ECE3710 Course Syllabus

ECE3710

Circuits and Electronics (2-0-2)

Prerequisites
PHYS 2212/2232

Corequisites
None

Catalog Description
An introduction to electric circuit elements and electronic devices and a study of circuits containing such devices.

Textbook(s)
myDAQ, National Instruments. (required) (comment: The National Instruments myDAQ unit and the Circuits textbook (by Ulaby, Maharbiz) may be purchased as a bundle at http://www.studica.com/GeorgiaTech.html)

Ulaby, Maharbiz, *Circuits* (2nd edition), National Technology & Science Press, 2013. ISBN 1934891193, ISBN 9781934891193 (required) (comment: NOTE: The ISBN is for the book alone. The National Instruments myDAQ unit and the Circuits textbook may be purchased as a bundle at http://www.studica.com/GeorgiaTech.html)

Course Outcomes
Upon successful completion of this course, students should be able to:

1. determine voltages and currents in a resistive network.
2. sketch the transient response of RC and RL circuits and be familiar with the standard transient responses of RLC circuits.
3. use complex phasors to determine the steady-state responses of sinusoidal sources voltages or currents.
4. understand and analyze the frequency response characteristics of filters.
5. analyze power characteristics in reactive circuits.
6. build and test real circuits containing RLC components, op amps, diodes, and transistors.
7. design and build simple filters, rectifiers, and amplifiers.

Topical Outline

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Resistive Circuits (3.5 weeks)
        Components
        Ohm's Law
        Resistors in parallel, series
        Kirchhoff's Current and Voltage Laws
        Voltage divider and current divider laws
        Thevenin Equivalent Circuits
        Superposition
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Reactive Circuits (1.5 weeks)
- Inductors and Capacitors
- Parallel and series connections of inductors and capacitors
- Transient Analysis of First-Order circuits

Frequency Analysis of Circuits (2.5 weeks)
- Steady-state sinusoidal analysis and impedance
- Transfer function
- Bode plots
- Filtering

Power in AC Circuits (1 week)
- Real, reactive, and apparent power
- Power factor

Fundamental Devices in Electronics (2.5 weeks)
- Ideal diodes
- Simple piecewise linear model of diode
- MOS Field-Effect Transistors
- Operational Amplifiers

Electronic Applications (3.5 weeks)
- Rectifiers
- Amplifiers
- Active Filters

Students will perform hands-on activities using data acquisition bo