Course name	**ECE 20400 Introduction to Electrical and Electronics Circuits**
Credit and contact hours	(4 cr.) Class 3, Lab 1
Course coordinator's name	Seemein Shayesteh
Textbook	1. Giorgio Rizzoni, *Fundamentals of Electrical Engineering*, 2nd Ed./, McGraw-Hill, ISBN 9780073380568 2. Lab notes
Course information	ECE 20400 Introduction to Electrical and Electronic Circuits (4 cr.) P: or C: PHYS 25100 and MATH 26100 Class 3. Lab 3. Students will learn basics of electrical and electronic circuits including introduction to analog and digital electronic circuits. Measurement of electrical signals using meters, probes, and oscilloscopes are covered in the laboratory component of the course. Circuits are designed for minimum hardware with emphasis on understanding analog and digital electronics with practical use of digital and analog microchips. Non-ECE majors who complete this course can continue the digital course sequence offered by the ECE department including microprocessor systems and interfacing, and digital signal processing. No credit will be given for ECE majors. **Prerequisites/ Co-Requisite** PHYS 25100 and MATH 26100 **Required, Elective, or Selected Elective:** Required for ME, not allowed to be used in EE as well as CE
Goals for the course	Upon successful completion of the course, students should be able to 1. Solve elementary problems using basic principles, conventions, and procedures involving voltages, currents, power, and passive sign convention. [1] 2. Solve elementary problems using Ohm's Law, Kirchhoff's Voltage Law, Kirchhoff's Current Law, linearity, and the maximum power theorem. [1] 3. Solve elementary dc and ac problems using basic techniques such as current division, voltage division, node-voltage analysis, mesh analysis, and superposition. [1] 4. Derive a Boolean expression for digital circuit using positive logic. [1, 6] 5. Design a digital combination circuit given the input, output, and description of the system with maximum four inputs. [1, 2, 6] 6. Distinguish and characterize different types of flip-flops. [6] 7. Design digital circuits using various digital logic building blocks such as multiplexers, flip-flops. [1, 2, 6]

	8. Demonstrate the ability to analyze simple digital circuits. [2, 6] ***The laboratory Component*** 1. Perform basic measurements of voltages and currents in electrical circuits using basic laboratory measurement equipment, such as oscilloscopes, function generators, and digital multi-meters. [1, 6] 2. Demonstrate the ability to use oscilloscope triggering for different purposes. [1, 6] 3. Measure the phase difference between two sinusoidal signals using the oscilloscope. [1, 6] 4. Make measurements to verify Kirchhoff's Current Law and Kirchhoff's Voltage Law in a resistive circuit through measurements. [1, 6] 5 Design, assemble, and test circuits that demonstrate basic op-amp applications such as amplifiers. [1, 6] 6 Build and test digital circuits based on given schematics. 7. Display the amplitude and phase response of an R-L-C circuit. [1, 6] 8. Design, analyze, and test single-stage amplifiers that use bipolar transistors, FETs, or operational amplifiers. [1, 2, 6] 9. Measure propagation delays in TTL gates. [1, 6] 10. Perform a functional simulation of a digital circuit. [1, 6]
List of topics to be covered	1. Introduction: Electric charges, current, voltage, resistance and conductance, and DC circuits. 2. Basic Laws and Techniques for DC and AC Analysis: Ohm's law, Kirchhoff's laws, Nodal analysis, Mesh analysis, and maximum power transfer. 3. Transient Analysis: Capacitors, inductors, first order networks, time constants of an RC network. 4. Basic concepts of electronics, analog and digital signal 5. Analog electronics: Diode operation and models, transistors, BJT operation and models, and operational amplifier operation and model 6. Number systems, Boolean algebra, and truth table 7. Logic gates and combination circuits 8. TTL and MOS families 9. Flip-flops, latches 10. Sequential circuits
Syllabi approved by	Seemein Shayesteh
Date of approval	07/26/2019