2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Manufacturing Cooperative Education - OJT**
Course Type: **Career Preparatory**
Career Cluster: **Manufacturing**

Secondary – Cooperative Education - OJT	
Course Number	9200420
CIP Number	06149999CP
Grade Level	9-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	Any District Certification appropriate to the students' chosen career field
CTSO	SkillsUSA

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 cluster(s); 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 cluster(s).

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Manufacturing Cooperative Education OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

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

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 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Program Title: **Manufacturing Cooperative Education OJT**
Secondary Number: **9200420**

Standards and Benchmarks	
01.0	Perform designated job skills--The student will be able to:
01.01	Perform tasks as outlined in the training plan.
01.02	Demonstrate job performance skills.
01.03	Demonstrate safety procedures on the job.
01.04	Maintain appropriate records.
01.05	Attain an acceptable level of productivity.
01.06	Demonstrate appropriate dress and grooming habits.
02.0	Demonstrate work ethics--The student will be able to:
02.01	Follow directions.
02.02	Demonstrate good human relations skills on the job.
02.03	Demonstrate good work habits.
02.04	Demonstrate acceptable business ethics.

Additional Information

Special Notes

There is a **Cooperative Education Manual** available online that has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE website at http://www.fldoe.org/workforce/dwdframe/pdf/STEPS-Manual.pdf.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization(s) for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities may need additional time (beyond the regular school year) to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Manufacturing Directed Study**
Career Cluster: **Manufacturing**

Secondary – Career Preparatory	
Course Number	9201000
CIP Number	0614999901
Grade Level	11-12, 30, 31
Standard Length	1 credit - Multiple credits
Teacher Certification	Any District Certification appropriate to the students' chosen career field
CTSO	SkillsUSA

Purpose

The purpose of this course is to provide students with learning opportunities in a prescribed program of study within the manufacturing cluster(s) that will enhance opportunities for employment in the career field chosen by the student.

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

Course Structure

The content is prescribed by the instructor based upon the individual student's assessed needs for directed study.

This course may be taken only by a student who has completed or is currently completing a specific secondary job preparatory program or occupational completion point for additional study in this career cluster. A student may earn multiple credits in this course.

The selected standards and benchmarks, which the student must master to earn credit, must be outlined in an instructional plan developed by the instructor.

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 expertise in a specific occupation contained within the career cluster.
02.0 Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results.
03.0 Apply enhanced leadership and professional career skills.
04.0 Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study.

Florida Department of Education
Student Performance Standards

Course Title: **Manufacturing Directed Study**
Course Number: **9201000**
Course Credit: **1**

CTE Standards and Benchmarks	
01.0	Demonstrate expertise in a specific occupation within the career cluster--The student will be able to:
01.01	The benchmarks will be selected from the appropriate curriculum frameworks and determined by the instructor based upon the individual students assessed needs.
02.0	Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results--The student will be able to:
02.01	Select investigative study referencing prior research and knowledge.
02.02	Collect, organize and analyze data accurately and precisely.
02.03	Design procedures to test the research.
02.04	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
03.0	Apply enhanced leadership and professional career skills--The student will be able to:
03.01	Develop and present a professional presentation offering potential solutions to a current issue.
03.02	Enhance leadership and career skills through work-based learning including job placement, job shadowing, entrepreneurship, internship, or a virtual experience.
03.03	Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.
03.04	Enhance written and oral communications through the development of presentations, public speaking, and live and/or virtual interviews.
04.0	Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study--The student will be able to:
04.01	Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.
04.02	Read and interpret information relative to the chosen occupation.
04.03	Locate and evaluate key elements of oral and written information.
04.04	Analyze and apply data and/or measurements to solve problems and interpret documents.
04.05	Construct charts/tables/graphs using functions and data.

Additional Information

Laboratory Activities

A learning laboratory is provided as required to support the educational activities of the student. This laboratory may be in the traditional classroom, in an industry setting, or a virtual learning environment.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Biomedical Equipment Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

Secondary – Career Preparatory	
Program Number	9204100
CIP Number	0615040105
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	ELECTRONIC @7 7G MED EQUIP TECH 7G BIOMED EQ 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9062 – Medical Equipment Repairer 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial 49-9071 – Maintenance and Repair Workers, General
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment in an industry related to biomedical equipment technology, such as electronics troubleshooting, electronics assemblers, etc. 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 course content includes, but is not limited to, hydraulics, pneumatics, optics and mechanics to troubleshoot, service and repair equipment commonly used for treatment, diagnosis and monitoring of patients in a medical environment. Course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Equipment Repair industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 three occupational completion points.

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	9540310	Electronics Fundamentals 1	1 credit	49-2094	2
B	9204110	Electronics Equipment Troubleshooter	1 credit	49-9071	2
	9204120	Medical Electronics 1	1 credit	49-9062	2
C	9204130	Biomedical Electronics Technician	1 credit	49-9062	2

Academic Alignment Table

The courses comprising this program have not yet been aligned to the Next Generation Sunshine State Standards contained in specific math and science core academic courses. This alignment is a collaborative review by Career and Technical Education (CTE) teachers and core academic teachers. Once the program has been subjected to this alignment, this curriculum framework will include a table depicting the number of academic standards in each CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course.

Courses	Algebra 1	Algebra 2	Geometry	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics	Marine Science 1 Honors	Physical Science	Physics 1
Electronics Fundamentals 1	^^	^^	^^	0/53 0%	0/52 0%	0/56 0%	0/55 0%	0/58 0%	0/35 0%	0/42 0%	0/56 0%	0/53 0%
Electronics Equipment Troubleshooter	^^	^^	^^	0/53 0%	0/52 0%	0/56 0%	0/55 0%	0/58 0%	0/35 0%	0/42 0%	0/56 0%	0/53 0%
Medical Electronics 1	^^	^^	^^	0/53 0%	0/52 0%	0/56 0%	0/55 0%	0/58 0%	0/35 0%	0/42 0%	0/56 0%	0/53 0%

Courses	Algebra 1	Algebra 2	Geometry	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics	Marine Science 1 Honors	Physical Science	Physics 1
Biomedical Electronics Technician	^^	^^	^^	0/53 0%	0/52 0%	0/56 0%	0/55 0%	0/58 0%	0/35 0%	0/42 0%	0/56 0%	0/53 0%

^^ *Alignment pending full implementation of the Florida Standards for Mathematics.*

** *Alignment pending review*

\# *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for Mathematics & Language Arts (FS-M/LA)

Some or all of the courses in this program have been aligned to the Florida Standards for Mathematics and Language Arts used in core academic classes. Data shown in the framework table (column 'FS-M/LA') contains the results of these alignment efforts.

Next Generation Sunshine State Standards (NGSSS) - Science

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards (NGSSS) for Science. Data shown in the framework table (column 'NGSSS-Sci') contains the results of these alignment efforts.

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 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Biomedical Equipment Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Biomedical Equipment Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.
04.0 Demonstrate proficiency in soldering and basic laboratory practices.
05.0 Demonstrate proficiency in basic DC circuits.
06.0 Demonstrate employability skills.
07.0 Demonstrate an understanding of entrepreneurship.
08.0 Demonstrate proficiency in knowledge of basic computer usage.
09.0 Demonstrate proficiency in advanced DC circuits.
10.0 Demonstrate proficiency in AC circuits.
11.0 Demonstrate proficiency in analog circuits.
12.0 Demonstrate proficiency in solid state devices.
13.0 Demonstrate proficiency in digital circuits.
14.0 Demonstrate proficiency in fundamental micro-processors.
15.0 Demonstrate appropriate understanding of basic math skills.
16.0 Demonstrate an understanding of basic science skills.
17.0 Demonstrate skills in technical recording.
18.0 Demonstrate appropriate communication skills.
19.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Biomedical Equipment Technology.
20.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Biomedical Equipment Technology.
21.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.
22.0 Demonstrate proficiency with Transistor Pulse Amplifiers.
23.0 Demonstrate proficiency with Trigger Device Circuits.
24.0 Demonstrate proficiency with Operational Amplifiers.
25.0 Demonstrate proficiency in knowledge of Electromagnetics.
26.0 Demonstrate proficiency with Fiber Optic Applications.
27.0 Demonstrate proficiency in DC Motor Systems.
28.0 Demonstrate proficiency with Motor Control Systems.
29.0 Demonstrate an understanding of safety concepts and best practices.
30.0 Demonstrate appropriate understanding of “The Human Machine”.
31.0 Demonstrate an understanding of Monitoring Systems.

32.0 Demonstrate proficiency with Basic Monitoring Equipment.
33.0 Demonstrate proficiency with Medical Support Equipment.
34.0 Demonstrate proficiency with Motors.
35.0 Demonstrate proficiency with Power Systems.
36.0 Demonstrate proficiency with Laboratory Equipment.
37.0 Demonstrate proficiency with Sterilization Equipment.
38.0 Demonstrate an understanding of Biomedical Imaging Systems.
39.0 Demonstrate proficiency with Radiographic Imaging Systems.
40.0 Demonstrate proficiency with Magnetic Resonance Imaging Systems.
41.0 Demonstrate proficiency with Impedance Tomography Systems.
42.0 Demonstrate proficiency with Life Support Systems.
43.0 Demonstrate proficiency with Respiratory Systems.
44.0 Demonstrate proficiency with Cardio Systems.
45.0 Demonstrate proficiency with Renal Systems.
46.0 Demonstrate proficiency with Incubators.
47.0 Demonstrate proficiency with Biomedical Optic Systems.
48.0 Demonstrate proficiency with Surgical Support Tools.
49.0 Demonstrate proficiency using Biomedical Information Systems.

