

**Florida Department of Education
Curriculum Framework**

Program Title: Electrical and Instrumentation Technology 2
Program Type: Career Preparatory
Career Cluster: Manufacturing

Career Certificate Program – Career Preparatory	
Program Number	J110200
CIP Number	0615040402
Grade Level	30, 31
Standard Length	800 hours
Teacher Certification	Refer to the Program Structure section
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3023 – Electrical and Electronic Engineering Technicians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 11 Language: 10 Reading: 10

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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, and the technical training to support professional personnel in the engineering, design, development and evaluation of electrical and instrument systems.

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 two 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.

The standard length of this program is 800 hours. **Electrical and Instrumentation Technology 1** is a core program. It is recommended that students complete **Electrical and Instrumentation Technology 1** or demonstrate mastery of the outcomes in that program prior to enrollment in **Electrical and Instrumentation Technology 2**.

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	SOC Code
A	EEV0656	Instrument Technician	ELECTRONIC @7 7G TEC ELEC @7 7G	400 hours	49-2094
B	EEV0658	Operating Engineer Assistant Stationary		400 hours	17-3023

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:

- 1.0 Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS).
- 2.0 Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control devices.
- 3.0 Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices.
- 4.0 Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices.
- 5.0 Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices.
- 6.0 Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices.
- 7.0 Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices.
- 8.0 Demonstrate process operation skills.
- 9.0 Demonstrate knowledge of technical reporting.

Florida Department of Education
 Student Performance Standards

Program Title: Electrical and Instrumentation Technology 2
Career Certificate Program Number: J110200

Course Number: EEV0656
Occupational Completion Point: A
Instrument Technician – 400 Hours – SOC Code 49-2094

Course Description:

The Instrument Technician course is designed to build on the skills and knowledge students learned in the Electrician Maintenance course for entry into the Electrical and Instrumentation Technology industry. Students explore career opportunities and requirements of a professional electrical and instrumentation technician. Content emphasizes beginning skills key to the success of working in the Electrical and Instrumentation industry. Students study distributed control systems (DCS); level, pressure, temperature, flow, physical property, and chemical property measurement and control devices.

CTE Standards and Benchmarks	
1.0	Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS).--The student will be able to:
1.1	Describe the principles and purpose of a DCS system.
1.2	Describe the architecture and components of a DCS system.
1.3	Configure control points on a DCS system.
1.4	Perform data storage routines on a DCS system.
1.5	Print graphs of control point responses from a DCS system.
1.6	Perform data communications through PLC or discrete input/output interface units.
1.7	Perform preventive maintenance and calibrate on DCS system devices.
1.8	Troubleshoot and repair faults in DCS systems.
2.0	Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control device.--The student will be able to:
2.1	Demonstrate knowledge of the terminology, physics, methods and principles of level measurement and control.
2.2	Identify level measurement purpose and requirements.
2.3	Identify level measurement instruments.
2.4	Identify solid level measuring systems.
2.5	Identify instrument calibration standards.

CTE Standards and Benchmarks

2.6	Identify safe standards, installation techniques and maintenance practices as applicable to level measurement.
2.7	Identify common causes of level measurement instrument and sensor failures.
2.8	Troubleshoot and repair level measurement and control system failures.
2.9	Identify ultrasonic level devices.
2.10	Identify principles of operation for radiation type, level control devices.
2.11	Determine correct applications for direct level measurement devices: floats, displacers, conductivity probes, etc.)
2.12	Determine correct applications for indirect level measurement devices: (hydraulic pressure, bubble tubes, radioactive emitters and detectors, etc.)
2.13	Design and operate a level control loop.
2.14	Calibrate level elements, transmitters and controllers.
2.15	Demonstrate knowledge of final control elements and applications for level loops.
3.0	Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices.--The student will be able to:
3.1	Demonstrate knowledge of the terminology, physics, methods and principles of pressure measurement and control.
3.2	Identify pressure measurement instruments.
3.3	Identify pressure measurement purpose and requirements.
3.4	Identify applications of vacuum/pressure measuring methods.
3.5	Identify the elements of vacuum/pressure measurement systems.
3.6	Identify safety standards, installation techniques and maintenance practices as applicable to vacuum/pressure measurement.
3.7	Identify instrument calibration standards.
3.8	Identify common vacuum/pressure, measuring instrument and sensor failures.
3.9	Troubleshoot and repair vacuum/pressure measurement and control system failures.
3.10	Demonstrate knowledge of elastic deformation elements.
3.11	Design and operate pressure loop.
3.12	Calibrate pressure elements, transmitters and controllers.
3.13	Demonstrate knowledge of differential pressure elements, principles, and applications.
3.14	Demonstrate knowledge of applications and requirements of vacuum breakers and pressure relief devices.
3.15	Demonstrate knowledge of final control elements and applications for vacuum/pressure loops.
4.0	Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices.--The student will be able to:

