

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
- 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
- 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