Florida Department of Education
Student Performance Standards

Course Title: **Electronics Fundamentals 1**
Course Number: **9540310**
Course Credit: **1**

Course Description:
This course teaches basic DC an AC electricity and electronics fundamentals. It emphasizes troubleshooting techniques and it brings elements that help to develop fine motor skills. This course defines techniques, requirements and expectations for those seeking to enter the job market as employees or small business owners.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Biomedical Equipment Technology.		
	01.01 Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02 Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	

Florida Standards			Correlation to CTE Program Standard #
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Biomedical Equipment Technology.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.01.3	Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. LAFS.910.WHST.1.3	

Florida Standards			Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.		

Florida Standards	Correlation to CTE Program Standard #
03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Demonstrate proficiency in soldering basic laboratory practices—The Student will be able to:		
04.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.		
04.02 Make electrical connections.		
04.03 Identify and use hand tools properly.		
04.04 Identify and use power tools properly.		
04.05 Demonstrate acceptable soldering techniques.		
04.06 Demonstrate acceptable de-soldering techniques.		
04.07 Demonstrate electrostatic discharge (ESD) safety procedures.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
04.08	Describe the construction of printed circuit boards (PCB's).		
04.09	Explain the theoretical concepts of soldering.		
04.10	Demonstrate rework and repair techniques.		
05.0	Demonstrate proficiency in basic direct current (DC) circuits—The Student will be able to:		
05.01	Demonstrate proficiency in basic DC circuits.		
05.02	Solve problems in electronic units utilizing metric prefixes.		
05.03	Identify sources of electricity.		
05.04	Define voltage, current, resistance, power and energy.		
05.05	Apply Ohm's law and power formulas.		
05.06	Read and interpret color codes and symbols to identify electrical components and values.		
05.07	Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.		
05.08	Compute conductance and compute and measure resistance of conductors and insulators.		
05.09	Apply Ohm's law to series circuits.		
05.10	Analyze and troubleshoot series circuits.		
05.11	Apply Ohm's law to parallel circuits.		
05.12	Analyze and troubleshoot parallel circuits.		
06.0	Demonstrate employability skills—The Student will be able to:		
06.01	Discuss elements of a job search.		
06.02	Develop sources of information about a job.		
06.03	Identify documents that may be required when applying for a job.		
06.04	Complete a job application form correctly.		
06.05	Demonstrate competence in job interview techniques.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
06.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons.		
06.07	Identify acceptable work habits.		
06.08	Demonstrate knowledge of how to make appropriate job changes.		
06.09	Demonstrate acceptable employee health habits.		
06.10	Demonstrate knowledge of the “Right-to-Know Law” as recorded in (29 CFR-1910.1200).		
06.11	Resume writing.		
07.0	Demonstrate an understanding of entrepreneurship—The Student will be able to:		
07.01	Define entrepreneurship.		
07.02	Describe the importance of entrepreneurship to the American economy.		
07.03	List the advantages and disadvantages of business ownership.		
07.04	Identify the risks involved in ownership of a business.		
07.05	Identify the necessary personal characteristics of a successful entrepreneur.		
07.06	Identify the business skills needed to operate a small business efficiently and effectively.		
07.07	Corporate structure “S”,”C”, Sole Proprietor, “LLC”		
08.0	Demonstrate proficiency in knowledge of basic computer usage—The Student will be able to:		
08.01	Demonstrate proficiency in the knowledge of basic computer use.		
08.02	Demonstrate the use of computer application programs (i.e., word processing, data base, Excel).		
09.0	Demonstrate proficiency in advanced DC circuits—The Student will be able to:		
09.01	Solve algebraic problems to include exponentials to DC.		
09.02	Relate electricity to the nature of matter.		
09.03	Apply Ohm’s law to series-parallel and parallel-series circuits.		
09.04	Construct and verify the operation of series-parallel and parallel-series and bridge circuits.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
09.05 Troubleshoot series-parallel and parallel-series and bridge circuits.		
09.06 Identify and define voltage divider circuits (loaded and unloaded).		
09.07 Construct and verify the operation of voltage divider circuits (loaded and unloaded).		
09.08 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).		
09.09 Describe magnetic properties of circuits and devices.		
09.10 Determine the physical and electrical characteristics of capacitors and inductors.		
09.11 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants.		
09.12 Set up and operate power supplies for DC circuits.		
10.0 Demonstrate proficiency in AC circuits—The Student will be able to:		
10.01 Solve basic trigonometric problem as applicable to electronics.		
10.02 Define the characteristics of AC capacitive circuits.		
10.03 Analyze and troubleshoot AC capacitive circuits.		
10.04 Define the characteristics of AC inductive circuits.		
10.05 Analyze and troubleshoot AC inductive circuits.		
10.06 Define and apply the principles of transformers to AC circuits.		
10.07 Analyze and troubleshoot AC circuits utilizing transformers.		
10.08 Analyze and troubleshoot differentiator and integrator circuits.		
10.09 Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).		
10.10 Define the characteristics of series and parallel resonant circuits.		
10.11 Analyze and troubleshoot R-C, R-L, and RLC circuits.		
10.12 Define the characteristics of frequency selective filter circuits.		
10.13 Analyze and troubleshoot frequency selective filter circuits.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
10.14 Define the characteristics of polyphase circuits.		
10.15 Define basic motor theory and operation.		
10.16 Define basic generator theory and operation.		
10.17 Set up and operate power supplies for AC circuits.		
10.18 Analyze and measure power in AC circuits.		

Florida Department of Education
Student Performance Standards

Course Title: **Electronics Equipment Troubleshooter**
Course Number: **9204110**
Course Credit: **1**

Course Description:
This course develops skills and understanding of basic electronics, Analog, Digital, and Microprocessor functions. Students will learn or refresh practical and applied math and science skills.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Biomedical Equipment Technology.		
	01.01 Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02 Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	

Florida Standards			Correlation to CTE Program Standard #
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Biomedical Equipment Technology.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.01.3	Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. LAFS.910.WHST.1.3	

Florida Standards			Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.		

Florida Standards	Correlation to CTE Program Standard #
03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
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 Analyze and troubleshoot multistage amplifiers.		
11.03 Identify and define operating characteristics and applications of linear integrated circuits.		
11.04 Identify and define operating characteristics and applications of basic power supplies and filters.		
11.05 Identify and define operating characteristics and applications of differential and operational amplifiers.		
11.06 Analyze and troubleshoot differential and operational amplifier circuits.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
11.07 Identify and define operating characteristics of audio power amplifiers.		
11.08 Analyze and troubleshoot audio power amplifiers.		
11.09 Identify and define operating characteristics and applications of power supply regulator circuits.		
11.10 Analyze and troubleshoot power supply regulator circuits.		
11.11 Identify and define operating characteristics and applications of active filters.		
11.12 Analyze and troubleshoot active filter circuits.		
11.13 Identify and define operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits.		
11.14 Analyze and troubleshoot oscillator circuits.		
11.15 Identify and define operating characteristics and applications of cathode ray tubes and optoelectronic devices.		
11.16 Set up and operate measuring instruments for analog circuits.		
12.0 Demonstrate proficiency in solid state devices—The Student will be able to:		
12.01 Identify and define properties of semiconductor materials.		
12.02 Identify and define operating characteristics and applications of junction and special diodes.		
12.03 Analyze and troubleshoot diode circuits.		
12.04 Identify and define operating characteristics and applications of bipolar and field effect transistors,		
12.05 Identify and define operating characteristics and applications of single-stage amplifiers.		
12.06 Analyze and troubleshoot single-stage amplifiers.		
12.07 Analyze and troubleshoot thyristor circuitry.		
12.08 Set up and operate; DVM, power supplies, oscilloscopes, and function generators for solid-state devices.		
12.09 Demonstrate transistor testing techniques.		
13.0 Demonstrate proficiency in digital circuits—The Student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
13.01 Define and apply numbering systems to codes and arithmetic operations.		
13.02 Analyze and minimize logic circuits using Boolean operations.		
13.03 Set up and operate; logic probes, pulsers, oscilloscopes, logic analyzers, and pulse generators for digital circuits.		
13.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.		
13.05 Identify types of logic gates and their truth tables.		
13.06 Construct combinational logic circuits using integrated circuits.		
13.07 Troubleshoot logic circuits.		
13.08 Analyze types of flip-flops and their truth tables.		
13.09 Troubleshoot flip-flops.		
13.10 Identify, define and measure characteristics of integrated circuit (IC) logic families.		
13.11 Identify types of registers and counters.		
13.12 Troubleshoot registers and counters.		
13.13 Analyze clock and timing circuits.		
13.14 Troubleshoot clock and timing circuits.		
13.15 Identify types of arithmetic-logic circuits.		
13.16 Troubleshoot arithmetic-logic circuits.		
13.17 Identify types of encoding and decoding devices.		
13.18 Troubleshoot encoders and decoders.		
13.19 Identify types of multiplexer and demultiplexer circuits.		
13.20 Troubleshoot multiplexer and demultiplexer circuits.		
13.21 Identify types of memory circuits.		
13.22 Relate the uses of digital-to-analog and analog-to-digital conversions.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
13.23 Troubleshoot digital-to-analog and analog-to-digital circuits.		
13.24 Identify types of digital displays.		
13.25 Troubleshoot digital display circuits.		
14.0 Demonstrate proficiency in fundamental micro-processors—The Student will be able to:		
14.01 Identify central processing unit (CPU) building blocks and their uses (architecture).		
14.02 Analyze bus concepts.		
14.03 Analyze various memory schemes.		
14.04 Use memory devices in circuits.		
14.05 Set up and operate oscilloscopes for microprocessor systems.		
14.06 Identify types of input and output devices and peripherals.		
14.07 Interface input and output ports to peripherals.		
14.08 Analyze and troubleshoot input and output ports.		
15.0 Demonstrate appropriate understanding of basic math skills—The Student will be able to:		
15.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.		
15.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.		
15.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.		
15.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.		
15.05 Demonstrate and understanding of federal, state, and local taxes and their computation.		
16.0 Demonstrate an understanding of basic science skills—The Student will be able to:		
16.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.		
16.02 Draw conclusions or make interferences from data.		
16.03 Identify health-related problems, which may result from exposure to work related		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
chemicals and hazardous materials, and know the proper precautions required for handling such materials.		
16.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.		
17.0 Demonstrate skills in technical recording—The Student will be able to:		
17.01 Draw and interpret electronic schematics.		
17.02 Write reports and make oral presentations.		
17.03 Maintain test logs.		
17.04 Make equipment failure reports.		
17.05 Specify and requisition simple electronic components.		
17.06 Compose technical letters and memoranda.		
17.07 Write formal reports of laboratory experiences.		
17.08 Draft preventive maintenance procedures.		
18.0 Demonstrate appropriate communication skills—The Student will be able to:		
18.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.		
18.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.		
18.03 Read and follow written instructions.		
18.04 Answer and ask questions coherently and concisely.		
18.05 Read critically by recognizing assumptions and implications and by evaluating ideas.		
18.06 Demonstrate appropriate telephone/communication skills.		

