ECE4043 Course Syllabus

ECE4043

Senior Analog Electronics Laboratory (1-0-3-2)

CMPE Degree

This course is Elective for the CMPE degree.

EE Degree

This course is Selected Elective for the EE degree. * (Selected Elective means this course is one of a few choices that are required for the degree.)

Lab Hours

3 supervised lab hours and 0 unsupervised lab hours

Course Coordinator

Robinson Jr,Robert Allen

Prerequisites

ECE 3040 [min C] and ECE 3043 [min C]

Corequisites

None

Catalog Description

Theory and experiments related to the design, analysis, construction, and measurement of advanced analog electronic circuits using discrete devices (diodes, bipolar junction transistors, MOSFETs).

Textbook(s)

Leach, Brewer, & Robinson, *Experiments in Analog Electronic Circuits* (1st edition), Kendall Hunt, 2012. ISBN 1465232419, ISBN 9781465232410 (required)

Course Outcomes

Upon successful completion of this course, students should be able to:

1. Evaluate the performance of advanced analog electronic circuits by using test and measurement instrumentation including dc power supplies, function generators, oscilloscopes, digital multimeters, and RCL meters.
2. Design analog electronic circuits such as amplifiers, filters, rectifiers, and oscillators to meet given specifications.
3. Validate designs and problem solutions by using mathematical and circuit simulation software.
4. Analyze and construct advanced circuits and relate expected behavior to experimental measurements.

Student Outcomes

In the parentheses for each Student Outcome:
"P" for primary indicates the outcome is a major focus of the entire course.
“M” for moderate indicates the outcome is the focus of at least one component of the course, but not majority of course material.

"LN" for "little to none" indicates that the course does not contribute significantly to this outcome.

1. (P) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. (LN) 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. (LN) An ability to communicate effectively with a range of audiences
4. (LN) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. (LN) 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. (P) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. (P) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topical Outline

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1. Terminal Characteristics of the BJT: Collecting curve trace
2. BJT Amplifier configurations: CE, CB, CC, Cascode, Cascade,
3. JFET Applications: CS Amplifier, Chopper Modulator, Voltage
4. BJT Differential Amplifier: Biasing, Differential Gain, Com
5. MOSFET amplifier configurations: CS, Differential Amplifier
6. Discrete Feedback Amplifiers: Series-Shunt, Shunt-Series, S
7. Current Sources: JFET, BJT, MOSFET, Current Mirrors
8. Switched Capacitor Filters: Low Pass, High Pass, Bandpass,
9. Discrete Voltage Regulator: Open Loop, Feedback Error Corre
10. Discrete Op-Amp: Differential Input Stage, Gain Stage, Push
11. Discrete Oscillators: Colpitts, Clapp, Emitter-Coupled
12. Design Project: A task involving circuits previously encoun