

Key Concepts for Class Midterm Exam

- The course breaks down into the following areas.
 - Physical Modeling: general approach and, specifically, electrical systems (resistors, capacitors, op-amps, voltage sources, voltage meters)
 - Mathematical Modeling: general approach and, specifically, electrical systems (KVL, KCL, equations for pure / ideal resistors and capacitors, op-amp golden rules, differential equation and impedance methods)
 - Analysis
 - Zero-, First-, and Second-Order Dynamic Systems: Time Response and Frequency Response
 - MatLab (step and bode commands) and Simulink Simulations of low-pass filter and feedback control system

- Control Systems
 - Open-Loop and Feedforward Control
 - Feedback Control
 - Stability: Strength of Corrective Action and System Dynamic Lags
 - Benefits of Negative Feedback, in particular, insensitivity to parameter variations in the plant
 - PID control: Physical significance of each mode
 - Block Diagram System Representation and Simplification
 - Control System Design (specifically PI control) using a 2nd-Order Standard-Form Transfer Function and 2nd-Order-Model Performance Specifications (rise time, overshoot, and settling time)
 - Effect of an added zero or pole to a 2nd-order transfer function on the time response / frequency response