

## TECHNOLOGY 270: Electrical Fundamentals and Circuit Analysis I

**2007-08 Catalog Data:** TECH 270 Electrical Fundamentals and Circuit Analysis I  
(3 Credits)

**Catalog Description:** Introduction to circuit element and models: Kirchhoff's laws, Thevenin's theorem, and Norton's theorem; maximum power transfer; series and parallel circuits; power triangle; two-port networks; equivalent networks with direct current or sinusoidal current.

**Prerequisites:** TECH 175 and MATH 155

**Co-requisites:** TECH 270A

**Textbooks:**

- Robbins & Miller, Circuit Analysis, Delmar, 3<sup>rd</sup> Edition.

**Instructor:** Dr. Said Oucheriah

Learning Objectives	Relational ABET Learning Outcomes
Learn to apply Ohm's law, Kirchhoff's laws and compute power in dc circuits.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn to apply methods of analysis: branch-current analysis, mesh (loop) analysis, and nodal analysis.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn to apply the superposition theorem, Thevenin's theorem, Norton's theorem, and maximum power transfer theorem.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and

	<p>technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to describe various types of commercial capacitors, to compute the capacitance for series and parallel configurations, and to compute capacitor voltage and current for simple time varying waveforms.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to describe charging and discharging of simple RC circuits, to plot voltage and current transients.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to describe what an inductor is and what its effect on circuit operation.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to compute inductance for series and parallel configurations, voltages and current for steady state dc excitation.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to compute voltage and current transients in RL circuits during the current building phase, and the current decay phase.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p>

	F. An ability to identify, analyze and solve technical problems.
Learn to define and compute frequency, period, amplitude, RMS, and peak-to-peak values, to compute instantaneous sinusoidal voltage or current at any instant in time, use phasors to represent sinusoidal voltages and currents and determine phase relationships between waveforms using phasors.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to add and subtract voltages and current using phasors, and compute inductive and capacitive reactance.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to explain the impedance concept, and determine voltages and currents in simple ac circuits using the impedance concept.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to compute active, reactive, apparent power and power factor.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to measure power in single-phase circuits.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.

	<p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
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