Florida Department of Education
Curriculum Framework

Program Title: **Electronic Systems Technician**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

Career Certificate Program	
Program Number	J540300
CIP Number	0615030332
Grade Level	30, 31
Program Length	900 hours
Teacher Certification	Refer to the **Program Structure** section
CTSO	SkillsUSA
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Computation (Mathematics): 10 Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the manufacturing career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the manufacturing career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in electronic support services positions.

The content includes but is not limited to direct current (DC) circuits, alternating current (AC) circuits and analog circuits; solid state and digital devices; microprocessors; use of circuit diagrams and schematics; soldering and chassis assembly techniques; laboratory practices; and technical recording and reporting.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	EEV0012	Electronic Assembler and DC Technician	AVIONICS @7 7G ELECTRONIC @7 7G RADIO TV %7 %G TEC ELEC @7 7G TV PROD TEC @7 7G	150 hours
B	EEV0820	Electronic Digital and Microprocessor Technician		150 hours
C	EEV0130	Electronic AC Technician		150 hours
D	EEV0824	Electronic Solid-State and Analog Technician		150 hours
E	EEV0825	Electronic Systems and Equipment Technician		300 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social, and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership, and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

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

01.0   Demonstrate proficiency in electronics assembly, soldering, and basic laboratory practices.
02.0   Demonstrate proficiency in basic DC circuits.
03.0   Demonstrate proficiency in advanced DC circuits.
04.0   Demonstrate proficiency in digital circuits.
05.0   Demonstrate proficiency in fundamental microprocessors.
06.0   Demonstrate skills in technical recording utilizing industry recognized computer application software.
07.0   Demonstrate proficiency in AC circuits.
08.0   Demonstrate proficiency in solid state devices.
09.0   Demonstrate proficiency in analog circuits.
10.0   Demonstrate proficiency in basic systems troubleshooting.
11.0   Demonstrate proficiency in fiber optic circuits.
12.0   Explain the importance of employability and entrepreneurship skills.
13.0   Demonstrate an understanding of emerging electronic technologies.

Florida Department of Education
Student Performance Standards

Program Title: Electronic Systems Technician
Career Certificate Program Number: J540300

Course Description: The Electronic Assembler and DC Technician course prepares students for entry into the electronics technology industry. Students explore career opportunities and requirements of a professional electronics technician. Students study basic soldering lab practices, Basic DC and Advanced DC circuitry.

Course Number: EEV0012 Occupational Completion Point: A Electronic Assembler and DC Technician – 150 Hours
01.0 Demonstrate proficiency in electronics assembly, soldering, and basic laboratory practices. The student will be able to:
01.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.
01.02 Identify and use hand tools and power tools properly.
01.03 Draw and interpret electronic schematics.
01.04 Apply recognized industry accepted standard electrostatic discharge (ESD) safety procedures.
01.05 Make electrical connections.
01.06 Specify and request simple electronic components.
01.07 Properly place and solder components on a basic printed circuit board (PCB) to industry accepted standards.
01.08 Apply recognized industry standard soldering and De soldering techniques to include surface mount and thru-hole techniques.
01.09 Apply recognized industry accepted standard techniques for rework and repair.
01.10 Understand the purpose for writing reports and properly communicating results.
01.11 Understand the purpose for recording data.
01.12 Understand the purpose for designing curves and graphs.
01.13 Understand the purpose for writing formal laboratory experience reports.
01.14 Understand the process for generating equipment failure reports.
01.15 Understand the process for maintaining test logs.
01.16 Understand preventive maintenance and calibration procedures and related documentation.
02.0 Demonstrate proficiency in basic DC circuits. The student will be able to:

	02.01	Solve problems in electronic units utilizing metric prefixes.
	02.02	Describe the relationship of DC electricity to the nature of matter.
	02.03	Identify sources of electricity.
	02.04	Define voltage, current, resistance, power and energy.
	02.05	Apply Ohm's law and power formulas to series circuits.
	02.06	Read and interpret color codes, surface mount codes, and symbols to identify electrical components and values.
	02.07	Measure properties of a circuit using appropriate test equipment.
	02.08	Compute conductance and compute and measure resistance of conductors and insulators.
	02.09	Verify, analyze, and troubleshoot the operation of series circuits.
	02.10	Apply Ohm's law to parallel circuits.
	02.11	Verify, analyze, and troubleshoot the operation of parallel circuits.
03.0	Demonstrate proficiency in advanced DC circuits. The student will be able to:	
	03.01	Solve algebraic problems to include exponentials to DC.
	03.02	Apply Ohm's law to series-parallel and parallel-series circuits.
	03.03	Verify, analyze, and troubleshoot the operation of series-parallel, parallel-series, and bridge circuits.
	03.04	Verify, analyze, and troubleshoot and the operation of voltage divider circuits (loaded and unloaded).
	03.05	Apply and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
	03.06	Describe magnetic properties of circuits and devices.
	03.07	Determine the physical and electrical characteristics of capacitors and inductors.
	03.08	Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
	03.09	Verify the operation of power supplies for DC circuits.
	03.10	Identify and explain the theory of DC motors and their practical applications.

