

# TECHNOLOGY 175: Electricity and Electronics Fundamentals

**2007-08 Catalog Data:** TECH 175 Electricity and Electronics Fundamentals (3 credits)

**Catalog Description:** Fundamentals of dc and ac circuits, network laws and theorems, passive circuit components, semiconductors, electric machines, and digital systems.

**Prerequisites:** MATH 155 and PHYS 150A or PHYS 210.

**Co-requisites:** TECH 175A (selected laboratory experiments to accompany TECH 175)

**Textbook**

- Electricity and Electronics, Gerrish/Dugger/Roberts, GW Publisher.

**Instructor:** Dr. Liping Guo

Learning Objectives	Relational ABET Learning Outcomes
Define force, torque, energy, power, charge, current, electric/magnetic fields, electromagnetism and measurement units.	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.
State the electric properties of materials and determine wire size and resistance using AWG and color code tables.	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.
Reduce a dc network to basic circuit and calculate resistance, power, voltage, and current using ohm's law and power equations.	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.
Determine time constant and describe the transient responses of capacitors and inductors.	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.

Calculate total impedance, voltage, current, power factor, and ac powers (S,P,Q) of an RLC circuit.	<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>
Explain the basic operation of relay, solenoid, buzzer, circuit breaker, transformer, and simple electric machine.	<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>
Describe various types of ac and dc motors and their industrial applications.	<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>
Explain the operations and applications of diodes, transistors, and IC chips.	<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>
Convert between binary and decimal numbers and explain the operation of logic gates, flip-flops, and counters.	<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>
Determine the output states of digital systems using truth table method.	<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>
Investigate/discuss an electrical system or product that is of interest to you and explain environmental, social, or ethical issues involved (term paper.)	<p>G. An ability to communicate effectively in writing.</p> <p>I. A recognition of the need for, and an ability to engage in lifelong learning.</p> <p>J. An ability to understand professional, ethical and social responsibilities.</p>

Construct simple electric circuit and use equipment to measure resistance, voltage, current, frequency, and phase shift.	<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>C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.</p> <p>E. An ability to function effectively on teams.</p> <p>N. An ability to use modern laboratory techniques, skills, and/or equipment effectively.</p>
Write lab reports in proper technical format making use of spreadsheets to present data, perform calculations, and generate graphs.	<p>E. An ability to function effectively on teams.</p> <p>G. An ability to communicate effectively in writing.</p> <p>M. An ability to program computers and/or utilize computer applications effectively.</p>

Topics:

- Electricity and basic measurements
- Circuit materials and sources
- DC circuit analysis
- Magnetism, AC circuits and generators
- Electric motors and transformers
- Electronic Circuits
- Semiconductors
- IC and Digital Circuits