

1. EE 331 Electrical Engineering I
2. 4 Credit Hours and 5 Contact Hours
3. Course coordinator: LT Daniel Gift, USN
4. Text book, title, author, and year:
 - a. Fundamentals of Electric Circuits, Alexander & Saduki, 2016, 6th Edition
 - b. Introduction to Electric Machinery, USNA
 - c. Electronics, Hambley, 1999, 2nd Edition
5. Specific course information
 - a. A study of DC and AC electrical elements and circuits, including Thevenin equivalence, natural and forced responses of first-order systems, AC power, and AC three-phase systems. Diodes and rectifier circuits are introduced and drive discussion of applications in power regulation and machine control. AC and DC machines are investigated and discussed the in the context of a shipboard environment.
 - b. Prereq: Physics II (SP212 or SP222).
 - c. Required
6. Specific goals for the course
 - a. Apply circuit analysis techniques to solve for voltage, current, and power in linear DC and AC circuits. Analyses including voltage or current dividers, nodal analysis, Thevenin, source transformation, and basic application of Kirchhoff's voltage and current laws.
 - b. Design linear circuits to achieve an intended function.
 - c. Understand the operation of, and make basic analysis computations for, circuits containing transformers, rectifiers, and zener diodes.
 - d. Analyze three-phase circuits and be able to calculate voltages, currents, and power.
 - e. Analyze DC (linear and permanent magnet) and AC (synchronous) electric machines and predict electrical and mechanical performance.
 - f. Demonstrate the ability to properly perform/simulate, record, and report laboratory work.
 - g. Understand military applications of course material.
7. Topics covered:
 - a. Circuit Analysis: KCL, KVL, Ohm's Law, series and parallel, Nodal Analysis, Voltage and Current dividers, Superposition, Source Transformation, Thevenin, and Maximum Power Transfer
 - b. Linear Machines and DC Motors
 - c. Capacitors, Inductors, and RL/RC transient analysis
 - d. AC Circuit Analysis: Sinusoids, Phasors and Impedance, KCL, KVL, Ohm's Law, series and parallel, Nodal Analysis, Voltage and Current dividers, Superposition, Source Transformation, and Thevenin

- e. Single phase AC Power, Complex Power, Power Factor, Max Power Transfer, and Power Factor Correction
- f. Transformer and power distribution basics
- g. Three phase sources, circuit analysis, and three phase AC power
- h. AC Synchronous Machine
- i. Diodes, half and full wave rectifier basics, and basic power supply design