Course Description: The Electronic Digital and Microprocessor Technician course is designed to build on the skills and knowledge students learned in the Electronics Assembler and DC Technician course for entry into the electronics technology industry. Students study digital circuitry, fundamental micro-processor theory, and technical recording.

Course Number: EEV0820 **Occupational Completion Point: B** **Electronic Digital and Microprocessor Technician – 150 Hours**	
04.0	Demonstrate proficiency in digital circuits. The student will be able to:
	04.01 Define and apply numbering systems to codes and arithmetic operations.
	04.02 Analyze and minimize logic circuits using Boolean operations.
	04.03 Verify the operation of digital devices and circuits using appropriate test equipment.
	04.04 Verify, analyze and troubleshoot the operation of combinational logic circuits and sequential logic gates.
	04.05 Verify, analyze, and troubleshoot the operation of flip-flops using integrated circuits and their truth tables.
	04.06 Identify, define and measure characteristics of integrated circuit (IC) logic families.
	04.07 Verify, analyze, and troubleshoot the operation of registers and counters.
	04.08 Verify, analyze, and troubleshoot the operation of timing circuits.
	04.09 Verify, analyze, and troubleshoot the operation of arithmetic-logic circuits.
	04.10 Verify, analyze and troubleshoot the operation of encoding and decoding devices.
	04.11 Verify, analyze and troubleshoot the operation of multiplexer and demultiplexer circuits.
	04.12 Identify types of memory circuits.
	04.13 Verify, analyze and troubleshoot the operation of digital-to-analog and analog-to-digital circuits.
	04.14 Verify, analyze and troubleshoot the operation of digital display circuits.
05.0	Demonstrate proficiency in fundamental microprocessors. The student will be able to:
	05.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
	05.02 Safely install and remove a CPU without damaging.
	05.03 Analyze bus concepts.
	05.04 Analyze various memory schemes.
	05.05 Define and identify the types of memory devices and circuits.
	05.06 Define and identify the functions of a microprocessor.
	05.07 Analyze and troubleshoot a microprocessor system.
	05.08 Define and identify microprocessor peripheral devices.
	05.09 Demonstrate the proper handling of a microprocessor.

05.10	Compare and contrast micro types and programming language types.
06.0	**Demonstrate skills in technical recording utilizing industry recognized computer application software. The student will be able to:**
06.01	Draw and interpret electronic schematics.
06.02	Record data and design curves and graphs.
06.03	Write reports and make oral presentations.
06.04	Maintain test logs.
06.05	Make equipment failure reports.
06.06	Specify and requisition simple electronic components.
06.07	Compose technical letters and memoranda with issue and solutions.
06.08	Write formal reports of laboratory experiences.
06.09	Understand preventive maintenance and calibration procedures and related documentation.

Course Description: The Electronic AC Technician course is designed to build on the skills and knowledge students learned in the Electronic Digital and Microprocessor Technician course for entry into the electronics technology industry. Students study AC circuitry, and technical recording.

Course Number: EEV0130
Occupational Completion Point: C
Electronic AC Technician – 150 Hours

07.0	**Demonstrate proficiency in AC circuits. The student will be able to:**
07.01	Solve basic trigonometric problem as applicable to electronics.
07.02	Verify, analyze, and troubleshoot the operation of AC capacitive circuits and their characteristics.
07.03	Verify, analyze, and troubleshoot the operation of AC inductive circuits and their characteristics.
07.04	Verify, analyze, and troubleshoot the operation of AC circuits utilizing transformers and their principles of transformers to AC circuits.
07.05	Verify, analyze, and troubleshoot the operation of differentiators and integrators to determine R-C and R-L time constraints.
07.06	Define, analyze, and troubleshoot the characteristics of Resistive, Inductive, and Capacitive (RLC) circuits, R-C & R-L circuits.
07.07	Verify, analyze, and troubleshoot the operation of series and parallel resonant circuits and their characteristics
07.08	Verify, analyze, and troubleshoot operations of frequency selective filter circuits and their characteristics
07.09	Define the characteristics of poly-phase circuits.
07.10	Define basic AC motor theory, operation, and practical applications.

	07.11	Define basic generator theory, operation, and practical applications.
	07.12	Operate power supplies for AC circuits.
	07.13	Set up and operate oscilloscopes for AC circuits.
	07.14	Set up and operate function generators for AC circuits.
06.0		Demonstrate skills in technical recording utilizing industry recognized computer application software. The student will be able to:
	06.01	Draw and interpret electronic schematics.
	06.02	Record data and design curves and graphs.
	06.03	Write reports and make oral presentations.
	06.04	Maintain test logs.
	06.05	Make equipment failure reports.
	06.06	Specify and requisition simple electronic components.
	06.07	Compose technical letters and memoranda with issue and solutions.
	06.08	Write formal reports of laboratory experiences.
	06.09	Understand preventive maintenance and calibration procedures and related documentation.