Florida Department of Education
Student Performance Standards

Course Title: **Medical Electronics 1**
Course Number: **9204120**
Course Credit: **1**

Course Description:
This course develops skills and understanding of advanced electronics circuits; semiconductor devices, fiber optics, and basic motor applications.

Florida Standards			Correlation to CTE Program Standard #
19.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Biomedical Equipment Technology.		
	19.01 Key Ideas and Details		
	19.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	19.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	19.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	19.02 Craft and Structure		
	19.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	19.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	19.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
19.03	Integration of Knowledge and Ideas		
	19.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	19.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	19.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
19.04	Range of Reading and Level of Text Complexity		
	19.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	19.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Biomedical Equipment Technology.		
20.01	Text Types and Purposes		
	20.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	20.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
	20.01.3	Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. LAFS.1112.WHST.1.3	
20.02	Production and Distribution of Writing		

Florida Standards			Correlation to CTE Program Standard #
	20.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	20.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	20.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
20.03	Research to Build and Present Knowledge		
	20.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	20.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	20.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
20.04	Range of Writing		
	20.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
21.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.		
21.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
21.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
21.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
21.04 Model with mathematics. MAFS.K12.MP.4.1	
21.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
21.06 Attend to precision. MAFS.K12.MP.6.1	
21.07 Look for and make use of structure. MAFS.K12.MP.7.1	
21.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSS-Sci

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.0 Demonstrate proficiency with Transistor Pulse Amplifiers—The Student will be able to:		
22.01 Observe and study Schmitt Trigger operation.		
22.02 Troubleshoot Schmitt Trigger circuits.		
23.0 Demonstrate proficiency with Trigger Device Circuits—The Student will be able to:		
23.01 Understand trigger devices.		
23.02 Explain uni-junction transistor oscillator operation.		
23.03 Validate SCR trigger circuit operation.		
23.04 Explain SCR power control operation.		
23.05 Troubleshoot SCR circuit circuits.		
23.06 Differentiate between DIAC, TRIAC, and 4-layer diodes.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
23.07 Classify programmable uni-junction transistors.		
24.0 Demonstrate proficiency with Operational Amplifiers—The Student will be able to:		
24.01 Examine operational amplifiers functionality.		
24.02 Troubleshoot operational amplifiers.		
25.0 Demonstrate proficiency in knowledge of Electromagnetics—The Student will be able to:		
25.01 State magnetism and electromagnetic principles.		
25.02 Extrapolate magnetic calculations.		
26.0 Demonstrate proficiency with Fiber Optic Applications—The Student will be able to:		
26.01 Understand fiber optics.		
26.02 Apply fiber optics concepts to communications protocols.		
26.03 Understand lasers.		
26.04 Construct fiber optic cable connections.		
26.05 Troubleshoot fiber optic system devices.		
27.0 Demonstrate proficiency in DC Motor Systems—The Student will be able to:		
27.01 Explain the concepts and principles of DC series field motors.		
27.02 Label brushless DC motor components.		
27.03 Troubleshoot AC motor systems.		
27.04 Describe pulse width modulation and amplification functionality.		
27.05 Troubleshoot open loop motor system.		
28.0 Demonstrate proficiency with Motor Control Systems—The Student will be able to:		
28.01 Investigate the functionality of motion detection.		
28.02 Recognize error detection and feedback protocols.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	28.03 Troubleshoot closed loop system.		
	28.04 Investigate the functionality of position detection.		
	28.05 Extrapolate Proportional-Integral-Derivative (PID) control system output functions.		
	28.06 Troubleshoot Proportional-Integral-Derivative (PID) control systems.		
	28.07 Distinguish the differences between motion detection and position detection.		
29.0	Demonstrate an understanding of safety concepts and best practices—The Student will be able to:		
	29.01 Evaluate personal and workplace safety concerns.		
	29.02 Justify medical ethics.		
	29.03 Create an Electrical Shock and Safety Public Service Announcement (PSA).		
	29.04 Design a “Best Practices” plan for tool safety.		
	29.05 Apply National Electric Code (NEC) Standards to medical facilities.		
	29.06 Compare and contrast Biomedical Equipment specifications and installation requirements.		
	29.07 Diagram a Systems Thinking model.		
30.0	Demonstrate appropriate understanding of “The Human Machine” —The Student will be able to:		
	30.01 Define medical terminology words and terms.		
	30.02 Communicate an understanding of cells and body fluid.		
	30.03 Reconstruct the skeletal and muscle system as they apply to biomechanics.		
	30.04 Recognize and document the gastrointestinal system.		
	30.05 Explain the functionality of the nervous and endocrine systems.		
	30.06 List the functions of the circulatory and pulmonary systems.		
	30.07 Outline the proper procedures for handling bio-hazardous materials.		
31.0	Demonstrate an understanding of Monitoring Systems—The Student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	31.01 Collect and confirm biomedical measurements.		
	31.02 Align the proper electrodes, sensors, and transducer to a biomedical measurement.		
	31.03 Provide examples of signal processing techniques.		
	31.04 Identify data recording systems.		
32.0	Compile and Compare Data through the Usage of Basic Monitoring Equipment—The Student will be able to:		
	32.01 Recognize vital signs.		
	32.02 Compare blood pressure measurements from various sources.		
	32.03 Chart blood oxygen level measurements over multiple time periods.		
	32.04 Plot temperature measurements and explain how temperature sensors react to various skin conditions.		
	32.05 Apply electro-cardio measurement devices and determine normal outcomes.		
	32.06 Estimate pulse and respiratory measurements and compare to actual scales.		
33.0	Demonstrate proficiency with Medical Support Equipment—The Student will be able to:		
	33.01 Understand the fundamental concepts and principles of biomedical pumps.		
	33.02 Explain displacement pumps functionality.		
	33.03 List the applications of centrifugal and gravity pumps.		
	33.04 Detail the effects of electromagnetic and impedance on pumps		
	33.05 Observe the operation of vacuum and pneumatic pumps.		
34.0	Demonstrate proficiency with Motors—The Student will be able to:		
	34.01 Understand motion control as it applies to biomedical motors.		
	34.02 Analyze and troubleshoot stepper, linear, PCB, and pneumatic motors.		
35.0	Demonstrate proficiency with Power Systems—The Student will be able to:		
	35.01 Formulate a plan for managing AC power in a medical environment.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
35.02 Differentiate between batteries and their application to medical equipment.		
35.03 Evaluate battery backup systems for rated capacity and life expectancy.		
35.04 Summarize the characteristics of various dental compressor systems.		
36.0 Demonstrate proficiency with Laboratory Equipment—The Student will be able to:		
36.01 Compare and contrast biological and chemical testing systems		
36.02 Categorize manipulation, prep, and storage systems to their laboratory application.		
37.0 Demonstrate proficiency with Sterilization Equipment—The Student will be able to:		
37.01 Understand the need and describe the process of sterilization.		
37.02 List the types of sterilization equipment.		
37.03 Analyze and troubleshoot ultrasonic and ultraviolet sterilization systems.		

Florida Department of Education
Student Performance Standards

Course Title: **Biomedical Electronics Technician**
Course Number: **9204130**
Course Credit: **1**

Course Description:
This course will develop skills and understanding of basic biomedical systems.

