ECE 202: Circuit Theory
Applications

Concepts:
- Differential and characteristic equations and roots
- Phasor representation of current and voltage
- Equivalence between time and frequency domain
- Sinusoidal steady-state analysis
- Instantaneous and average power
- Effective (RMS) values
- Apparent power
- Power factor
- Complex Power
- Balanced three-phase circuits
- Magnetic flux and transformers
- Linear, ideal, and autotransformers
- Resonances
- System transfer function
- Filters
- Laplace Transform

Applications:
- Design of passive and active filters
- Design of phase shifters
- Power factor correction
- Filter design
- Resonant circuit design

Tools:
- Cadence
- MATLAB

Pre-requisites:
- ECE103

First and second order RLC
- Understands operation of first and second order circuits
- Can derive characteristic equation, determine type of response and find total response of a circuit

AC Circuit Analysis
- Can use mesh and node analysis to analyze circuits with independent and dependent sources
- Can apply superposition, source transformation, Thevenin and Norton theorems

AC Power Analysis
- Can calculate instantaneous and average power
- Understands the difference between maximum and RMS value and can apply correct formulas
- Understands principles of power factor correction
- Can use PQS triangle

Three Phase Circuits
- Knows configuration of three-phase circuits
- Can apply formulas for balanced connections

Frequency Response and Filters
- Can calculate transfer function and phase shift
- Can express transfer function in Bode format and draw Bode plots
- Understands Decibel scale

Filter Analysis
- Can calculate transfer function, cutoff and center frequency, bandwidth, quality factor
- Can perform magnitude and frequency scaling of a given filter

Transfer Function
- Laplace transform
- Bode plots
- Complex response

Pre-requisites:
- ECE103

As of 3/11/13