Course Description: The Electronic Solid-State and Analog Technician course is designed to build on the skills and knowledge students learned in the Electronic AC Technician course for entry into the electronics technology industry. Students study solid state devices, analog circuitry, and technical recording.

Course Number: EEV0824 **Occupational Completion Point: D** **Electronic Solid-State and Analog Technician – 150 Hours**		
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, for example Zener diodes.
	08.04	Verify, analyze, and troubleshoot the proper operation of diode circuits.
	08.05	Identify and define operating characteristics and applications of bipolar transistors,
	08.06	Identify and define operating characteristics and applications of field effect transistors.
	08.07	Identify and define operating characteristics and applications of single-stage amplifiers.

	08.08	Verify, analyze, and troubleshoot the operation of single-stage amplifiers.
	08.09	Understand the principles and application of thyristor circuity.
	08.10	Set up and operate power supplies, oscilloscopes and function generators for solid-state devices.
	08.11	Verify the proper operation of transistors.
	08.12	Analyze and troubleshoot transistor circuits.
09.0	Demonstrate proficiency in analog circuits. The student will be able to:	
	09.01	Verify, analyze, and troubleshoot the operational characteristics and applications of multistage amplifiers.
	09.02	Identify and define operating characteristics and applications of linear integrated circuits.
	09.03	Verify, analyze, and troubleshoot the operating characteristics and applications of basic power supplies and filters.
	09.04	Verify, analyze, and troubleshoot the operating characteristics and applications of differential and operational amplifiers.
	09.05	Verify, analyze, and troubleshoot the operating characteristics and applications of audio power amplifiers.
	09.06	Verify, analyze, and troubleshoot the operating characteristics and applications of power supply regulator circuits.
	09.07	Verify, analyze, and troubleshoot the operating characteristics and applications of active filter circuits.
	09.08	Verify, analyze, and troubleshoot the operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits.
	09.09	Verify, analyze, and troubleshoot the operating characteristics and applications of Optoelectronic Devices including: Liquid Crystal Display (LCD), Light Emitting Diode (LED), and Three Dimensional (3D) technologies.
06.0	Demonstrate skills in technical recording utilizing industry recognized computer application software. The student will be able to:	
	06.01	Draw and interpret electronic schematics.
	06.02	Record data and design curves and graphs.
	06.03	Write reports and make oral presentations.
	06.04	Maintain test logs.
	06.05	Make equipment failure reports.
	06.06	Specify and requisition simple electronic components.
	06.07	Compose technical letters and memoranda with issue and solutions.
	06.08	Write formal reports of laboratory experiences.
	06.09	Understand preventive maintenance and calibration procedures and related documentation.

Course Description: The Electronic Systems and Equipment Technician course is designed to build on the skills and knowledge students learned in the Electronic Solid-State and Analog Technician course for entry into the electronics technology industry. Students study basic systems troubleshooting, fiber optic circuitry, employability and entrepreneurship skills, and emerging electronic technologies.

Course Number: EEV0825 **Occupational Completion Point: F** **Electronic Systems and Equipment Technician – 300 Hours**
10.0   Demonstrate proficiency in basic systems troubleshooting. The student will be able to:
10.01   Identify basic components of systems.
10.02   Interpret basic flow charts, block diagrams, schematics, and technical documentation.
10.03   Isolate a system malfunction to a specific subsystem or field replaceable unit.
11.0   Demonstrate proficiency in fiber optic circuits. The student will be able to:
11.01   Describe the nature of light propagation.
11.02   Identify and define optical transmitters, receivers, and fibers.
11.03   Recognize a fiber optic cable connection that complies too industry standards.
11.04   Determine reflectivity, refractivity, and losses within a fiber optic system.
12.0   Explain the importance of employability and entrepreneurship skills. The students will be able to:
12.01   Identify and demonstrate positive work behaviors needed to be employable.
12.02   Develop personal career plan that includes goals, objectives, and strategies.
12.03   Research licensing, certification, and industry credentialing requirements.
12.04   Maintain a career portfolio to document knowledge, skills, and experience.
12.05   Evaluate and compare employment opportunities that match career goals.
12.06   Identify and exhibit traits for retaining employment.
12.07   Identify opportunities and research requirements for career advancement.
12.08   Research the benefits of ongoing professional development.
12.09   Examine and describe entrepreneurship opportunities as a career planning option.
13.0   Demonstrate an understanding of emerging electronic technologies. The student will be able to:
13.01   Research and identify careers and workforce needs that employ emerging electronic technologies.
13.02   Identify the skills required to work within careers that use emerging electronic technologies.

13.03	Apply learned skills and competencies related to various electronic technology industry sectors. (e.g., communications, telecommunications, computer networking, consumer electronics, medical electronics, avionics, mechatronics, etc.)

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools, and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate, and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Reading and Language Arts). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02, Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01, F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College System Institution must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91, F.S.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.