Florida Standards			Correlation to CTE Program Standard #
19.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Biomedical Equipment Technology.		
	19.01 Key Ideas and Details		
	19.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	19.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	19.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	19.02 Craft and Structure		
	19.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	19.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	19.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
19.03	Integration of Knowledge and Ideas		
	19.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	19.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	19.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
19.04	Range of Reading and Level of Text Complexity		
	19.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	19.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Biomedical Equipment Technology.		
20.01	Text Types and Purposes		
	20.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	20.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
	20.01.3	Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. LAFS.1112.WHST.1.3	
20.02	Production and Distribution of Writing		

Florida Standards			Correlation to CTE Program Standard #
	20.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	20.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	20.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
20.03	Research to Build and Present Knowledge		
	20.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	20.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	20.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
20.04	Range of Writing		
	20.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
21.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Biomedical Equipment Technology.		
21.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		

Florida Standards	Correlation to CTE Program Standard #
21.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
21.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
21.04 Model with mathematics. MAFS.K12.MP.4.1	
21.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
21.06 Attend to precision. MAFS.K12.MP.6.1	
21.07 Look for and make use of structure. MAFS.K12.MP.7.1	
21.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Demonstrate an understanding of Sound Imaging Systems—The Student will be able to:		
38.01 Explain the characteristics of sound waves.		
38.02 Describe the Doppler Effect and list the medical uses of Doppler.		
38.03 Determine how sonography and ultrasonography equipment capture images of the body's internal functions.		
38.04 Explain how echocardiography creates an image of the heart muscle and identify information that is captured and displayed by echocardiograph equipment.		
38.05 Develop a preventative maintenance plan for a given sound imaging system (ultrasound, echocardiograph).		
39.0 Demonstrate proficiency with Radiographic Imaging Systems—The Student will be able to:		
39.01 Prepare a 20 minute presentation on the types, operation, and safety precautions of a given Radiographic Imaging System (x-ray, fluoroscopic).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
39.02	Differentiate between an x-ray and a fluoroscopic imaging system and define the limitations of each.		
39.03	Analyze and troubleshoot faulted radiographic imaging systems.		
40.0	Demonstrate proficiency with Nuclear Imaging Systems—The Student will be able to:		
40.01	Identify the main components of MRI, CT, and PET imaging systems and describe the information provided by these systems.		
40.02	Develop an operational procedures step-action table from the observation of the operation of MRI, CT, and PET imaging systems.		
40.03	Evaluate a faulted Magnetic Resonance Imaging System and create a troubleshooting procedure for determining the cause of the fault.		
41.0	Demonstrate proficiency with Impedance Tomography Systems—The Student will be able to:		
41.01	Diagram the process of nerve impulses across synapses and at neuromuscular junctions.		
41.02	Draw a block diagram of the key elements of an EMG, EEG, and ECG system.		
41.03	Recognize the operational differences between EMG, EEG, and ECG systems.		
41.04	List the common failures associated with EMG, EEG, and ECG systems and recommend interventions for returning the equipment to an operational condition.		
42.0	Demonstrate proficiency with Life Support Systems—The Student will be able to:		
42.01	Categorize biomedical needs as basic, advance, or long term life support.		
42.02	Explain the purpose and operation of various life support systems and link their use with the appropriate level of life support.		
42.03	Choose the best infusion device (intravenous, subcutaneous, respiratory) to provide life support to a given medical condition.		
42.04	Write a troubleshooting plan to correct malfunctions on specific life support systems.		
43.0	Demonstrate proficiency with Respiratory Systems—The Student will be able to:		
43.01	Identify the types and explain the operation of different types of Resuscitator Systems.		
43.02	List the critical elements to verify when maintaining respiratory equipment, ventilators, and nebulizers.		
44.0	Demonstrate proficiency with Cardio Systems—The Student will be able to:		
44.01	Describe the purpose and operation of various types of Cardio Systems.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
44.02 Explain the safety precautions when using and working with Defibrillators.		
44.03 Report on the history, purpose, and technical requirements of pacemakers.		
45.0 Demonstrate proficiency with Renal Systems—The Student will be able to:		
45.01 Recognize the types of renal dysfunctions.		
45.02 Draw a flow diagram of Renal System Equipment with their interfaces to the human renal system.		
45.03 Determine the corrective action for common Dialysis Equipment failures.		
46.0 Demonstrate proficiency with Incubators—The Student will be able to:		
46.01 Correlate the fetal biomedical functions to the elements an incubator provides (ambient temperature, skin temperature, humidity, oxygen, sound and lighting) and explain the purpose and operation of each element.		
46.02 Explain the purpose and components of an MR-Compatible Neonatal Incubator.		
46.03 Describe the process of monitoring fetal heart, temperature, and respiratory parameters and determine the life-sustaining ranges of each.		
46.04 Create a preventative maintenance plan for Incubators.		
47.0 Demonstrate proficiency with Biomedical Optic Systems—The Student will be able to:		
47.01 Practice the protocols associated with working in the operating room environment (dress code, sterilization, equipment handling).		
47.02 Define the characteristics of fiber optics and calculate reflective and refraction errors in a fiber optic cable.		
47.03 Select a type of operating room optic system (laser, optical microscope, endoscopy, etc) and prepare a 15 minute lesson that describes the purpose, use, operation, and precautions associated with the system.		
48.0 Demonstrate proficiency with Surgical Support Systems—The Student will be able to:		
48.01 Explain the use and operation of the different types of Surgical Support Systems (electrosurgical generators, cauterization, lighting, suction, robotics, adjustable patient platforms, and cooling).		
48.02 Analyze malfunctions in surgical support systems and develop a troubleshooting process plan.		
49.0 Demonstrate Proficiency using Biomedical Information Systems—The Student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
49.01 Research the meaning and provide examples of health-care informatics.		
49.02 Conduct a survey of local medical facilities and determine the types of Facility Information Systems used in the biomedical industry.		
49.03 Draw a block diagram of a typical health-care facility Central Monitoring System.		

Additional Information

Laboratory Activities

Laboratory investigations, including the use of scientific research, measurement, and laboratory technologies are an integral part of this course. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

This program is aligned with the post-secondary Biomedical Equipment Repair Technology (BERT) program (J400100), so students may enroll at a post-secondary institution where BERT is offered, and complete the remaining OCP(s) for the BERT program.

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the Classification of Instructional Programs (CIP) number (0615040106).

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Articulation

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Bright Futures/Gold Seal Scholarship

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx.

Fine Arts/Practical Arts Credit

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation (http://www.fldoe.org/articulation/CCD/files/pacourses1314.pdf). A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (http://www.fldoe.org/articulation/CCD/default.asp).

Equivalent Mathematics and Equally Rigorous Science Courses

Equally rigorous science courses are based upon levels of cognitive complexity of content specific benchmarks, depth and breadth of content focus, and required laboratory components.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Introduction to Manufacturing**
Course Type: **Orientation/Exploratory**
Career Cluster: **Manufacturing**

Secondary – Middle School	
Course Number	9260350
CIP Number	149260350M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	TEC ED 1 @ 2 AUTO PROD 7G ENG 7G ELECTRONIC @7 7G IND ENGR 7G
CTSO	FL-TSA
Facility Code	240 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the manufacturing career cluster. The content includes but is not limited to planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

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

Standards

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

01.0 Demonstrate an understanding of the Production career pathway.
02.0 Demonstrate an understanding of the Manufacturing Production Process Development career pathway.
03.0 Demonstrate an understanding of the Maintenance, Installation and Repair career pathway.
04.0 Demonstrate an understanding of the Quality Assurance career pathway.
05.0 Demonstrate an understanding of the Logistics and Inventory Control career pathway.
06.0 Demonstrate an understanding of the Health, Safety and Environmental Assurance career pathway.
07.0 Apply leadership and communication skills.
08.0 Describe how information technology is used in the Manufacturing career cluster.
09.0 Use information technology tools.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Manufacturing**
Course Number: **9260350**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the manufacturing career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the manufacturing career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Production career pathway–The student will be able to:
01.01	Define and use proper terminology associated with the Production career pathway.
01.02	Describe some of the careers available in the Production career pathway.
01.03	Identify common characteristics of the careers in the Production career pathway.
01.04	Research the history of the Production career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Production career pathway.
01.06	Describe technologies associated in careers within the Production career pathway.
02.0	Demonstrate an understanding of the Manufacturing Production Process Development career pathway–The student will be able to:
02.01	Define and use proper terminology associated with the Manufacturing Production Process Development career pathway.
02.02	Describe some of the careers available in the Manufacturing Production Process Development career pathway.
02.03	Identify common characteristics of the careers in the Manufacturing Production Process Development career pathway.
02.04	Research the history of the Manufacturing Production Process Development career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Manufacturing Production Process Development career pathway.
02.06	Describe technologies associated in careers within the Manufacturing Production Process Development career pathway.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the Maintenance, Installation and Repair career pathway–The student will be able to:
03.01	Define and use proper terminology associated with the Maintenance, Installation and Repair career pathway.
03.02	Describe some of the careers available in the Maintenance, Installation and Repair career pathway.
03.03	Identify common characteristics of the careers in the Maintenance, Installation and Repair career pathway.
03.04	Research the history of the Maintenance, Installation and Repair career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Maintenance, Installation and Repair career pathway.
03.06	Describe technologies associated in careers within the Maintenance, Installation and Repair career pathway.
04.0	Demonstrate an understanding of the Quality Assurance career pathway–The student will be able to:
04.01	Define and use proper terminology associated with the Quality Assurance career pathway.
04.02	Describe some of the careers available in the Quality Assurance career pathway.
04.03	Identify common characteristics of the careers in the Quality Assurance career pathway.
04.04	Research the history of the Quality Assurance career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Quality Assurance career pathway.
04.06	Describe technologies associated in careers within the Quality Assurance career pathway.
05.0	Demonstrate an understanding of the Logistics and Inventory Control career pathway–The student will be able to:
05.01	Define and use proper terminology associated with the Logistics and Inventory Control career pathway.
05.02	Describe some of the careers available in the Logistics and Inventory Control career pathway.
05.03	Identify common characteristics of the careers in the Logistics and Inventory Control career pathway.
05.04	Research the history of the Logistics and Inventory Control career pathway and describe how the careers have evolved and impacted society.
05.05	Identify skills required to successfully enter any career in the Logistics and Inventory Control career pathway.
05.06	Describe technologies associated in careers within the Logistics and Inventory Control career pathway.
06.0	Demonstrate an understanding of the Health, Safety and Environmental Assurance career pathway–The student will be able to:
06.01	Define and use proper terminology associated with the Health, Safety and Environmental Assurance career pathway.
06.02	Describe some of the careers available in the Health, Safety and Environmental Assurance career pathway.

