Course name	**ECE 20100 Linear Circuit Analysis I**
Credit and contact hours	(3 cr.) Class 3
Course coordinator's name	Steven Rovnyak
Textbook	C. K. Alexander and M. N. O. Sadiku, *Fundamentals of Electric Circuits*, 6th ed., McGraw-Hill, 2016. ISBN-13: 9780078028229
Course information	ECE 20100 Linear Circuit Analysis I (3 cr.) P: or C: MATH 26100 and PHYS 25100. C: ECE 20700. Class 3. Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source transformations; Thevenin's and Norton's theorems; superposition. Transient response of resistor capacitor (RC), resistor inductor (RL), and resistor inductor capacitor (RLC) circuits; sinusoidal steady-state and impedance. Instantaneous and average power. **Prerequisites/ Co-Requisite** P: or C: MATH 26100 and PHYS 25100. C: ECE 20700 **Required, Elective, or Selected Elective:** EE Required, CE Required
Goals for the course	Upon successful completion of the course, students should be able to 1. Solve basic problems involving voltage, current, charge, and power, energy, and direction/polarity conventions. 2. Describe circuit elements using their current-voltage relationships including sources, resistors, capacitors and inductors. 3. Solve circuits using Kirchhoff's Laws and following solution methods such as nodal and mesh analysis. [1] 4. Apply the properties of linearity, superposition, source transformation, Thevenin and Norton equivalent circuits, and the maximum power transfer theorem. [1] 5. Analyze op amp circuits using ideal op amp assumptions. [1] 6. Determine the transient response of first-order RL and RC circuits with DC sources to initial conditions, switching operations, and step changes in source values. [1] 7. Determine the transient response of basic second-order RLC circuits with DC sources to initial conditions, switching operations, and step changes in source values. [1] 8. Determine the steady-state response of linear RLC circuits to sinusoidal inputs using phasor mathematics. [1] 9. Determine the instantaneous power, average power, apparent power and the complex power for a circuit element in sinusoidal steady state. [1]

List of topics to be covered	1. Voltage, current, charge, power, energy, and direction/polarity conventions. (1.5 classes) 2. Circuit element descriptions, Ohm's law. (0.5 classes) 3. Kirchhoff's Laws and source combinations. (1.0 classes) 4. Combining resistors and conductances. (1.0 classes) 5. Voltage division and current division. (1.0 classes) 6. Nodal analysis and mesh analysis. (2.5 classes) 7. Linearity, superposition, source transformations. (1.5 classes) 8. Thevenin's theorem and Norton's theorem. (2.0 classes) 9. Maximum power theorem. (0.5 classes) 10. Ideal op amp circuits. (2.0 classes) 11. I-V relationships for the inductor and capacitor. (1.5 classes) 12. Source-free RL and RC circuits. (1.5 classes) 13. RL and RC circuits with DC sources. (1.5 classes) 14. Source-free series and parallel RLC circuits. (2.5 classes) 15. Series and parallel RLC circuits with DC sources. (1.5 classes) 16. Phasor representation of sinusoids. (0.5 classes) 17. Sinusoidal steady-state analysis of circuits. (2.0 classes) 18. Instantaneous power and average power. (0.75 classes) 19. Complex power and RMS-value phasors. (0.75 classes) 20. Apparent power, reactive power and power factor. (2.0 classes) 21. Exams (2.0 classes and final exam period)
Syllabi approved by	Steven Rovnyak
Date of approval	08/07/2019