ELECTRONICS TECHNOLOGY 1-4
ACTIVITY/COURSE CODES: 6133, 6134, 6135, 6136

(Effective in the 2013-14 CATE Student Reporting Procedures Manual: The program name Core Electronics will change to Electronics Technology. Also, Communication Electronics and Industrial Electronics will no longer be separate programs with course codes, as their content is now included in Electronics Technology 1-4.)

PROGRAM DESCRIPTION:

This program is designed to teach the foundation of electrical/electronics theory in which concepts will be reinforced daily through hands-on practical applications. Students taking Electronics Technology should have knowledge of the essential concepts of physical science and have algebraic and geometric reasoning skills. This program provides students with a solid foundation for college and/or other post-graduation opportunities.

Electronics Technology standards are aligned with the Associate C.E.T. competencies from the Electronics Technicians Association International (ETA-I). Mastery of Electronics Technology standards can be the first step toward preparation for ETA-I's Associate C.E.T. exam for national industry certification. See http://eta-i.org.

RESOURCES:

www.mysctexbooks.com

CREDIT:

1, 2, or 3 Carnegie units per activity code (dependent upon schools' bell schedules)

OBJECTIVE:

Given the necessary equipment, materials, and instruction, the student, on completion of the prescribed course of study, will be able to successfully accomplish the following standards.

UNIT A: DEMONSTRATING SAFE WORK HABITS AND PROCEDURES TO MEET OSHA STANDARDS (CONTINUIOUS THROUGHOUT THE PROGRAM OF STUDY)

1. Identify various types, purposes, and operation of fire extinguishers.
2. Identify and practice shop safety, including environmental hazards.
3. Identify electrical hazards.
4. Identify and practice safe soldering methods.
5. Identify various safety measures and procedures and when and how to use them.
6. Identify environmental protection measures and procedures and when and how to use them.

7. Demonstrate safe and proper use of hand tools.
8. Demonstrate various methods of controlling static discharge.
9. Demonstrate safe and proper use of test equipment.
10. Demonstrate the use and care of appropriate personal protective equipment (PPE).
11. Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDS).
12. Complete safety test.

UNIT B: DEMONSTRATING PROFICIENCY IN DC ELECTRONICS

1. Identify electronic components and their schematic symbols utilizing existing codes and notations (e.g., color codes and exponential notation).
2. Interpret schematic, block, and pictorial diagrams.
3. Apply Ohm's law in solving DC electronic problems.
4. Apply Watt's law in solving DC electronic power problems.
5. Apply Kirchhoff's laws in solving DC electronic problems.
6. Evaluate and test DC series circuits.
7. Evaluate and test DC parallel circuits.
8. Evaluate and test DC series-parallel circuits.
9. Evaluate and test sources of DC signals and power.
10. Evaluate and test DC resistive devices.
11. Evaluate and test circuit controls (e.g., switches, fuses, circuit breakers, relays).

UNIT C: DEMONSTRATING PROFICIENCY IN AC ELECTRONICS

1. Identify electronic components and their schematic symbols.
2. Interpret schematic, block, and pictorial diagrams.
3. Solve AC electronics problems involving current, voltage, resistance, reactance, impedance, and power.
4. Describe the function and operation of capacitors in AC circuits.
5. Describe the function and operation of inductors in AC circuits.
6. Describe the function and operation of RL, RC, and RLC circuits.
7. Describe the function and operation of transformers.

UNIT D: DEMONSTRATING PROFICIENCY IN SEMICONDUCTOR DEVICES

1. Identify electronic components and their schematic symbols.
2. Interpret schematic, block, and pictorial diagrams.
3. Describe the function and operation of semiconductor devices.
4. Describe the functions and operations of diode circuits, rectifiers, and transistor amplifiers.
5. Demonstrate techniques for handling and replacing semiconductors.

UNIT E: DEMONSTRATING PROFICIENCY IN DIGITAL ELECTRONICS

1. Identify and convert number systems: binary, octal, decimal, hexadecimal, and binary coded decimal.
2. Identify electronic components and their schematic symbols.
3. Interpret schematic, block, and pictorial diagrams.
4. Interpret and develop truth tables and Boolean expressions of logic circuits.
5. Test the operation of logic gates.
6. Test the operation of clock and timing circuits.
7. Build and test combinational logic circuits for a given application.
8. Test counter and controller circuits for sequential logic applications.
9. Interpret information on integrated circuits (IC) data and specification sheets.
10. Test the operation of analog to digital (A/D) and digital to analog (D/A) converters.

UNIT F: DEMONSTRATING PROFICIENCY IN SOLDERING AND ASSEMBLING TECHNIQUES

1. Select and maintain soldering and desoldering tools.
2. Solder and desolder components.
3. Select and install connection devices (e.g., terminal, lug, crimp, spade).

UNIT G: DEMONSTRATING PROFICIENCY IN USE OF TEST EQUIPMENT

1. Measure voltage, current, and resistance using multimeters (e.g., VOM, DMM, DVM).
2. Measure voltage, time, frequency, and phase angle using an oscilloscope.
3. Operate a power source.
4. Operate signal and function generators.

The student may be exposed to this additional technical content depending on each school's unique situation.

ADVANCED ELECTRONICS TECHNOLOGY CONTENT:

1. Apply network theorems (superposition, Thevenin's, and Norton's).
2. Perform vector analysis in RL, RC, and RLC circuits.
3. Demonstrate uses of thyristors, analog ICs, and optoelectric devices.
4. Perform arithmetic operations in various digital number systems.
5. Test the operations of binary adders.
6. Apply De Morgan's theorem to simplify Boolean expressions.

INDUSTRIAL ELECTRONIC CONTROL SYSTEMS:

1. Identify electronic component schematic symbols.
2. Test and repair motor control systems (e.g., starters, control wiring, variable-speed drives, overcurrent protection).
3. Identify and test sensors.
4. Test and repair solid-state power controls.
5. Test, repair, and maintain computer-controlled systems (e.g., CNC, robotics, and process control).

PROGRAMMABLE LOGIC CONTROLS:

1. Identify electronic component schematic symbols.
2. Describe the function and purpose of a programmable logic controller (PLC).
3. Compare hardwired and PLC systems.
4. Convert between number systems.
5. Analyze a binary logic network.
6. Describe the purpose of the various power supplies used within a PLC.
7. Construct input/output (I/O) circuits.
8. Define the function of the PLC processor module.
9. Describe the interrelations between microprocessor components.
10. State the characteristics of the different types of memory.
11. Demonstrate the features of relay ladder logic instruction categories.
12. Demonstrate the principles used to correlate PLC hardware components to software instructions.
13. Convert a hardware ladder diagram to a PLC ladder diagram.
14. Program PLC using above diagram.
15. Troubleshoot problems in PLC circuit using a given diagram.

BASIC INSTALLATION AND MAINTENANCE PROCEDURES FOR AUDIO AND VIDEO EQUIPMENT:

1. Describe operation of audio and video equipment.
2. Install and maintain major types of audio and video equipment.