

COMPETENCY PROFILE

ALTERNATE CURRENT II (AC 2)

BTC: ELTR 115 (78 clock hours/4 credits)

Students continue their exploration of AC with transformers, filter circuits (low-pass, high-pass, band-stop and band-pass), and passive integrator and differentiator circuits with theory and lab work.



Upon completion of high school equivalent courses, the student will be able to:

- Explain the concept of mutual inductance.
- Determine the step-up/step-down ratio for a transformer and calculated ideal values of voltages and currents in a transformer circuit.
- Explain the concept of current transformer, auto-transformer and its applications.
- Explain the resistor power, reactive power, apparent power, and power factor.
- Calculate impedance transformation in a transformer circuit.
- Explain the superposition principle for AC signals.
- Calculate the relative magnitudes and frequencies of harmonics in a symmetrical square-wave signal.
- Design and build a passive differentiator circuit, given fundamental signal frequency.
- Calculate the power factor of an AC power circuit from oscilloscope readings.
- Calculate the necessary capacitor size to correct for lagging power factor in an AC power circuit.
- Explain the operation of an AC induction motor.
- Explain the operation of an AC synchronous motor.
- Explain the operation of an AC generator, or alternator.
- Calculate voltages and currents in "delta" and "wye" three-phase AC circuits.
- Describe the output wave form of a RL, and RC switching circuits with input square wave.
- Describe the passive integrator and differentiator circuits.
- Predict the effects of specific component failures in AC circuits.
- Demonstrate proficiency with industry standard notations through the use of proper units of measurement, metric prefixes, and schematic diagram creation.
- Construct a practical, functioning AC circuit project in permanent form (soldered, not breadboarded), given a schematic diagram and performance specifications.

College Textbooks:

- 📖 **Electronics Technology Fundamentals (conventional flow version)**, by Paynter and Boydell.
- 📖 **Textbook (supplement) -- Lessons in Electric Circuits, Volume 2 (AC)**, by Tony R. Kuphaldt.
Or access online: <<http://ibiblio.org/obp/electricCircuits/AC>>