ECE 211 – Circuit Analysis I

Credits: 3, **Contact Hours:** Two 75-minute lecture session per week.

Coordinator: Hassan Shanechi, Senior Lecturer of ECE

Textbook: Fundamentals of Electric Circuits, By: C. K. Alexander and M. N. O. Sadiku, McGraw-Hill, 7th Edition 2020

Catalog Data: ECE 211: Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction to nonlinear circuits. Operational amplifier circuits, diode circuits.

Lecture: 2 Lab: 0 Credits: 3 Satisfies: Communications (C)

Prerequisites or co-requisites by topic: Concurrent registration in MATH 252, (3-0-3) (C)

Enrollment: Required course for CPE and EE majors

Specific outcomes of instruction:
Below are listed the objectives for this course as adopted by the ECE faculty.

After completing this course, the student should be able to do the following:

1. Derive and apply the relevant equations of DC circuit analysis.
2. Draw the symbols for active and passive circuit components.
3. Given a resistive network with multiple nodes and loops, containing both independent and dependent sources, use a variety of appropriate methods to find all unknown variables.
4. Given a resistive network with multiple nodes and loops, containing both independent and dependent sources, determine the load resistance that allows the source to deliver maximum power to the load; calculate the maximum power that is transferred.
5. Given resistors (or capacitors or inductors) connected in series or in parallel, find the equivalent resistance (or capacitance or inductance).
6. Given a series or parallel RL (or RC or RLC) circuit excited by a constant voltage or current, write the response equation, and find the solution.
7. List the possible modes of response for a second-order circuit.
8. Given a first order or a second order network with op amps, be able to analyze it.
9. Be familiar with nonlinear circuit elements and able to solve simple networks with diodes.

Relationship of ECE 211 specific outcomes of instruction to student outcomes:

	Student Outcomes	**Course Goals**
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	1,3,4,5,6,7,8, 9
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	4,8
3	An ability to communicate effectively with a range of audiences	
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	
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	
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Topics:

- Introduction, basic concepts (1 week)
- Basic laws (2 weeks)
- Methods of analysis (2.5 weeks)
- Circuit theorems (1.5 week)
- Energy storing elements, capacitors and inductors (1.5 week)
- First-order circuits (1.5 week)
- Second-order circuits (1.5 weeks)
- Operational amplifier (2 weeks)
- Introduction to nonlinear circuits, diode circuits (1.5 weeks)

Prepared by: Hassan Shanechi **Date:** March 1, 2020