

## EE 220

- 1. Course Number & Name:** EE 220, Electric Circuits
- 2. Course Credit and Contact Hours:** 3 Units, 3 hours
- 3. Course Coordinator:** Dr. Mohamed Salem
- 4. Textbook:** Charles K. Alexander and Matthew N. O. Sadiku, *Fundamentals of Electric Circuits*, 6th Edition, McGraw Hill., 2016, ISBN 978-0078028229
- 5. Supplemental Materials:** None
- 6. Specific Course Information:**
  - a. Description:** Review of Kirchhoff's laws, circuit design, node and mesh analysis, etc.; Thevenin's theorem, Norton's theorem, steady state and transient analysis, transfer function. AC power and three-phase circuits, Y-Delta equivalents. Multi-port networks, two-port networks with energy storage, ideal transformers. Amplifiers and frequency response, filters.
  - b. Prerequisites:** EE 110, CS 115, and MATH 211, or consent of instructor
  - c. Co-Requisite:** EE 221 and PHYS 214, or consent of instructor
  - d. Status:**  Required for EE program,  Elective,  Selected Elective
- 7. Specific Goals for the Course:**
  - a. Specific outcomes of instruction:** Upon successful completion of this course the students will be able to:
    - i. Analyze circuit problems involving voltage, current, charge, and power.
    - ii. Understand and apply basic circuit laws and analyze DC circuits using nodal and mesh analysis methods.
    - iii. Apply superposition, source transformation, Thevenin's & Norton's theorems.
    - iv. Understand current and voltage characteristics of capacitors and inductors and their use in basic circuits.
    - v. Determine transient responses of first order RC and RL circuits.
    - vi. Use phasors for steady-state sinusoidal circuit analysis.
    - vii. Understand the basics of instantaneous, average, effective, and complex power; power factor, and three-phase circuits.

- viii. Understand the basics of ideal transformers.
- ix. Determine transfer function and frequency response of first order circuit.
- x. Understand and articulate public health, safety, and welfare considerations in engineering design solutions.

**b. This course supports the following ABET Student Outcomes:**

- i. SO-1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*
- ii. SO-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.*

**8. Brief List of Topics to be Covered:**

- a. Basic concepts
- b. Basic Laws: Ohm's law, Kirchhoff's laws, series and parallel resistors
- c. Methods of analysis: Nodal analysis, mesh analysis
- d. Circuit theorems: Superposition, source transformation, Thevenin's & Norton's theorems
- e. Capacitors and inductors
- f. First-order circuits: RC and RL circuits, transients & steady state analysis
- g. Sinusoids and phasors
- h. AC Power analysis and three-phase circuits
- i. Transformers
- j. Frequency response: Transfer function, Bode plots, passive filters
- k. Engineering design and public health, safety, and welfare