**EECE 2015: Circuits Laboratory 1**

**Class Schedule:** 1 – 1 hour lecture, 1 – 2 hour laboratory equivalent to 2 credits

**Course Coordinator**: Dr. James Richie

**Course Materials:**

**Required:** James W. Nilsson and Susan A. Riedel, Electric Circuits, 10th Ed., Pearson-Prentice Hall, Upper Saddle River, NJ 2015. (current text used in EECE 2010)

 EECE 2015 Handouts, NI Lab View/MultiSim

**Supplies:**  EECE Tools Kit, EECE Cable Kit, experimenter’s breadboard (proto board), needlenose pliers

**Course Description**:

Introduction to circuit design, construction, and testing. The basics of circuit construction techniques and electronic test measurement skills are covered. Circuit components such as resistors, inductors, capacitors and op-amps are used. Emphasis is placed on DC and transient response of circuits.

**Prerequisites**: EECE 2010 must be taken concurrently

**Required** in the Electrical and Computer Engineering programs and for the Bioelectronics major in the Biomedical Engineering program.

**Contribution to Professional Component**: Engineering Science 80%

 Engineering Design 20%

**Course Goals:**

• Reinforce student knowledge of electrical and electronic circuits with hands-on experiments.

• Introduce students to circuit construction technique.

• Introduce students to the basics of electronic test equipment measurement skills.

• Introduce students to the various circuit components, including resistors, inductors, capacitors, and op-amps.

**Course Objectives:**

*By the end of this course, you should be able to ....*

1. Use the circuit simulation program, MultiSim
2. Use proper circuit construction techniques with an experimenter’s breadboard.
3. Use a DMM to measure voltage, current and resistance.
4. Describe circuit component tolerance and identify the tolerance markings of resistors.
5. Build and test various circuit networks.
6. Design various circuit networks, including (but not limited to) a voltage divider network, an attenuator circuit, an “arbitrary” resistive network, an inverting amplifier.
7. Use the World Wide Web to find device data sheets.
8. Use the connection diagram for a specified IC op-amp (“pin-out”) to properly attach the terminals for circuit operation.
9. Describe the physical construction of (simple) inductors and capacitors.
10. Use a function generator properly.
11. Use an oscilloscope to measure/monitor voltages in a circuit with respect to ground.
12. Measure the time constant for RL and RC Step Response.

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

**Course Topics:**

Lab 1: MultiSim Fundamentals

Lab 2: Lab Introduction

Lab 3: Simple Resistive Networks

Lab 4: Delta-Y Transformations

Lab 5: Design Challenges

Lab 6: Thévenin Equivalent and Maximum Power Transfer

Lab 7: Op-Amp Introduction

Lab 8: (More) Operational Amplifier Applications

Lab 9: Time Domain Analysis, The Oscilloscope and the Function Generator

Lab 10: RL and RC Step Response

Lab 11: RLC Step Response