

ECE 201 Electrical Networks I (4) F, S, SS

Course (Catalog) Description: Introduction to electrical networks. Component models, transient, and steady-state analysis. Lecture, laboratory.

Prerequisite: ECE 100.

Pre or Corequisites: MAT 274, PHY 131, 132.

Textbook: J. D. Irwin, *Basic Engineering Circuit Analysis*, 7th Ed., John Wiley & Sons, 2002.

Supplemental:

- Course website at <http://ceaspub.eas.asu.edu/ece201/>
- Laboratory website at <http://ceaspub.eas.asu.edu/ece201lab/>
- PSpice for Windows books from various authors.

Coordinator: Subcommittee on Electrical Science Courses.

Required for majors in aerospace, bioengineering, computer systems, electrical, industrial, materials, and mechanical engineering; optional for majors in civil engineering.

Computer Usage: PSpice simulation of ac and dc circuits.

Prerequisites by Topic:

1. Ordinary differential equations
2. Physics: electricity and magnetism

Course Objective:

Students are proficient in basic analysis, design, and measurement of linear analog electrical systems important across engineering disciplines.

Course Outcomes:

1. Students have knowledge of the application of linear electrical circuits across engineering disciplines and within sub-disciplines of electrical engineering.
2. Students are proficient in measurement of electrical systems.
3. Students can analyze complex dc and ac linear circuits both analytically and with PSpice.
4. Students can design simple linear electrical circuits.

Laboratory Experiments

Students meet weekly for a three-hour laboratory under the guidance of a TA.

1. Introduction and Basics
2. Using SPICE
3. More SPICE
4. Using the Multimeter
5. Making Electrical Connections
6. Some Circuit Models
7. Op Amps
8. The Oscilloscope
9. Linear and Nonlinear Circuits
10. Waveforms and Function Generators

Course Topics

Selected Material from Textbook

Electrical engineering subdisciplines and technology:
Power systems, Telephone, Instrumentation, AM radio
(1.5 weeks)

Custom handouts from course website.

Basic quantities: circuit elements, power, passive sign
convention (0.5 weeks)

Chap. 1, Basic Concepts

Ohm's Law, Kirchhoff's Laws, Parallel and Series circuits
(2 weeks)

Chap. 2, Resistive Circuits; Section 7.7, Basic (AC)
Analysis using Kirchhoff's Laws

Nodal and loop analysis techniques for dc and ac circuits;
operational amplifiers (2 weeks)

Chap. 3, Nodal and Loop Analysis Techniques;
Section 7.8, (AC) Analysis techniques

Superposition, Thevenin's and Norton's Theorems (2
weeks)

Chap. 4, Additional Analysis Techniques; Section
7.8, (AC) Analysis techniques

Capacitors and inductors; circuits with energy storage
elements (1 week)

Chap. 5, Capacitance and Inductance

First and second order circuits; transient response (2
weeks)

Chap. 6, First- and Second-Order Transient Circuits

Phasors, Impedance, AC steady-state analysis (2 weeks)

Chap. 7, AC Steady-State Analysis

Tests, quizzes, and examinations (1 week)