer Circuits
4.  Optocouplers and Isolation
5.  BJT Emitter Follower Amplifiers
6.  LM386 Audio Amplifier Circuits
7.  BJT Common Emitter Amplifier
8.  Comparators
9.  Semiconductor Switches
10.  TRIAC Light Dimmer Circuit
11.  OpAmp Active Filter Design
12.  J-FET Common Source Amplifier

Schedule:  One 1 hour common lecture session per week, plus three hours lab work for each section.

Computer Usage:  Use of Laptop PCs to perform PSpice circuit simulation, LabView GPIB instrument data import to spreadsheet, and creation of schematics using OrCAD Capture.
Design Projects: In Spring 99, the semester long project was entitled “Digital Voice and Music Link”. The basic requirements were to convert an analog audio signal to pulses using pulse width modulation, for transmission over an isolated communication link, and demodulation of the signal back into its original analog form. Also, each of the weekly exercises focuses on design with approximately three circuits built illustrating different concepts.

Laboratory Experiments: (as discussed)

Written and Oral Communications: A complete informal lab report each week, totally originated by each student team. Extensive oral discussions during laboratory periods regarding lab procedures and experimental methods. Formal written report describing the development of the project. Informal oral presentations during project critical design review and demonstration.

Teamwork: Students carry out design preparations and perform laboratory work, written reports and design project in groups of two, although solo performance is permitted.

Assessment methods used:

1. Graded lab reports and student assisted initial grading of lab reports
2. Online weekly quizzes.
3. Midterm and final exams
4. Project milestone accomplishments and final report.

Contribution to Professional Component: Engineering Science - 2 credit hours
Engineering Design - 2 credit hours.

Program Objectives & Related Strategy and Actions:
2: i, iii
4: i
5: i, ii

ABET 2000 Criterion 3 Contents: a, b, c, d, e, f, g, k.

Prepared by: Ronald J. LaSpisa; Date: April 25, 2002