



Multiple Category Scope and Sequence: Scope and Sequence Report For Course Standards and Objectives, Content, Skills, Vocabulary

Wednesday, August 20, 2014, 1:31PM



| Unit | Course Standards and Objectives | Content | Skills | Vocabulary |
|--|--|---|---|--|
| <p>District Basic Basic Electronics (47.0105) (District) 2014-2015 Collaboration</p> | <p>Safety (Week 1, 2 Weeks)  </p> <p>UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 01 Students will be able to understand and demonstrate safe practices.</p> <ul style="list-style-type: none"> ▪ Objective 0101 Use safe work practices. (A1) <ul style="list-style-type: none"> a. Describe the purposes of legislation concerning safety in the workplace. b. Describe safety precautions and procedures pertaining to and working with electricity. c. Describe correct safety procedures for hand and power tools. d. Locate and describe shop safety equipment. e. Use safe work practices. | <ul style="list-style-type: none"> ▪ The reason and purpose of safety regulations ▪ Safe practice around electrical circuitry ▪ Basic hand and power tool safety | <ul style="list-style-type: none"> ▪ State reasons why we have safety regulations ▪ Discuss general safety practices to observe around electrical circuits ▪ Demonstrate proper hand and power tool use. | <ul style="list-style-type: none"> ▪ Circuit Breaker ▪ Lock-out tag-out ▪ Material Safety Data Sheets (MSDS) ▪ Fatal Current ▪ Lethal Voltage |
| | <p>Tools: Part 1 (Week 2, 2 Weeks)  </p> <p>UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 02 Students will be able to understand and demonstrate the use of shop tools, materials, and techniques.</p> <ul style="list-style-type: none"> ▪ Objective 0201 Select and use hand and common power tools. (B1) <ul style="list-style-type: none"> a. Identify hand tools used by electronics technicians. b. Describe the procedures to be used to care for hand tools. c. Identify the proper use and care of power tools and their accessories d. Select and use hand tools. e. Select and use common power tools and their | <ul style="list-style-type: none"> ▪ Basic electrical hand tools ▪ Tool care ▪ soldering technique | <ul style="list-style-type: none"> ▪ Demonstrate basic electrical hand tool use ▪ Demonstrate proper soldering iron prep and care | <ul style="list-style-type: none"> ▪ Solder ▪ Diagnol Cutting Pliers ▪ Lineman Pliers ▪ Flux ▪ Rosin Core |

accessories.

Components: Part

1  (Week 3, 2 Weeks) 

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 04
Students will be able to understand and demonstrate how to test and select passive electronics components.

- Objective 0401
Identify electronic components. (D1)
 - a. Identify electronic passive components i.e. resistors, capacitors, and inductors.
 - b. Using standard electronic multiplication prefixes, determine the values for electronic components from their markings and physical characteristics.
 - c. Identify electronic components.

- How to identify common passive electronic components by their appearance
- Be able to match common passive electronic components with their schematic symbols
- Identify passive electronic component values based on the markings placed on them.

- Students will be able to identify common passive electronic components by their appearance with a high degree of accuracy.
- Students will be able to match common passive electronic components with their schematic symbols with a high degree of accuracy.
- Students will be able to identify passive electronic component values with a high degree of accuracy based on the markings on the components.

- Resistor
- Potentiometer
- Schematic Symbol
- Fuse
- Capacitor
- Inductor
- transformer
- Farad
- Henry
- Ohm
- Switch
- Normally Closed
- Normally Open

Electronic Test Equipment

 (Week 4, 8 Weeks) 

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 03
Students will be able to understand and demonstrate the use of test equipment.

- Objective 0301
Use multimeters – digital and analog. (C1)
 - a. Describe the proper handling, storage and use of digital meters.
 - b. Describe the proper handling, storage and use of analog meters.
 - c. Use multimeters.
- Objective 0302
Use bench power supplies. (C2)
 - a. Describe the operation of a bench power supply and its controls.
 - b. Use power supplies.

