



# **ELECTRONICS TECHNICIAN Basic Electronics**

A course that prepares individuals to apply technical knowledge and skills to assemble, install, operate, maintain, and repair electrical/electronic equipment used in business, industry, and manufacturing. Includes instruction in installing, maintaining, and testing various types of electronic equipment. These courses are based on the state electronics task list.

**USOE  
7/23/2008**

# BASIC ELECTRONICS

Levels: Grades 10-12  
Units of Credit: Minimum 0.5  
CIP Code: 47.0105  
Prerequisite: None

## CORE STANDARDS, OBJECTIVES, AND INDICATORS

**STANDARD 470105-01**      **Students will be able to understand and demonstrate safe practices.**

### Objectives

- 470105-0101      Use safe work practices. (A1)
- Describe the purposes of legislation concerning safety in the workplace.
  - Describe safety precautions and procedures pertaining to and working with electricity.
  - Describe correct safety procedures for hand and power tools.
  - Locate and describe shop safety equipment.
  - Use safe work practices.

**STANDARD 470105-02**      **Students will be able to understand and demonstrate the use of shop tools, materials, and techniques.**

### Objectives

- 470105-0201      Select and use hand and common power tools. (B1)
- Identify hand tools used by electronics technicians.
  - Describe the procedures to be used to care for hand tools.
  - Identify the proper use and care of power tools and their accessories
  - Select and use hand tools.
  - Select and use common power tools and their accessories.
- 470105-0202      Select and use hardware associated with electricity. (B2, B5)
- Identify nuts, bolts, screws, and washers.
  - Identify cable and wire support hardware.
  - Select and use hardware used by electronics technician.
- 470105-0203      Solder and desolder. (B3, B5)
- Explain the principles of soldering and desoldering.
  - Describe appropriate soldering techniques such as tinning, physical connections, temperature selection, and cleaning.
  - Describe the precautions to prevent electrostatic discharge (ESD) during soldering.
  - On a P.C. board solder and desolder ICs, wire and discrete components.

- Show appropriate use of heat sinks on solid state components.

**STANDARD  
470105-03**

**Students will be able to understand and demonstrate the use of test equipment.**

**Objectives**

470105-0301

Use multimeters – digital and analog. (C1)

- Describe the proper handling, storage and use of digital meters.
- Describe the proper handling, storage and use of analog meters.
- Use multimeters.

470105-0302

Use bench power supplies. (C2)

- Describe the operation of a bench power supply and its controls.
- Use power supplies.

**STANDARD  
470105-04**

**Students will be able to understand and demonstrate how to test and select passive electronics components.**

**Objectives**

470105-0401

Identify electronic components. (D1)

- Identify electronic passive components i.e. resistors, capacitors, and inductors.
- Using standard electronic multiplication prefixes, determine the values for electronic components from their markings and physical characteristics.
- Identify electronic components.

470105-0402

Use, test and select batteries. (D2)

- Describe the construction, operation, testing and maintenance of batteries.
- Use, test, and select batteries.

470105-0403

Use, test and select resistive devices. (D3)

- Describe the principles of resistance.
- Identify resistive devices and draw their schematic symbols.
- Describe the function of resistive devices.
- Describe the procedures for testing resistive devices.
- Use, test and select resistive devices.

470105-0404

Use, test, and select switches and relays. (D4)

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

**STANDARD**

**Students will be able to understand and demonstrate induction.**

## 470105-05

### Objectives

470105-0501

Describe principles of magnetism and electromagnetism learning. (F7)

- Explain the principles of magnetic fields.
- Explain the principles of electromagnetic fields.
- Describe the operation and application of magnetic devices.
- Describe the principles of electromagnetic induction.

### **STANDARD 470105-06**

**Students will be able to understand and demonstrate capacitors & their application.**

### Objectives

470105-0601

Use, test, and select capacitors. (D8)

- Describe the principles of operation of capacitors.
- Describe the common types of capacitors, their schematic symbols, major parts and uses.
- Describe the operation of capacitors in DC and AC circuits.
- Describe the procedures for selecting, testing and connecting capacitors in series and parallel circuits.
- Use, test, and select capacitors.

### **STANDARD 470105-07**

**Students will be able to understand and demonstrate how use transformers.**

### Objectives

470105-0701

Troubleshoot transformer circuits. (G3)

- Describe the procedure for constructing, testing, and troubleshooting transformer circuits.

