

July 2006

Florida Department of Education
Outcomes - Standards

Program Title: Electronic Technology

CIP Number 0615030300

Length - 1400 Hours - Certificate

INTENDED OUTCOMES

After successfully completing the program, the student will be able to:

- 01.0 Demonstrate proficiency in soldering and basic laboratory practices.
- 02.0 Demonstrate proficiency in basic D.C. circuits.
- 03.0 Demonstrate employability skills.
- 04.0 Demonstrate an understanding of entrepreneurship.
- 05.0 Demonstrate proficiency in knowledge of basic computer usage.
- 06.0 Demonstrate proficiency in advanced D.C. circuits.
- 07.0 Demonstrate proficiency in A.C. circuits.
- 08.0 Demonstrate proficiency in solid state devices.
- 09.0 Demonstrate proficiency in digital circuits.
- 10.0 Demonstrate proficiency in fundamental micro-processors.
- 11.0 Demonstrate proficiency in analog circuits.
- 12.0 Demonstrate skills in technical recording.
- 13.0 Demonstrate appropriate communications skills.
- 14.0 Demonstrate appropriate understanding of basic math skills.
- 15.0 Demonstrate an understanding of basic science skills.

Student Performance Standards

Program Title: Electronic Technology

- 01.0 **DEMONSTRATE PROFICIENCY IN SOLDERING BASIC LABORATORY PRACTICES**--The student will be able to:
 - 01.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.
 - 01.02 Make electrical connections.
 - 01.03 Identify and use hand tools properly.
 - 01.04 Identify and use power tools properly.
 - 01.05 Demonstrate acceptable soldering techniques.
 - 01.06 Demonstrate acceptable desoldering techniques.
 - 01.07 Demonstrate electrostatic discharge (ESD) safety procedures.
 - 01.08 Describe the construction of printed circuit boards (PCB's).
 - 01.09 Explain the theoretical concepts of soldering.
 - 01.10 Demonstrate rework and repair techniques.
- 02.0 **DEMONSTRATE PROFICIENCY IN BASIC DIRECT CURRENT (DC) CIRCUITS**--The student will be able to:
 - 02.01 Demonstrate proficiency in basic D.C. circuits.
 - 02.02 Solve problems in electronic units utilizing metric prefixes.
 - 02.03 Identify sources of electricity.
 - 02.04 Define voltage, current, resistance, power and energy.
 - 02.05 Apply Ohm's law and power formulas.
 - 02.06 Read and interpret color codes and symbols to identify electrical components and values.

- 02.07 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.
- 02.08 Compute conductance and compute and measure resistance of conductors and insulators.
- 02.09 Apply Ohm's law to series circuits.
- 02.10 Construct and verify operation of series circuits.
- 02.11 Analyze and troubleshoot series circuits.
- 02.12 Apply Ohm's law to parallel circuits.
- 02.13 Construct and verify the operation of parallel circuits.
- 02.14 Analyze and troubleshoot parallel circuits.

- 03.0 **DEMONSTRATE EMPLOYABILITY SKILLS**--The student will be able to:
 - 03.01 Conduct a job search.
 - 03.02 Secure information about a job.
 - 03.03 Identify documents that may be required when applying for a job.
 - 03.04 Complete a job application form correctly.
 - 03.05 Demonstrate competence in job interview techniques.
 - 03.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons.
 - 03.07 Identify acceptable work habits.
 - 03.08 Demonstrate knowledge of how to make appropriate job changes.
 - 03.09 Demonstrate acceptable employee health habits.
 - 03.10 Demonstrate knowledge of the "Right-to-Know Law" as recorded in (29 CFR-1910.1200).

- 04.0 **DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP**--The student will be able to:
 - 04.01 Define entrepreneurship.
 - 04.02 Describe the importance of entrepreneurship to the American economy.
 - 04.03 List the advantages and disadvantages of business ownership.
 - 04.04 Identify the risks involved in ownership of a business.
 - 04.05 Identify the necessary personal characteristics of a successful entrepreneur.
 - 04.06 Identify the business skills needed to operate a small business efficiently and effectively.

- 05.0 **DEMONSTRATE PROFICIENCY IN KNOWLEDGE OF BASIC COMPUTER USAGE**--The student will be able to:
 - 05.01 Demonstrate the use of a micro-computer operating system.
 - 05.02 Demonstrate the use of a high-level computer language.
 - 05.03 Demonstrate the use of microcomputer application programs (i.e., word processing, database and spreadsheet).

- 06.0 **DEMONSTRATE PROFICIENCY IN ADVANCED D.C. CIRCUITS**--The student will be able to:
 - 06.01 Solve algebraic problems to include exponentials to DC.
 - 06.03 Relate electricity to the nature of matter.
 - 06.16 Apply Ohm's law to series-parallel and parallel-series circuits.
 - 06.17 Construct and verify the operation of series-parallel and parallel-series and bridge circuits.
 - 06.18 Troubleshoot series-parallel and parallel-series and bridge circuits.
 - 06.19 Identify and define voltage divider circuits (loaded and unloaded).
 - 06.20 Construct and verify the operation of voltage divider circuits (loaded and unloaded).