CTE Standards and Benchmarks	
06.03	Identify common characteristics of the careers in the Health, Safety and Environmental Assurance career pathway.
06.04	Research the history of the Health, Safety and Environmental Assurance career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Health, Safety and Environmental Assurance career pathway.
06.06	Describe technologies associated in careers within the Health, Safety and Environmental Assurance career pathway.
07.0	Apply leadership and communication skills–The student will be able to:
07.01	Discuss the establishment and history of the FL-TSA organization.
07.02	Identify the characteristics and responsibilities of organizational leaders.
07.03	Demonstrate parliamentary procedure skills during a meeting.
07.04	Participate on a committee which has an assigned task and report to the class.
07.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
07.06	Use a computer to assist in the completion of a project related to the manufacturing career cluster.
08.0	Describe how information technology is used in the manufacturing career cluster–The student will be able to:
08.01	Identify information technology (IT) careers in the manufacturing career cluster, including the responsibilities, tasks and skills they require.
08.02	Relate information technology project management concepts and terms to careers in the manufacturing career cluster.
08.03	Manage information technology components typically used in professions of the manufacturing career cluster.
08.04	Identify security-related ethical and legal IT issues faced by professionals in the manufacturing career cluster.
09.0	Use information technology tools–The student will be able to:
09.01	Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the manufacturing career cluster.
09.02	Use e-mail clients to send simple messages and files to other Internet users.
09.03	Demonstrate ways to communicate effectively using Internet technology.
09.04	Use different types of web search engines effectively to locate information relevant to the manufacturing career cluster.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Introduction to Manufacturing and Career Planning**
Course Type: **Orientation/Exploratory**
Career Cluster: **Manufacturing**

Secondary – Middle School	
Course Number	9260360
CIP Number	149260360M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	TEC ED 1 @ 2 AUTO PROD 7G ENG 7G ELECTRONIC @7 7G IND ENGR 7G
CTSO	FL-TSA
Facility Code	240 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the manufacturing career cluster. The content includes but is not limited to planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

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

Standards

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

01.0 Demonstrate an understanding of the Production career pathway.
02.0 Demonstrate an understanding of the Manufacturing Production Process Development career pathway.
03.0 Demonstrate an understanding of the Maintenance, Installation and Repair career pathway.
04.0 Demonstrate an understanding of the Quality Assurance career pathway.
05.0 Demonstrate an understanding of the Logistics and Inventory Control career pathway.
06.0 Demonstrate an understanding of the Health, Safety and Environmental Assurance career pathway.
07.0 Apply leadership and communication skills.
08.0 Describe how information technology is used in the Manufacturing career cluster.
09.0 Use information technology tools.

Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.

10.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
11.0 Develop skills to locate, evaluate, and interpret career information.
12.0 Identify and demonstrate processes for making short and long term goals.
13.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
14.0 Understand the relationship between educational achievement and career choices/postsecondary options.
15.0 Identify a career cluster and related pathways that match career and education goals.
16.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
17.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Manufacturing and Career Planning**
Course Number: **9260360**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the manufacturing career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the manufacturing career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Production career pathway–The student will be able to:
01.01	Define and use proper terminology associated with the Production career pathway.
01.02	Describe some of the careers available in the Production career pathway.
01.03	Identify common characteristics of the careers in the Production career pathway.
01.04	Research the history of the Production career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Production career pathway.
01.06	Describe technologies associated in careers within the Production career pathway.
02.0	Demonstrate an understanding of the Manufacturing Production Process Development career pathway–The student will be able to:
02.01	Define and use proper terminology associated with the Manufacturing Production Process Development career pathway.
02.02	Describe some of the careers available in the Manufacturing Production Process Development career pathway.
02.03	Identify common characteristics of the careers in the Manufacturing Production Process Development career pathway.
02.04	Research the history of the Manufacturing Production Process Development career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Manufacturing Production Process Development career pathway.

CTE Standards and Benchmarks	
02.06	Describe technologies associated in careers within the Manufacturing Production Process Development career pathway.
03.0	Demonstrate an understanding of the Maintenance, Installation and Repair career pathway–The student will be able to:
03.01	Define and use proper terminology associated with the Maintenance, Installation and Repair career pathway.
03.02	Describe some of the careers available in the Maintenance, Installation and Repair career pathway.
03.03	Identify common characteristics of the careers in the Maintenance, Installation and Repair career pathway.
03.04	Research the history of the Maintenance, Installation and Repair career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Maintenance, Installation and Repair career pathway.
03.06	Describe technologies associated in careers within the Maintenance, Installation and Repair career pathway.
04.0	Demonstrate an understanding of the Quality Assurance career pathway–The student will be able to:
04.01	Define and use proper terminology associated with the Quality Assurance career pathway.
04.02	Describe some of the careers available in the Quality Assurance career pathway.
04.03	Identify common characteristics of the careers in the Quality Assurance career pathway.
04.04	Research the history of the Quality Assurance career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Quality Assurance career pathway.
04.06	Describe technologies associated in careers within the Quality Assurance career pathway.
05.0	Demonstrate an understanding of the Logistics and Inventory Control career pathway–The student will be able to:
05.01	Define and use proper terminology associated with the Logistics and Inventory Control career pathway.
05.02	Describe some of the careers available in the Logistics and Inventory Control career pathway.
05.03	Identify common characteristics of the careers in the Logistics and Inventory Control career pathway.
05.04	Research the history of the Logistics and Inventory Control career pathway and describe how the careers have evolved and impacted society.
05.05	Identify skills required to successfully enter any career in the Logistics and Inventory Control career pathway.
05.06	Describe technologies associated in careers within the Logistics and Inventory Control career pathway.

CTE Standards and Benchmarks	
06.0	Demonstrate an understanding of the Health, Safety and Environmental Assurance career pathway–The student will be able to:
06.01	Define and use proper terminology associated with the Health, Safety and Environmental Assurance career pathway.
06.02	Describe some of the careers available in the Health, Safety and Environmental Assurance career pathway.
06.03	Identify common characteristics of the careers in the Health, Safety and Environmental Assurance career pathway.
06.04	Research the history of the Health, Safety and Environmental Assurance career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Health, Safety and Environmental Assurance career pathway.
06.06	Describe technologies associated in careers within the Health, Safety and Environmental Assurance career pathway.
07.0	Apply leadership and communication skills–The student will be able to:
07.01	Discuss the establishment and history of the FL-TSA organization.
07.02	Identify the characteristics and responsibilities of organizational leaders.
07.03	Demonstrate parliamentary procedure skills during a meeting.
07.04	Participate on a committee which has an assigned task and report to the class.
07.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
07.06	Use a computer to assist in the completion of a project related to the manufacturing career cluster.
08.0	Describe how information technology is used in the manufacturing career cluster–The student will be able to:
08.01	Identify information technology (IT) careers in the manufacturing career cluster, including the responsibilities, tasks and skills they require.
08.02	Relate information technology project management concepts and terms to careers in the manufacturing career cluster.
08.03	Manage information technology components typically used in professions of the manufacturing career cluster.
08.04	Identify security-related ethical and legal IT issues faced by professionals in the manufacturing career cluster.
09.0	Use information technology tools–The student will be able to:
09.01	Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the manufacturing career cluster.
09.02	Use e-mail clients to send simple messages and files to other Internet users.

CTE Standards and Benchmarks	
	09.03 Demonstrate ways to communicate effectively using Internet technology.
	09.04 Use different types of web search engines effectively to locate information relevant to the manufacturing career cluster.
Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes--The student will be able to:	
10.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
11.0	Develop skills to locate, evaluate, and interpret career information.
12.0	Identify and demonstrate processes for making short and long term goals.
13.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
14.0	Understand the relationship between educational achievement and career choices/postsecondary options.
15.0	Identify a career cluster and related pathways that match career and education goals.
16.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
17.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

Career Planning

The requirements of section 1003.4156 (1) (e), Florida Statutes, have been integrated into this course. The statute requires that students take a career and education planning course that must result in a completed personalized academic and career plan for the student; must emphasize the importance of entrepreneurship skills; must emphasize technology or the application of technology in career fields; and, beginning in the 2014-2015 academic year, must provide information from the Department of Economic Opportunity's economic security report as described in section 445.07, Florida Statutes. For additional information on the Middle School Career and Education Planning course requirements, go to http://www.fldoe.org/workforce/ced/.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Fundamentals of Manufacturing**
Course Type: **Orientation/Exploratory**
Career Cluster: **Manufacturing**

Secondary – Middle School	
Course Number	9260400
CIP Number	149260400M
Grade Level	6-8
Standard Length	One Year
Teacher Certification	TEC ED 1 @ 2 AUTO PROD 7G ENG 7G ELECTRONIC @7 7G IND ENGR 7G
CTSO	FL-TSA
Facility Code	240 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the manufacturing career cluster. This course provides students with opportunities to become familiar with related careers and develop fundamental technological literacy as they learn about the history, systems, and processes of manufacturing. In addition, the course will provide an overview of the safe use of tools and equipment used in the industry.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

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

Standards

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

01.0 Demonstrate an understanding of the societal impact of manufacturing.
02.0 Demonstrate an understanding of the history of manufacturing**.**
03.0 Demonstrate an understanding of the universal systems model as it relates to manufacturing.
04.0 Demonstrate an understanding of safe work practices while performing tasks.
05.0 Identify materials and resources used in manufacturing.
06.0 Describe the essential systems and processes involved in manufacturing.
07.0 Perform a pre-planned introductory manufacturing activity applying correct safety procedures, appropriate use of materials, and processing operations.
08.0 Use visual and verbal communication to present employment and career opportunities in manufacturing.
09.0 Students will select and demonstrate techniques, skills, tools, and understanding related to manufacturing.
10.0 Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities associated with FL-TSA.