- Multi-meter settings and whether item being tested power is on or off when using the setting.
- Bench power supplies controls
- How to combine logic and math skills to reverse engineer simple electrical and electronics circuits.

- Students will select the correct multimeter setting, meter lead connection points and circuit power setting to test voltage, current, or resistance.
- Students will adjust lab power supply voltage and current to settings required to test an electronic item with item power specifications given.

- Multimeter
- Ohmmeter
- Voltmeter
- Ammeter
- Diode Test
- Resistance
- Voltage
- Current

Basic Theory: Intro



(Week 4, 5 Weeks)

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 08
Students will be able to understand and demonstrate basic electronic theory.

- Objective 0801
Describe basic principles of electrical theory. (F1)
 - a. Describe the atomic structure of matter.
 - b. Describe the units of electrical charge, voltage and current.
 - c. Describe the factors that affect the movement of electrical charges.

- Basic structure of an atom
- electrical energy flow
- Ohm's law basic formula
- Ohm's law power derivative

- Students will be able to explain the basic atomic structure of an atom.
- Students will be able to explain both conventional and electron theory of electrical energy flow.
- Students will be able to state the basic Ohms law formula
- Students will be able to state the power derivative of Ohm's law.

- Electron
- Neutron
- Proton
- Potential energy
- Voltage
- Coulomb
- Ampere

Components Part



2: (Week 7, 2 Weeks)

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 04
Students will be able to understand and demonstrate how to test and select passive electronics components.

- Objective 0402
Use, test and select batteries. (D2)
 - a. Describe the construction, operation, testing and maintenance of batteries.
 - b. Use, test, and select batteries.
- Objective 0403
Use, test and select resistive devices. (D3)
 - a. Describe the principles of resistance.
 - b. Identify resistive devices and draw their schematic symbols.
 - c. Describe the function of resistive devices.
 - d. Describe the procedures for testing resistive devices.
 - e. Use, test and select resistive devices.
- Objective 0404
Use, test, and select switches and relays. (D4)

- Switch types, acronyms, and uses
- Battery ratings
- Switch and Battery testing
- Resistor Color Coding

- Students will be able to identify switch types by their schematic symbols, acronyms, and contact number-layout
- Students will be able to test battery charge levels
- Students will be able to select correct batteries based on voltage and amp-hour ratings.
- Students will be able to determine the value of a resistive device based on its color coding.

- Color Code
- Amp-Hour
- Toggle
- SPST
- DPST
- SPDT
- DPDT
- Momentary
- Normally Closed
- Normally Open

- a. Describe switch types, schematic symbols and operation.
- b. Describe relay types, their major parts, schematic symbols and operation.
- c. Describe procedures for selecting, connecting and testing switches and relays.
- d. Connect, test and select switches.
- e. Test, select and connect relays.

Basic Theory: Part 2: Ohms Law

basics  (Week 12, 2 Weeks) 

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 08
Students will be able to understand and demonstrate basic electronic theory.

- Ohm's Law Basic formula and derivatives
- Student will be able to explain Ohms Law basic formula and it's derivatives.
- Ohm's Law

- Objective 0802
Verify ohm's law and power equations. (F2)
 - a. State Ohms Law and graph the relationships between voltage, current and resistance in circuits.
 - b. Use formulas and basic mathematics to solve Ohms Law problems.
 - c. Use formulas to calculate electric power requirements.
 - d. Describe the effect on power requirements of changing voltage, current or resistance on power.
 - e. Describe power dissipation in resistive devices.
 - f. From schematic diagrams, predict the voltage, current, and resistance in all parts of a circuit.
 - g. Determine proper power ratings for resistors.

Induction  (Week 12, 1 Week) 

UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 05
Students will be able to understand and demonstrate induction.

- How magnetic energy is converted into electrical energy and electrical energy into magnetic
- Students will be able to explain the process of how magnetic energy is converted into electrical energy or electrical energy into magnetic
- Induction
- Permeability
- Magnetic-polarization
- Air core

- Objective 0501
Describe principles of magnetism and electromagnetism learning. (F7)
 - a. Explain the principles of magnetic fields.
 - b. Explain the principles of electromagnetic fields.
 - c. Describe the operation and application of magnetic devices.
 - d. Describe the principles of electromagnetic induction.

energy.

energy.

