

# ECE 103: DC Circuit Analysis

IN

## Differential and Integral Calculus

- Differentiate and integrate exponentials, polynomials, and trigonometric functions

## Complex Numbers

- Resolve complex numbers into Cartesian or polar representatives
- Do complex algebra

## Graphics, Functions

- Understand elementary theory of functions (continuity, monotonicity, inversion, etc.)

## Pre-requisites

- MATH 160 with a C or higher

## Concepts:

- Electrical variables and systems of units
  - Charge
  - Resistance, Capacitance, Inductance
  - Current and voltage
  - Power and energy
- Ohm's Law
- Kirchhoff's Law
- Series and parallel connections
- Circuit Analysis
  - Nodal and Mesh analysis
- Circuit theorems
  - Thevenin and Norton equations
- Source transformation
- Operational amplifiers
  - Ideal Op Amp, OpAmp circuits
- Source-free RC/RL circuits
- Step response RC/RL circuits
- Source free RLC circuits
- Step response RLC circuits

## Applications:

- DC voltage and current power supply design
- Summing amplifier
- Differential amplifier
- Digital to analog converter
- Cascade amplifiers
- First order RC, RL circuits
- Delay circuits

## Tools:

- MATLAB

OUT

## Circuit Analysis

- Use node and mesh analysis, source transformation and linearity to determine node voltage and loop currents
- Find Thevenin and Norton Equivalent Circuits
- Analyze basic OpAmp circuits

## Laboratory Skills

- Analyze measurements
- Command of lab and measurement procedures
- Write lab reports
- Be proficient with basic lab instrumentation like multimeters and oscilloscopes

## Modeling and Simulation

- Has introduction to MATLAB
- Understand the role of modeling and simulation