Florida Department of Education
Student Performance Standards

Course Title: **Fundamentals of Manufacturing**
Course Number: **9260400**
Course Length: **One Year**

Course Description:

This course provides students with opportunities to become familiar with related careers and develop fundamental technological literacy as they learn about the history, systems, and processes of manufacturing. In addition, the course will provide an overview of the safe use of tools and equipment used in the industry.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the societal impact of manufacturing--The student will be able to:
01.01	Track the evolution of manufacturing and its impact on society.
01.02	Explain the educational requirements and professional expectations associated with a career in manufacturing.
01.03	Describe the impact of governmental and political systems on manufacturing.
01.04	Explain the interaction between manufacturing industries and social change
01.05	Explain how manufacturing made the United States a world leader.
01.06	Describe the relationship between manufacturing and the environment
01.07	Explain the importance of a technologically literate workforce to the manufacturing industry.
02.0	Demonstrate an understanding of the history of manufacturing--The student will be able to:
02.01	Identify key historical events and their impact on manufacturing.
02.02	List key persons who have contributed to change in manufacturing.
02.03	Describe the Industrial Revolution and its impact on manufacturing.
02.04	Identify pioneers of the manufacturing industry.
02.05	Describe/debate the affect that automation has had on manufacturing.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the universal systems model as it relates to manufacturing--The student will be able to:
03.01	Describe the processes of input, processing, output, and feedback that comprise the universal systems model.
03.02	Demonstrate applications of the universal systems model in manufacturing.
03.03	Describe the role of time, capital, people, tools and machines, energy, materials, and information within the universal systems model as it applies to manufacturing industries.
04.0	Demonstrate an understanding of safe work practices while performing tasks--The student will be able to:
04.01	Identify safety equipment.
04.02	Recognize immediate, potential, and hidden hazards.
04.03	Perform housekeeping tasks related to maintaining a safe work environment.
04.04	Pass a safety test with a perfect score prior to operating equipment.
04.05	Demonstrate the proper safe use of tools and equipment
04.06	Identify safety color codes
05.0	Identify materials and resources used in manufacturing--The student will be able to:
05.01	Describe the seven basic technological resources.
05.02	Describe the properties of manufacturing materials.
05.03	Explain how materials are classified.
05.04	List, measure, and compare common mechanical properties of select materials.
05.05	List sources and costs where materials may be obtained
05.06	Create a bill of materials
05.07	Calculate production cost analysis
06.0	Describe the essential systems and processes involved in manufacturing--The student will be able to:
06.01	Compare and contrast custom, intermittent, and continuous manufacturing systems.
06.02	Demonstrate fundamentals of producing technical sketches.

CTE Standards and Benchmarks	
06.03	Create simple two and three dimensional drawings using CAD software.
06.04	List common hand tools used in the maintenance, installation, and repair of equipment.
06.05	Identify commonly used power tools.
06.06	Describe primary manufacturing processes.
06.07	List secondary manufacturing processes.
06.08	Define the terms separating and forming as it relates to manufacturing.
06.09	Identify separating processes – traditional and non-traditional.
06.10	Identify forming processes including casting, molding, compression, stretching, and conditioning.
06.11	Differentiate between combining processes such as mixing, bonding, coating, and mechanical filtering.
06.12	Produce a simple part applying computer assisted production equipment.
06.13	Program a robot to perform a repetitive task.
06.14	Create a device that will perform a task using a computer controlled program.
06.15	Describe the advantages/disadvantages of the separation processing of materials using manual versus computer controlled machinery.
06.16	Describe assembling processes.
06.17	Explain the importance of finishing processes.
06.18	Describe the role of quality control in the manufacturing process.
06.19	Explain the importance of quality control within a manufacturing system.
07.0	Perform a pre-planned introductory manufacturing activity applying correct safety procedures, appropriate use of materials, and processing operations--The student will be able to:
07.01	Use hand and power tools safely.
07.02	Demonstrate fundamentals of reading technical sketches.
07.03	Use English and/or metric measurement effectively in order to properly lay out a part for manufacturing.
07.04	Follow a production flow chart to produce a teacher-selected product.

CTE Standards and Benchmarks	
	07.05 Apply appropriate problem solving to improve an existing manufacturing system.
08.0	Use visual and verbal communication to present employment and career opportunities in manufacturing--The student will be able to:
	08.01 Present a technical report to an audience regarding a researched manufacturing related career using multimedia.
	08.02 Prepare and produce a portfolio representing experiences throughout the course of study.
09.0	Students will select and demonstrate techniques, skills, tools, and understanding related to manufacturing--The student will be able to:
	09.01 Use common tools correctly and safely.
	09.02 Describe strategies for selecting materials and processes necessary for developing a technological system or artifact.
	09.03 Demonstrate fundamental materials processing and assembly techniques.
	09.04 Evaluate the interdependence of components in a technological system and identify those elements that are critical to correct functioning.
	09.05 Apply analytical tools to the development of optimal solutions for technological problems.
10.0	Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities associated with FL-TSA--The student will be able to:
	10.01 Demonstrate effective communication skills.
	10.02 Participate in teamwork to accomplish specified organizational goals.
	10.03 Demonstrate cooperation and understanding with persons who are ethnically and culturally diverse.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Electronic Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I150303
CIP Number	0615030300
Grade Level	30, 31
Standard Length	1400 hours
Teacher Certification	ELECTRONIC @7 7G TEC ELEC @7 7G AVIONICS @7 7G RADIO TV 7G TV PROD TEC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3023 – Electrical and Electronic Engineering Technicians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment 51-2022 – Electrical and Electronic Equipment Assemblers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0010	Electronics Assembler	250 hours	51-2022
B	EEV0100	Electronics Tester	400 hours	51-2022
C	EEV0500	Electronics Equipment Repairer	375 hours	49-2094
D	EEV0616	Electronics Technician	375 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:

01.0 Demonstrate proficiency in 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 AC circuits.
05.0 Demonstrate proficiency in solid state devices.
06.0 Demonstrate proficiency in digital circuits.
07.0 Demonstrate proficiency in fundamental micro-processors.
08.0 Demonstrate skills in technical recording utilizing industry recognized computer application software.
09.0 Demonstrate proficiency in analog circuits.

Florida Department of Education
Student Performance Standards

Program Title: **Electronic Technology**
PSAV Number: **I150303**

Course Number: EEV0010
Occupational Completion Point: A
Electronics Assembler – 250 Hours – SOC Code 51-2022
Course Description:

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
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 Apply recognized industry accepted standard soldering techniques.	
01.06 Apply recognized industry accepted standard desoldering techniques.	
01.07 Apply recognized industry accepted standard electrostatic discharge (ESD) safety procedures.	
01.08 Design and/or construct printed circuit boards (PCB's) to industry accepted standards.	
01.09 Explain the theoretical concepts of industry accepted soldering techniques.	
01.10 Apply recognized industry accepted standard techniques for rework and repair.	
02.0 Demonstrate proficiency in basic DC circuits--The student will be able to:	
02.01 Demonstrate proficiency in basic DC 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.	