- 06.21 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).
 - 06.22 Apply maximum power transfer theorem.
 - 06.23 Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
 - 06.24 Describe magnetic properties of circuits and devices.
 - 06.25 Determine the physical and electrical characteristics of capacitors and inductors.
 - 06.26 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
 - 06.27 Set up and operate power supplies for DC circuits.
- 07.0 **DEMONSTRATE PROFICIENCY IN A.C. CIRCUITS**--The student will be able to:
- 07.01 Solve basic trigonometric problem as applicable to electronics.
 - 07.05 Define the characteristics of AC capacitive circuits.
 - 07.06 Construct and verify the operation of AC capacitive circuits.
 - 07.07 Analyze and troubleshoot AC capacitive circuits.
 - 07.08 Define the characteristics of AC inductive circuits.
 - 07.09 Construct and verify the operation of AC inductive circuits.
 - 07.10 Analyze and troubleshoot AC inductive circuits.
 - 07.11 Define and apply the principles of transformers to AC circuits.
 - 07.12 Construct and verify the operation of AC circuits utilizing transformers.
 - 07.13 Analyze and troubleshoot AC circuits utilizing transformers.
 - 07.14 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
 - 07.15 Analyze and troubleshoot differentiator and integrator circuits.
 - 07.16 Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
 - 07.17 Construct and verify the operation of series and parallel resonant circuits.
 - 07.18 Define the characteristics of series and parallel resonant circuits.
 - 07.19 Construct and verify the operation of series and parallel resonant circuits.
 - 07.20 Analyze and troubleshoot R-C, R-L, and RLC circuits.
 - 07.21 Define the characteristics of frequency selective filter circuits.
 - 07.22 Construct and verify the operation of frequency selective filter circuits.
 - 07.23 Analyze and troubleshoot frequency selective filter circuits.
 - 07.24 Define the characteristics of polyphase circuits.
 - 07.25 Define basic motor theory and operation.
 - 07.26 Define basic generator theory and operation.
 - 07.27 Set up and operate power supplies for AC circuits.
 - 07.28 Analyze and measure power in AC circuits.
 - 07.29 Set up and operate capacitor and inductor analyzers for AC circuits.
- 08.0 **DEMONSTRATE PROFICIENCY IN SOLID STATE DEVICES**--The student will be able to:
- 08.01 Identify and define properties of semiconductor materials.
 - 08.02 Identify and define operating characteristics and applications of junction diodes.
 - 08.03 Identify and define operating characteristics and applications of special diodes.
 - 08.04 Construct diode circuits.

- 08.05 Analyze and troubleshoot diode circuits.
 - 08.06 Identify and define operating characteristics and applications of bipolar transistors,
 - 08.07 Identify and define operating characteristics and applications of field effect transistors.
 - 08.08 Identify and define operating characteristics and applications of single-stage amplifiers.
 - 08.09 Construct single-stage amplifiers.
 - 08.10 Analyze and troubleshoot single-stage amplifiers.
 - 08.11 Construct thyristor circuitry.
 - 08.12 Analyze and troubleshoot thyristor circuitry.
 - 08.13 Set up and operate VOM for solid-state devices.
 - 08.14 Set up and operate DVM for solid-state devices.
 - 08.15 Set up and operate power supplies for solid-state devices.
 - 08.16 Set up and operate oscilloscopes for solid-state devices.
 - 08.17 Set up and operate function generators for solid-state devices.
 - 08.18 Set up and operate capacitor and inductor analyzers for solid-state devices.
 - 08.19 Set up and operate curve tracers.
 - 08.20 Set up and operate transistor testers.
- 09.0 **DEMONSTRATE PROFICIENCY IN DIGITAL CIRCUITS**--The student will be able to:
- 09.01 Define and apply numbering systems to codes and arithmetic operations.
 - 09.02 Analyze and minimize logic circuits using Boolean operations.
 - 09.03 Set up and operate logic probes for digital circuits.
 - 09.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
 - 09.05 Set up and operate pulsers for digital circuits.
 - 09.06 Set up and operate oscilloscopes for digital circuits.
 - 09.07 Set up and operate logic analyzers for digital circuits.
 - 09.08 Set up and operate pulse generators for digital circuits.
 - 09.09 Identify types of logic gates and their truth tables.
 - 09.10 Construct combinational logic circuits using integrated circuits.
 - 09.11 Troubleshoot logic circuits.
 - 09.12 Analyze types of flip-flops and their truth tables.
 - 09.13 Construct flip-flops using integrated circuits.
 - 09.14 Troubleshoot flip-flops.
 - 09.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.
 - 09.16 Identify types of registers and counters.
 - 09.17 Construct registers and counters using flip-flops and logic gates.
 - 09.18 Troubleshoot registers and counters.
 - 09.19 Analyze clock and timing circuits.
 - 09.20 Construct clock and timing circuits.
 - 09.21 Troubleshoot clock and timing circuits.
 - 09.22 Identify types of arithmetic-logic circuits.
 - 09.23 Construct arithmetic-logic circuits.
 - 09.24 Troubleshoot arithmetic-logic circuits.
 - 09.25 Identify types of encoding and decoding devices.
 - 09.26 Construct encoders and decoders.
 - 09.27 Troubleshoot encoders and decoders.
 - 09.28 Identify types of multiplexer and demultiplexer circuits.
 - 09.29 Construct multiplexer and demultiplexer circuits using integrated circuits.
 - 09.30 Troubleshoot multiplexer and demultiplexer circuits.