### **STANDARD 470105-08**

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

### Objectives

470105-0801

Describe basic principles of electrical theory. (F1)

- Describe the atomic structure of matter.
- Describe the units of electrical charge, voltage and current.
- Describe the factors that affect the movement of electrical charges.

470105-0802

Verify ohm's law and power equations. (F2)

- State Ohms Law and graph the relationships between voltage, current and resistance in circuits.
- Use formulas and basic mathematics to solve Ohms Law problems.
- Use formulas to calculate electric power requirements.
- Describe the effect on power requirements of changing voltage, current or resistance on power.

- Describe power dissipation in resistive devices.
  - From schematic diagrams, predict the voltage, current, and resistance in all parts of a circuit.
  - Determine proper power ratings for resistors.
- 470105-0803 Construct, measure and analyze simple series resistive circuits. (F3)
- Describe the principles of series circuits.
  - Calculate the voltage across, current through, equivalent resistance of and power dissipation for any component or group of components in a series resistive circuit.
  - State and use Kirchoff's voltage law and the voltage divider formula.
- 470105-0804 Construct, measure and analyze simple parallel resistive circuits. (F4)
- Describe parallel circuit principles.
  - Calculate the theoretical values of voltage, current, resistance and power in all parts of the circuit.
  - State and use Kirchoff's current law and the current divider formula to solve parallel circuit problems.

## **PROFESSIONAL DEVELOPMENT**

**STANDARD 470105-14 Students will understand the need for professional development.**

### **Objectives**

- 470105-1401 Complete a personal inventory.
- 470105-1402 Set and meet goals.
- 470105-1403 Be self-motivated.
- 470105-1404 Know how to make decisions.
- 470105-1405 Know how to manage time.
- 470105-1406 Organize personal belongings and equipment.
- 470105-1407 Learn to communicate verbally.
- 470105-1408 Write effective communications.
- 470105-1409 Establish a personal reading program.
- 470105-1410 Develop effective work skills and attitudes.
- 470105-1411\* Master a working knowledge of SkillsUSA.
  - State the SkillsUSA motto.
  - State the SkillsUSA creed.
  - Learn the SkillsUSA colors.
  - Describe the official SkillsUSA dress.
  - Describe the procedure for becoming a SkillsUSA officer.

**STANDARD 470105-15 Students will understand the need for leadership skills.**

### **Objectives**

- 470105-1501 Serve on a committee.
- 470105-1502 Prepare an agenda.
- 470105-1503 Assist in planning a meeting.
- 470105-1504 Review basic parliamentary procedure.
  - Make a main motion.
- 470105-1505 Participate in a school project.
- 470105-1506 Attend a community meeting.
- 470105-1507 Practice effective speaking.
- 470105-1508 Present a three- to five-minute talk.
- 470105-1509 Implement a leadership project.
- 470105-1510\* Master a working knowledge of SkillsUSA.
  - Describe the meaning of the SkillsUSA emblem.
  - State the SkillsUSA pledge.
  - Describe the duties of a SkillsUSA officer.

**STANDARD**                      **Students will understand the need for career planning.**  
**470105-16**

**Objectives**

- 470105-1601 Define your future occupation.
- 470105-1602 Survey employment opportunities.
- 470105-1603 Report on a trade journal article.
- 470105-1604 Explore opportunities for advanced training.
- 470105-1605 Conduct a worker interview.
- 470105-1606 Contact a professional association.
- 470105-1607 Explore entrepreneurship opportunities.
- 470105-1608 Give a talk about your career.
- 470105-1609 Review career goals.

**STANDARD**                      **Students will understand the importance of employability and**  
**470105-17**                      **work habits.**

**Objectives**

- 470105-1701 Develop a list of work standards to follow at school and on the job.
- 470105-1702 Evaluate your personal ethics.
  - Evaluate your personal ethics against acceptable workplace ethics.
- 470105-1703 Build a job search network.
- 470105-1704 Find job leads.
- 470105-1705 Write a resume.
- 470105-1706 Create a job portfolio.
- 470105-1707 Complete a job application.
- 470105-1708 Write a business letter and memo.
- 470105-1709 Participate in an actual or simulated job interview.

\* SkillsUSA PDP requirements - recommended.