CTE Standards and Benchmarks	National Standards
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 a digital multi-meter (DMM).	
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.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0100
Occupational Completion Point: B
Electronics Tester – 400 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
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	Describe the relationship of DC electricity to the nature of matter.	
03.03	Apply Ohm's law to series-parallel and parallel-series circuits.	
03.04	Construct and verify the operation of series-parallel and parallel-series and bridge circuits.	
03.05	Troubleshoot series-parallel and parallel-series and bridge circuits.	
03.06	Identify and define voltage divider circuits (loaded and unloaded).	
03.07	Construct and verify the operation of voltage divider circuits (loaded and unloaded).	
03.08	Analyze and troubleshoot voltage divider circuits (loaded and unloaded).	
03.09	Apply maximum power transfer theorem.	
03.10	Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.	
03.11	Describe magnetic properties of circuits and devices.	
03.12	Determine the physical and electrical characteristics of capacitors and inductors.	
03.13	Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.	
03.14	Set up and operate power supplies for DC circuits.	
03.15	Explain the theory of DC motor operation.	
03.16	Identify the practical applications for the use of a DC motor.	
04.0	Demonstrate proficiency in AC circuits--The student will be able to:	

CTE Standards and Benchmarks	National Standards
04.01 Solve basic trigonometric problem as applicable to electronics.	
04.02 Define the characteristics of AC capacitive circuits.	
04.03 Construct and verify the operation of AC capacitive circuits.	
04.04 Analyze and troubleshoot AC capacitive circuits.	
04.05 Define the characteristics of AC inductive circuits.	
04.06 Construct and verify the operation of AC inductive circuits.	
04.07 Analyze and troubleshoot AC inductive circuits.	
04.08 Define and apply the principles of transformers to AC circuits.	
04.09 Construct and verify the operation of AC circuits utilizing transformers.	
04.10 Analyze and troubleshoot AC circuits utilizing transformers.	
04.11 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.	
04.12 Analyze and troubleshoot differentiator and integrator circuits.	
04.13 Define the characteristics of Resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).	
04.14 Construct and verify the operation of series and parallel resonant circuits.	
04.15 Define the characteristics of series and parallel resonant circuits.	
04.16 Construct and verify the operation of series and parallel resonant circuits.	
04.17 Analyze and troubleshoot R-C, R-L, and RLC circuits.	
04.18 Define the characteristics of frequency selective filter circuits.	
04.19 Construct and verify the operation of frequency selective filter circuits.	
04.20 Analyze and troubleshoot frequency selective filter circuits.	
04.21 Define the characteristics of polyphase circuits.	
04.22 Define basic motor theory and operation.	
04.23 Define basic generator theory and operation.	
04.24 Set up and operate power supplies for AC circuits.	
04.25 Set up and operate oscilloscopes for AC circuits.	

CTE Standards and Benchmarks	National Standards
04.26 Set up and operate function generators for AC circuits.	
04.27 Analyze and measure power in AC circuits.	
04.28 Set up and operate capacitor and inductor analyzers for AC circuits.	
04.29 Explain the theory of AC motor operation.	
04.30 Identify the practical applications for the use of an AC motor.	
05.0 Demonstrate proficiency in solid state devices--The student will be able to:	
05.01 Identify and define properties of semiconductor materials.	
05.02 Identify and define operating characteristics and applications of junction diodes.	
05.03 Identify and define operating characteristics and applications of special diodes, ex. Zener diodes.	
05.04 Construct diode circuits.	
05.05 Analyze and troubleshoot diode circuits.	
05.06 Identify and define operating characteristics and applications of bipolar transistors,	
05.07 Identify and define operating characteristics and applications of field effect transistors.	
05.08 Identify and define operating characteristics and applications of single-stage amplifiers.	
05.09 Construct single-stage amplifiers.	
05.10 Analyze and troubleshoot single-stage amplifiers.	
05.11 Construct thyristor circuitry.	
05.12 Analyze and troubleshoot thyristor circuitry.	
05.13 Set up and operate power supplies for solid-state devices.	
05.14 Set up and operate oscilloscopes for solid-state devices.	
05.15 Set up and operate function generators for solid-state devices.	
05.16 Set up and operate capacitor and inductor analyzers for solid-state devices.	
05.17 Set up and operate curve tracers.	
05.18 Set up and operate transistor testers.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0500
Occupational Completion Point: C
Electronic Equipment Repairer – 375 Hours – SOC Code 49-2094

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
06.0 Demonstrate proficiency in digital circuits--The student will be able to:	
06.01 Define and apply numbering systems to codes and arithmetic operations.	
06.02 Analyze and minimize logic circuits using Boolean operations.	
06.03 Set up and operate logic probes for digital circuits.	
06.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.	
06.05 Set up and operate pulsers for digital circuits.	
06.06 Set up and operate oscilloscopes for digital circuits.	
06.07 Set up and operate logic analyzers for digital circuits.	
06.08 Set up and operate pulse generators for digital circuits.	
06.09 Identify types of logic gates and their truth tables.	
06.10 Construct combinational logic circuits using integrated circuits.	
06.11 Troubleshoot logic circuits.	
06.12 Analyze types of flip-flops and their truth tables.	
06.13 Construct flip-flops using integrated circuits.	
06.14 Troubleshoot flip-flops.	
06.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.	
06.16 Identify types of registers and counters.	
06.17 Construct registers and counters using flip-flops and logic gates.	

CTE Standards and Benchmarks	National Standards
06.18 Troubleshoot registers and counters.	
06.19 Analyze clock and timing circuits.	
06.20 Construct clock and timing circuits.	
06.21 Troubleshoot clock and timing circuits.	
06.22 Identify types of arithmetic-logic circuits.	
06.23 Construct arithmetic-logic circuits.	
06.24 Troubleshoot arithmetic-logic circuits.	
06.25 Identify types of encoding and decoding devices.	
06.26 Construct encoders and decoders.	
06.27 Troubleshoot encoders and decoders.	
06.28 Identify types of multiplexer and demultiplexer circuits.	
06.29 Construct multiplexer and demultiplexer circuits using integrated circuits.	
06.30 Troubleshoot multiplexer and demultiplexer circuits.	
06.31 Identify types of memory circuits.	
06.32 Relate the uses of digital-to-analog and analog-to-digital conversions.	
06.33 Construct digital-to-analog and analog-to-digital circuits.	
06.34 Troubleshoot digital-to-analog and analog-to-digital circuits.	
06.35 Identify types of digital displays.	
06.36 Construct digital display circuits.	
06.37 Troubleshoot digital display circuits.	
07.0 Demonstrate proficiency in fundamental micro-processors--The student will be able to:	
07.01 Identify central processing unit (CPU) building blocks and their uses (architecture).	
07.02 Safely install and remove a CPU without damaging.	
07.03 Analyze bus concepts.	
07.04 Analyze various memory schemes.	
07.05 Use memory devices in circuits.	

CTE Standards and Benchmarks	National Standards
07.06 Troubleshoot memory device circuits.	
07.07 Set up and operate oscilloscopes for microprocessor systems.	
07.08 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.	
07.09 Identify types of input and output devices and peripherals.	
07.10 Interface input and output ports to peripherals.	
07.11 Analyze and troubleshoot input and output ports.	
07.12 Compare and contrast macro processor programming language types.	
07.13 Diagram the macro processor programming sequence using a flow chart.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0616
Occupational Completion Point: D
Electronics Technician – 375 Hours – SOC Code 17-3023

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
08.0	Demonstrate skills in technical recording utilizing industry recognized computer application software--The student will be able to:	
08.01	Draw and interpret electronic schematics.	
08.02	Record data and design curves and graphs.	
08.03	Write reports and make oral presentations.	
08.04	Maintain test logs.	
08.05	Make equipment failure reports.	
08.06	Specify and requisition simple electronic components.	
08.07	Compose technical letters and memoranda.	
08.08	Write formal reports of laboratory experiences.	
08.09	Draft preventive maintenance and calibration procedures.	
09.0	Demonstrate proficiency in analog circuits--The student will be able to:	
09.01	Identify and define operational characteristics and applications of multistage amplifiers.	
09.02	Construct multistage amplifiers.	
09.03	Analyze and troubleshoot multistage amplifiers.	
09.04	Identify and define operating characteristics and applications of linear integrated circuits.	
09.05	Identify and define operating characteristics and applications of basic power supplies and filters.	
09.06	Construct basic power supplies and filters.	
09.07	Identify and define operating characteristics and applications of differential and operational amplifiers.	

CTE Standards and Benchmarks		National Standards
09.08	Construct differential and operational amplifier circuits.	
09.09	Analyze and troubleshoot differential and operational amplifier circuits.	
09.10	Identify and define operating characteristics of audio power amplifiers.	
09.11	Construct audio power amplifiers.	
09.12	Analyze and troubleshoot audio power amplifiers.	
09.13	Identify and define operating characteristics and applications of power supply regulator circuits.	
09.14	Construct power supply regulator circuits.	
09.15	Analyze and troubleshoot power supply regulator circuits.	
09.16	Identify and define operating characteristics and applications of active filters.	
09.17	Construct active filter circuits.	
09.18	Analyze and troubleshoot active filter circuits.	
09.19	Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.	
09.20	Construct oscillator circuits.	
09.21	Analyze and troubleshoot oscillator circuits.	
09.22	Identify and define operating characteristics and applications of Liquid Crystal Display (LCD), Light Emitting Diode (LED), and Three Dimensional (3D) technologies.	
09.23	Identify and define operating characteristics and applications of optoelectronic devices.	
09.24	Set up and operate measuring instruments for analog circuits.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	I150404
CIP Number	0615040400
Grade Level	30, 31
Standard Length	1800 hours
Teacher Certification	TEC ELEC @7 7G ELECTRONIC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2111 – Electricians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment 17-3023 – Electrical and Electronic Engineering Technicians
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
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 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0650	Electrician (Construction)	350 hours	47-2111
B	EEV0652	Instrument Mechanic	350 hours	49-2094
C	EEV0654	Electrician Maintenance	300 hours	47-2111
D	EEV0656	Instrument Technician	400 hours	49-2094
E	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:

01.0 Demonstrate knowledge of National Electrical Code (NEC).
02.0 Install and troubleshoot facility electrical circuits from service entrance to convenience outlets.
03.0 Demonstrate knowledge of using basic electrical drawings.
04.0 Demonstrate basic electrical construction skills.
05.0 Demonstrate understanding of DC power sources.
06.0 Demonstrate understanding of AC power sources.
07.0 Demonstrate knowledge of DC motors.
08.0 Demonstrate knowledge of AC motors.
09.0 Demonstrate knowledge of motor controls.
10.0 Demonstrate knowledge of transformers.
11.0 Demonstrate knowledge of over current protection and grounding.
12.0 Demonstrate knowledge of an industrial power distribution system.
13.0 Perform preventive and corrective maintenance on basic electrical power and control components.
14.0 Demonstrate knowledge of electrical test equipment.
15.0 Demonstrate knowledge of hydraulic and pneumatic systems.
16.0 Identify the basic principles and terminology of process control.
17.0 Identify the primary components of a process control system.
18.0 Demonstrate knowledge of using instrumentation drawings.
19.0 Demonstrate knowledge of using instrumentation test instruments.
20.0 Demonstrate knowledge of instrumentation installation techniques.
21.0 Demonstrate knowledge of programmable logic controllers (PLC).
22.0 Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS).
23.0 Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control devices.
24.0 Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices.
25.0 Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices.
26.0 Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices.
27.0 Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices.
28.0 Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices.
29.0 Demonstrate process operation skills.
30.0 Demonstrate knowledge of technical reporting.