- 09.31 Identify types of memory circuits.
 - 09.32 Relate the uses of digital-to-analog and analog-to-digital conversions.
 - 09.33 Construct digital-to-analog and analog-to-digital circuits.
 - 09.34 Troubleshoot digital-to-analog and analog-to-digital circuits.
 - 09.35 Identify types of digital displays.
 - 09.36 Construct digital display circuits.
 - 09.37 Troubleshoot digital display circuits.
- 10.0 **DEMONSTRATE PROFICIENCY IN FUNDAMENTAL MICROPROCESSORS**--The student will be able to:
- 10.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
 - 10.02 Analyze bus concepts.
 - 10.03 Analyze various memory schemes.
 - 10.04 Use memory devices in circuits.
 - 10.05 Troubleshoot memory device circuits.
 - 10.06 Set up and operate oscilloscopes for microprocessor systems.
 - 10.07 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
 - 10.08 Identify types of input and output devices and peripherals.
 - 10.09 Interface input and output ports to peripherals.
 - 10.10 Analyze and troubleshoot input and output ports.
 - 10.11 Write a macro processor program in assembly language.
 - 10.12 Write a macro processor program in machine language.
 - 10.13 Execute microprocessor instruction sets.
- 11.0 **DEMONSTRATE PROFICIENCY IN ANALOG CIRCUITS**--The student will be able to:
- 11.01 Identify and define operational characteristics and applications of multistage amplifiers.
 - 11.02 Construct multistage amplifiers.
 - 11.03 Analyze and troubleshoot multistage amplifiers.
 - 11.04 Identify and define operating characteristics and applications of linear integrated circuits.
 - 11.05 Identify and define operating characteristics and applications of basic power supplies and filters.
 - 11.06 Construct basic power supplies and filters.
 - 11.07 Identify and define operating characteristics and applications of differential and operational amplifiers.
 - 11.08 Construct differential and operational amplifier circuits.
 - 11.09 Analyze and troubleshoot differential and operational amplifier circuits.
 - 11.10 Identify and define operating characteristics of audio power amplifiers.
 - 11.11 Construct audio power amplifiers.
 - 11.12 Analyze and troubleshoot audio power amplifiers.
 - 11.13 Identify and define operating characteristics and applications of power supply regulator circuits.
 - 11.14 Construct power supply regulator circuits.
 - 11.15 Analyze and troubleshoot power supply regulator circuits.
 - 11.16 Identify and define operating characteristics and applications of active filters.
 - 11.17 Construct active filter circuits.
 - 11.18 Analyze and troubleshoot active filter circuits.
 - 11.19 Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.
 - 11.20 Construct oscillator circuits.

- 11.21 Analyze and troubleshoot oscillator circuits.
 - 11.22 Identify and define operating characteristics and applications of cathode ray tubes.
 - 11.23 Identify and define operating characteristics and applications of optoelectronic devices.
 - 11.24 Set up and operate measuring instruments for analog circuits.
- 12.0 **DEMONSTRATE SKILLS IN TECHNICAL RECORDING**--The student will be able to:
- 12.01 Draw and interpret electronic schematics.
 - 12.02 Record data and design curves and graphs.
 - 12.03 Write reports and make oral presentations.
 - 12.04 Maintain test logs.
 - 12.05 Make equipment failure reports.
 - 12.06 Specify and requisition simple electronic components.
 - 12.07 Compose technical letters and memoranda.
 - 12.08 Write formal reports of laboratory experiences.
 - 12.09 Draft preventive maintenance and calibration procedures.
- 13.0 **DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS**--The student will be able to:
- 13.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
 - 13.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 13.03 Read and follow written instructions.
 - 13.04 Answer and ask questions coherently and concisely.
 - 13.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
 - 13.06 Demonstrate appropriate telephone/communication skills.
- 14.0 **DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC MATH SKILLS**--The student will be able to:
- 14.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
 - 14.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
 - 14.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 14.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 14.05 Demonstrate and understanding of federal, state, and local taxes and their computation.
- 15.0 **DEMONSTRATE AN UNDERSTANDING OF BASIC SCIENCE SKILLS**--The student will be able to:
- 15.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 15.02 Draw conclusions or make inferences from data.
 - 15.03 Identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
 - 15.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.