

# 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**

- MATH160 with a minimum grade of C

## **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

## **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
- Analyze RL and RC 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