- Iron core

Capacitors



(Week 13, 1 Week)



UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 06
Students will be able to understand and demonstrate capacitors & their application.

- Objective 0601
Use, test, and select capacitors. (D8)
 - a. Describe the principles of operation of capacitors.
 - b. Describe the common types of capacitors, their schematic symbols, major parts and uses.
 - c. Describe the operation of capacitors in DC and AC circuits.
 - d. Describe the procedures for selecting, testing and connecting capacitors in series and parallel circuits.
 - e. Use, test, and select capacitors.

- Construction of a capacitor
- Capacitor time constants
- Types of capacitors

- Students will be able to describe the construction of a capacitor
- Students will be able to describe a capacitor time constants
- Students will be able to describe the different types of capacitors

- Dielectric
- Electrolytic
- Monolithic
- Electric polarization

Transformers



(Week 13, 1 Week)



UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 07
Students will be able to understand and demonstrate how use transformers.

- Objective 0701

- Construction of a transformer
- transformer types
- transformer winding ratio

- Students will be able to describe the construction of a transformer
- Students will be able to list the 3 main transformer types
- Students will be able to explain how a transformer winding ratio changes the

- Primary
- Secondary
- winding-ratio
- step-up
- step-down
- isolation

Troubleshoot transformer circuits. (G3)
 a. Describe the procedure for constructing, testing and troubleshooting transformer circuits.

electrical signal inputted into a transformer.

Basic theory:

Series Circuits

(Week 14, 3 Weeks)



UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 08
 Students will be able to understand and demonstrate basic electronic theory.

- Objective 0803
 Construct, measure and analyze simple series resistive circuits. (F3)
 a. Describe the principles of series circuits.
 b. Calculate the voltage across, current through, equivalent resistance of and power dissipation for any component or group of components in a series resistive circuit.
 c. State and use Kirchoff's voltage law and the voltage divider formula.

- State series circuit characteristics
- Calculate theoretical voltage, resistance, current, and electrical power values in a series resistor circuit.

- Students will be able to state series circuit characteristics
- Students will be able to calculate theoretical voltage, resistance, current, and electrical power values in a series resistor circuit.

- Kirchoff's voltage law

Employability and

Work Habits

(Week 14, 6 Weeks)



UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 17
 Students will understand the importance of employability and work habits.

- Objective 1701
 Develop a list of work standards to follow at school and on the job.
- Objective 1702
 Evaluate your personal ethics.
 a. Evaluate your personal ethics against acceptable workplace ethics.
- Objective 1703
 Build a job search network.
- Objective 1704
 Find job leads.

- The importance of having good employability skills

- Students will understand the importance of having good employability skills

- ethics
- network

- Objective 1705
Write a resume.
- Objective 1706
Create a job portfolio.
- Objective 1707
Complete a job application.
- Objective 1708
Write a business letter and memo.
- Objective 1709
Participate in an actual or simulated job interview.

**Basic Theory:
Parallel Circuits**



(Week 17, 3 Weeks)



UT: CTE: Skilled and Technical Sciences, UT: Grades 9-12, Basic Electronics Standard 08

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

- Objective 0804
Construct, measure and analyze simple parallel resistive circuits. (F4)
 - a. Describe parallel circuit principles.
 - b. Calculate the theoretical values of voltage, current, resistance and power in all parts of the circuit.
 - c. State and use Kirchoff's current law and the current divider formula to solve parallel circuit problems.

- State parallel circuit characteristics
- Calculate theoretical voltage, resistance, current, and electrical power values in a parallel resistor circuit.

- Students will be able to state parallel circuit characteristics
- Students will be able to calculate theoretical voltage, resistance, current, and electrical power values in a parallel resistor circuit.

- Kirchoff's current law