ECE 223: Electric Circuit Analysis III

Catalog Description

Frequency response and AC power. Includes transfer functions, design of analog filters, Bode plot analysis, pole-zero diagrams, and AC and three-phase power. Weekly lab.

Credits: 4

Goals

Students continue exploring the techniques of circuit analysis developed in ECE 221 and ECE 222. In the first part of the course we continue using Laplace analysis, especially transfer functions applied to AC steady-state circuits. The main emphasis of the course is to look at the frequency response of circuits, and explore both analysis and design of filters. In the second part of the course, we examine AC power concepts and three-phase power. The last topic in the course is representing circuits by two-port networks.

Course Coordinator and Committee

Donald Duncan (coordinator)
Melinda Holtzman
Renjeng Su

Textbooks

Current textbook: *Electric Circuits*, Nilsson and Riedel, 12th Edition, Pearson 2023, ISBN-13: 978-0137648375

Beginning in Fall 2025: *Fundamentals of Electric Circuits,* Alexander and Sadiku, 7th edition, McGraw-Hill 2021, ISBN-13: 978-1260226409.

The course instructor may choose to use a different textbook. Please check with your instructor before purchasing.

Prerequisites

Prerequisite: ECE 222

Corequisite: ECE 223L

Learning Outcomes

At the end of this course, students will be able to:

1. Use transfer functions and Bode plots to characterize circuit frequency response
2. Design and characterize simple frequency-selective filters
3. Calculate the various forms of AC power
4. Analyze three-phase circuits
5. Use two-port networks for circuit analysis
6. Design, construct, and demonstrate a lab project incorporating course concepts

Topical Outline

- Review of Laplace Transform circuit analysis
- First order analog filters
- Second and higher order analog filters
- Bode plots
- AC power and maximum power transfer
- Three-phase power
- Two-port networks
- Laboratory Project

Course Structure and Grading Criteria

Two 90 minute or three 65 minute weekly lectures and one weekly lab.

Grade based on homework, exams and lab reports. For details of the grading criteria, please see the syllabus provided by your instructor. Note that grading criteria may vary with the individual instructor.

Relevant Student Outcomes

The following student outcomes are supported by this course:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

(3) An ability to communicate effectively with a range of audiences

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Assessment Plan and Rubrics

Assessment is based on selected exam problems and lab reports.

Prepared by: Donald Duncan
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