

STRANDS AND STANDARDS

ELECTRONICS 1



Course Description

The first in a sequence of courses that prepares individuals to apply technical knowledge and skills to assemble and operate electrical/electronic equipment used in business, industry, and manufacturing. Instruction includes training in safety, electrical theory, parallel & series circuits, Kirchoff's Laws, schematic diagrams, electrical components, and soldering.

Core Code	38.01.00.00.021
Concurrent Enrollment Core Code	38.01.00.13.021
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	None
Skill Certification Test Number	651
Test Weight	0.5
License Type	Secondary Education 6-12
Required Endorsement(s)	Technology & Engineering, or
	T&E Electronics

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Describe typical electric shock hazards in industry.
- Describe the effects of electricity on the human body.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: <https://schools.utah.gov/cte/engineering/resources> under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will understand the proper use of test equipment.

Standard 1

Understand the proper configuration, handling, and storage of the following:

- Volt meter
- Ammeter
- Ohm meter
- Bench power supply

STRAND 3

Students will be able to understand and demonstrate how to use, test, and select electronic components.

Standard 1

Identify the following components and draw their schematic symbols:

- Resistor
- Potentiometer
- Capacitor
- Variable capacitor
- Relay switch

- Transformer
- Diode
- Antennae
- Transistor
- Microphone
- Speaker
- Batter
- AC power supply
- Terminal post
- Normally-open switch
- Normally-closed switch
- Incandescent light bulb
- Induction coil
- Light emitting diode
- Earth ground
- Chassis ground
- Single-pole single-throw switch
- Single-pole double-throw switch
- Ammeter
- Volt meter
- Ohm meter

Standard 2

Determine the values for electronic components from their markings and physical characteristics.

Standard 3

Describe the operation of and procedures for testing resistors and capacitors in both a series and in a parallel circuit.

STRAND 4

Students will be able to understand and demonstrate basic electrical theory.

Standard 1

Describe basic principles of electrical theory.

- Describe the atomic structure of matter.
- Describe the units of electrical charge, voltage, current, resistance, capacitance, and power.
- Describe the factors that affect the movement of electrical charges.
- Clearly distinguish between direct current (DC) and alternating current (AC).

Standard 2

Verify Ohm's Law.

- State Ohm's Law and graph the relationships between current, resistance, and voltage in circuits.
- Describe the effect on current when changing voltage or resistance.
- Use formulas and basic mathematics to solve problems involving Ohm's Law.

Standard 3

Verify Watts Law.

- State Watts Law and graph the relationships between voltage, current, and power in circuits.
- Describe the effect on power if voltage, current or resistance is changed.
- Use formulas and basic mathematics to solve problems involving Watt's Law.

Standard 4

Construct, measure and analyze simple series resistive circuits.

- Describe the principles of a series circuit.
- State and use Kirchoff's voltage law and the voltage divider formula to solve a series circuit problem.
- Calculate the theoretical values of voltage, current, resistance and power in all parts of a series circuit.
- Use a VIRP table to predict the voltage, current, resistance, and power in all parts of a series circuit from a schematic diagram.

Standard 5

Construct measure and analyze simple parallel resistive circuits.

- Describe the principles of a parallel circuit.
- State and use Kirchoff's current law and the current divider formula to solve parallel circuit problems.
- Calculate the theoretical values of voltage, current, resistance, and power in all parts of a parallel circuit.
- Use a VIRP table to predict the voltage, current, resistance, and power in all parts of a parallel circuit from a schematic diagram.

STRAND 5

Students will demonstrate the ability to successfully solder components to and desolder components from a printed circuit board.

Standard 1

Describe aspects of soldering techniques such as tinning, physical connections, temperature selection, and cleaning.

Standard 2

Describe the necessary precautions to prevent electrostatic discharge (ESD) during soldering.

Standard 3

Show appropriate use of heat sinks on solid state components.

Standard 4

Solder and desolder wires and discrete components on a printed circuit board.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand					Total Points	Total Questions
		1	2	3	4	5		
Electronics 1	651	13	1	13.5	41.5	2	71	48

Performance Skills

1. Create and utilize an engineering notebook per established conventions.
<https://schools.utah.gov/cte/engineering/resources>
2. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*.
<https://schools.utah.gov/cte/engineering/resources>
3. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).