ECE 2000: Electrical and Computer Engineering Principles

Credits and contact hours: 3 Credits (Flipped Format: One 75-minutes lecture per week plus online course modules on HuskyCT)

Instructor: David Tonn

  a. Other supplemental materials: Selected reference materials/articles posted online

Specific course information:
  a. Catalog Description: Basic concepts of circuit analysis as applied to electronic circuits and electromechanical devices, including measuring instruments.

  b. Prerequisite: PHYS 1402Q or 1502Q or 1230 or 1530, which may be taken concurrently. Recommended preparation: MATH 2410Q. This course and ECE 2001/W may not both be taken for credit. Intended for non-ECE majors.

  c. Required, elective, or selected elective: Required for ME Majors, elective for other non-ECE majors.

Specific goals for the course:
  a. Specific outcomes of instruction: Students will be able to
    • Apply the fundamental laws of circuit analysis (e.g. Ohm’s Law, Kirchhoff’s Laws) to the analysis of AC and DC series and parallel circuits
    • Apply intermediate methods of circuit analysis (e.g. Node Analysis, Thevenin’s Theorem) to AC and DC circuits
    • Communicate the principles of basic RC and RL filters
    • Communicate the basic principles of ideal operational amplifier circuits and practical limitations of actual amplifier circuits
    • Explain the proper safe usage of digital multi-meters and oscilloscopes for measurement of electrical parameters
    • Apply principles of circuit analysis to magnetic circuits for computing forces produced in moving coil, reluctance based, and permanent magnet based electromechanical actuators
    • Apply principles of circuit analysis to the steady state analysis of DC motors

  b. ABET Criterion 3 Student Outcomes addressed by the course:

    (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
Students learn to recognize the various kinds of components used in basic electronics and analyze them by applying techniques from mathematics, science and engineering.

(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
n/a

(3) an ability to communicate effectively with a range of audiences
n/a

(4) 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
n/a

(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
n/a

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
n/a

(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
The course is offered in a hybrid/flipped format and students use web-based modules for the theoretical treatment of the material.

Topics covered:
- Basic principles of DC circuit analysis
- Node Analysis, Superposition, Thevenin’s and Norton’s Theorems
- Capacitors and Inductors
- Principles of AC steady state analysis
- Principles of RC and RL filters
- Principles of transient analysis
- Operational amplifiers and practical amplifier limitations
- Principles of magnetic circuits
- Forces in linear electromechanical actuators
- Principles of DC motor analysis
- Concepts of AC motor operation