CTE Standards and Benchmarks

4.1	Demonstrate knowledge of the terminology, physics, methods and principles of temperature measurement and control.
4.2	Identify temperature measurement purpose and requirements.
4.3	Identify temperature measurement instruments.
4.4	Identify bimetallic and fluid-filled temperature measuring instruments.
4.5	Identify thermocouple and RTD temperature measuring instruments.
4.6	Identify and operate pyrometers and thermometers.
4.7	Identify safety standards, installation techniques and maintenance practices as applicable to temperature measurement.
4.8	Identify instrument calibration standards.
4.9	Identify common temperature measuring instrument and sensor failures.
4.10	Troubleshoot and repair temperature measurement and control system failure.
4.11	Design and operate a temperature control loop.
4.12	Calibrate temperature elements, transmitters and controllers.
4.13	Demonstrate knowledge of final control elements and applications for temperature loops.
5.0	Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices.--The student will be able to:
5.1	Demonstrate knowledge of the terminology, physics, methods and principles of fluid flow measurement and control.
5.2	Identify flow measurement purpose and requirement.
5.3	Identify secondary measurement devices for fluid flow.
5.4	Identify applications for variable area instruments.
5.5	Identify open channel flow devices.
5.6	Identify applications for positive displacement metering.
5.7	Identify flow displacement measurement methods.
5.8	Identify applications for magnetic flow meters.
5.9	Identify applications for ultrasonic flow metering methods.
5.10	Identify safety standards, installation techniques and maintenance practices as applicable to flow measurement.
5.11	Troubleshoot and repair flow measurement and control system failure.
5.12	Demonstrate knowledge of Venturi tubes, flow nozzles, orifice plates and pilot tubes to measure flow.
5.13	Demonstrate knowledge of mass flow measurement techniques.
5.14	Demonstrate knowledge of final control elements and applications for flow loops.

CTE Standards and Benchmarks

5.15	Calibrate flow elements, transmitters and controllers.
5.16	Design and operate a flow control loop.
6.0	Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices.--The student will be able to:
6.1	Identify weight and mass measuring units.
6.2	Identify methods for weighing materials in motion.
6.3	Identify weight displacement measurement methods.
6.4	Troubleshoot and repair weight instruments.
6.5	Perform operating systems checks, preventative maintenance and make adjustments to weight measurement loops.
6.6	Calibrate weight elements, transmitters and controllers.
6.7	Understand the principles of operation for consistency measuring instruments.
7.0	Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices.--The student will be able to:
7.1	Troubleshoot and repair pH measuring instruments.
7.2	Perform operating systems checks and make minor adjustments to pH measuring instruments.
7.3	Troubleshoot and repair liquid conductivity measuring instruments.
7.4	Understand basic principles of operation and the application for gas analyzer measuring instruments.
7.5	Demonstrate knowledge of measuring instruments used to enhance a safe work environment.

Florida Department of Education
Student Performance Standards

Course Number: EEV0658
Occupational Completion Point: B
Operating Engineer Assistant Stationary – 400 Hours – SOC Code 17-3023

Course Description:

The Operating Engineer Assistant Stationary course is designed to build on the skills and knowledge students learned in the Instrument Technician course. Students explore career opportunities and requirements of a professional electrical and instrumentation technician. Students study process operation, and technical reporting.

CTE Standards and Benchmarks	
8.0	Demonstrate process operation skills.--The student will be able to:
8.1	Use PLC's to troubleshoot process systems.
8.2	Identify safety isolation procedures for removing a device from a process.
8.3	Perform operating system checks, preventive maintenance and make minor adjustments to level control loops.
8.4	Perform operating system checks, preventive maintenance and make minor adjustments to vacuum/pressure control loops.
8.5	Perform operating system checks, preventive maintenance and make minor adjustments to temperature control loops.
8.6	Perform operating system checks, preventive maintenance and make minor adjustments to flow measuring instruments.
8.7	Perform operating system checks, preventive maintenance and make minor adjustments to consistency measuring instruments.
8.8	Perform operating system checks, preventive maintenance and make minor adjustments to liquid conductivity measuring instruments.
8.9	Perform operating system checks to pneumatic and hydraulic systems.
8.10	Operate control points on a DCS system.
9.0	Demonstrate knowledge of technical reporting.--The student will be able to:
9.1	Draw and interpret schematics.
9.2	Record data and prepare charts and graphs.
9.3	Write reports and make oral presentations.
9.4	Make equipment - failure reports.
9.5	Specify and requisition simple components.
9.6	Compose technical letters and memoranda.

CTE Standards and Benchmarks

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| 9.7 | Draw preventive maintenance and calibration procedures. |
| 9.8 | Write and use maintenance work orders. |

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.

Special Notes

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student. Access MyCareerShines by visiting: www.mycareershines.org.

Career and Technical Student Organization (CTSO)

SkillsUSA is the intercultural 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 a Career Certificate Program 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: Mathematics 11.0, Language 10.0, and Reading 10.0. 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(7), 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(3)(a), F.S., may also be exempted from

meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

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.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>