MAE 40
Linear Circuits (4 units)

Class/Laboratory Schedule: four hours of lecture, eight hours of outside preparation.
12 hours/week total

Course Coordinator(s): Jorge Cortes

Textbooks/Materials:

1. The Analysis and Design of Linear Circuits, (10th Edition), R.E. Thomas, A. J. Rosa and G. J Toussaint, Wiley 2023

Catalog Description: Steady-state and dynamic behavior of linear, lumped-parameter electrical circuits. Kirchoff's laws. RLC circuits. Node and mesh analysis. Operational amplifiers. Signal acquisition and conditioning. Electric motors. Design applications in engineering.

Prerequisites: Math 20D and Math 31AH or Math 18 or Math 20F, and Phys 2B. Enrollment restricted to Engineering Majors Only.

Course Type: Required

Performance Criteria:
Objective 1
1.1 Given a resistance circuit with dc inputs, students should be able to define a set of circuit variables, and to formulate the algebraic equations which describe the circuit.
1.2 Given a dynamic circuit with time-varying inputs, students should be able to define a set of circuit variables, and to formulate the equations which describe the circuit.

Objective 2
2.1 Given a resistance circuit with dc inputs, select an appropriate analysis technique and find the circuit response.
2.2 Given a dynamic circuit with time-varying inputs, select an appropriate analysis technique and find the circuit response.

Objective 3
3.1 Students will demonstrate an understanding of the design of active circuits using operational amplifiers and an appreciation of the signal conditioning properties required for digital acquisition.

Course Objectives:

1. To teach students the basic principles underlying the dynamics of linear electrical circuits.

2. To train students to formulate and solve the equations describing electrical circuits.

3. To introduce students to active circuits and to provide them with an understanding of their application to signal conditioning, acquisition and filtering.

Course Topics:

1. Equivalent circuits
2. Systematic circuit analysis
3. Active circuit
4. Laplace transform
5. Circuits in the s-domain
6. S-domain circuit analysis and design
7. Frequency response and filter design

Last Updated: April 2025