Florida Department of Education
Student Performance Standards

Program Title: **Electrical and Instrumentation Technology**
PSAV Number: **I150404**

Course Number: EEV0650
Occupational Completion Point: A
Electrician (Construction) – 350 Hours – SOC Code 47-2111

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Demonstrate knowledge of the National Electrical Code (NEC)--The student will be able to:	
01.01	Relate the NEC to general wiring practices.	
01.02	Relate the NEC to wire, conduit and box sizing.	
01.03	Relate the NEC to outlets, lighting, appliances and building services.	
01.04	Relate the NEC to services and service calculations.	
01.05	Relate the NEC to grounding and bonding requirements.	
01.06	Relate the NEC to over current protection.	
01.07	Relate the NEC to motor circuit wiring.	
01.08	Relate the NEC to transformers.	
01.09	Relate the NEC to hazardous location wiring.	
01.10	Relate the NEC to emergency and alternate power systems.	
01.11	Relate the NEC to industrial electrical.	
02.0	Install and troubleshoot facility wiring circuits from service entrance to convenience outlets--The student will be able to:	
02.01	Demonstrate the knowledge power requirements, distribution, and construction considerations to meet the needs for a safe and functional electrical system for residential, commercial, or industrial facilities.	
02.02	Determine the size of service entrance equipment, components and conductors.	
02.03	Demonstrate proper methods to install service entrance, lighting circuits and equipment branch circuits.	

CTE Standards and Benchmarks		National Standards
02.04	Demonstrate knowledge of NEC local codes, utility regulations, special ordinances and installation instructions.	
02.05	Demonstrate knowledge of optional electrical safety devices, special fixtures (explosion proof, waterproof), communications and alarm systems, timers and controllers.	
02.06	Demonstrate knowledge of the needs for, and the proper methods of facility grounding systems.	
02.07	Demonstrate the ability to troubleshoot faults in control and power circuits.	
02.08	Choose the correct test equipment to service electrical systems.	
03.0	Demonstrate knowledge of using basic electrical drawings--The student will be able to:	
03.01	Demonstrate the knowledge to describe, identify and use electrical symbols and abbreviations.	
03.02	Demonstrate the knowledge to use floor plans, lighting layouts and building service drawings.	
03.03	Demonstrate the knowledge to use single line power distribution drawings.	
03.04	Demonstrate the knowledge to use elementary drawings.	
03.05	Demonstrate the knowledge to use process logic drawings.	
03.06	Demonstrate the knowledge to convert English system and metric system measurements.	
03.07	Demonstrate the knowledge to use measuring scales to take accurate system measurements.	
03.08	Demonstrate the knowledge to produce accurate electrical drawings.	
03.09	Demonstrate the knowledge to prepare an equipment and material list.	
03.10	Demonstrate the knowledge to troubleshoot using the different electrical diagrams and drawings.	
04.0	Demonstrate basic electrical construction skills--The student will be able to:	
04.01	Use blueprints and associated documents to identify materials and equipment which will be needed to perform construction or maintenance task.	
04.02	Use the proper equipment to make correct and accurate bends in various types of electrical conduits.	
04.03	Use the proper equipment to thread electrical conduit.	
04.04	Make appropriate electrical terminations.	
04.05	Apply correct wiring methods to motors and motor control circuits.	
04.06	Apply correct wiring methods to transformers.	
04.07	Install non-metallic sheathed cable.	
04.08	Correctly install lighting fixtures and perform preventive and corrective maintenance.	

CTE Standards and Benchmarks		National Standards
	04.09 Correctly install switching and outlet devices.	
	04.10 Correctly use power tools.	
05.0	Demonstrate an understanding of DC power sources--The student will be able to:	
	05.01 Describe safe procedures for handling, storing, charging and installing storage batteries.	
	05.02 Describe electrical characteristics of lead-acid storage batteries, dry cells and NiCads.	
	05.03 Demonstrate knowledge of low voltage electronic power supplies.	
	05.04 Demonstrate knowledge of DC generator theory and construction for DC generators.	
	05.05 Perform troubleshooting and preventive maintenance on DC power sources.	
06.0	Demonstrate and understanding of AC power sources--The student will be able to:	
	06.01 Calculate and explain power factor.	
	06.02 Calculate and explain power factor corrections.	
	06.03 Demonstrate knowledge of the theory and physical and electrical characteristics of three phase alternators.	
	06.04 Demonstrate knowledge of the theory and application for engine driven generating sets, including types of prime movers and transfer switches.	
	06.05 Demonstrate knowledge of paralleling, synchronizing, testing three phase alternators.	
	06.06 Demonstrate knowledge of selecting, troubleshooting, connecting and maintaining 3-phase alternators.	
	06.07 Demonstrate knowledge of un-iterruptable power supplies (UPS).	
07.0	Demonstrate knowledge of DC motors--The student will be able to:	
	07.01 Demonstrate knowledge of DC motor theory and construction including series, shunt and compound motors.	
	07.02 Demonstrate knowledge of DC motor torque effectively speed regulation, loading and starting.	
	07.03 Demonstrate knowledge of performing maintenance procedures for and installation of DC motors.	
	07.04 Demonstrate knowledge of correctly apply testing and monitoring equipment to DC motors and machines.	
	07.05 Select and apply DC motor controls.	
08.0	Demonstrate knowledge of AC motors--The student will be able to:	
	08.01 Demonstrate knowledge of single-phase AC motors.	
	08.02 Demonstrate the ability to select connect and troubleshoot single phase AC motors.	

CTE Standards and Benchmarks		National Standards
08.03	Demonstrate knowledge of 3-phase AC motors.	
08.04	Demonstrate the ability to select, connect, troubleshoot and maintain 3-phase AC motors.	
08.05	Demonstrate the ability to correctly apply testing and monitoring equipment to AC 3-phase motors.	
08.06	Select and apply AC motor controls.	
08.07	Disassemble and assemble a single-phase motor.	
08.08	Disassemble and assemble a 3-phase motor.	
08.09	Perform preventative maintenance for AC motors.	
09.0	Demonstrate knowledge of motor controls--The student will be able to:	
09.01	Use schematics and drawings to troubleshoot electrical failures.	
09.02	Demonstrate knowledge of motor starters.	
09.03	Design, install, operate, and troubleshoot 2-wire control.	
09.04	Design, install, operate, and troubleshoot 3-wire control.	
09.05	Design, install, operate, and troubleshoot motor control circuits that use timers.	
09.06	Design, install, operate, and troubleshoot motor control circuits that use relays.	
09.07	Design, install, operate, and troubleshoot motor control circuits that use sequences.	
09.08	Demonstrate the ability to install and troubleshoot limit switches, proximity switches and other sensors in control circuits.	
09.09	Demonstrate knowledge of variable frequency drives (VFC's).	
09.10	Demonstrate knowledge of DC motor circuits.	
10.0	Demonstrate knowledge of transformers--The student will be able to:	
10.01	Demonstrate knowledge of transformer theory and application.	
10.02	Demonstrate knowledge of single-phase transformer theory and application.	
10.03	Demonstrate knowledge of theory and application of a single-phase 3-wire secondary system.	
10.04	Demonstrate knowledge of theory and application for single-phase transformers connected in 3-phase systems.	
10.05	Apply testing and monitoring equipment to transformers and their associated circuits.	
10.06	Install transformers to primary service and main switch metering equipment and secondary switching.	

CTE Standards and Benchmarks		National Standards
	10.07 Install transformer over current protection.	
11.0	Demonstrate knowledge of over current protection and grounding--The student will be able to:	
	11.01 List and identify types, classes and ratings of fuses and circuit breakers.	
	11.02 Describe operation of fuses and breakers.	
	11.03 Install fuses and breakers.	
	11.04 Select and apply branch-circuit protection for appliances.	
	11.05 Select and apply branch-circuit and overload protection for motors.	
	11.06 Relate the NEC to the selection and installation of over current protection devices.	
	11.07 Explain the purpose of equipment grounding.	
	11.08 Relate the NEC to the sizing and installation of grounding systems and conductors.	
	11.09 Perform preventative maintenance on grounding systems.	
12.0	Demonstrate knowledge of an industrial power distribution system--The student will be able to:	
	12.01 Demonstrate knowledge of a utility generation and distribution system.	
	12.02 Demonstrate knowledge of a typical industrial generation and distribution system.	
	12.03 Demonstrate knowledge of co-generation applications.	
	12.04 Demonstrate knowledge of protective relay applications.	
	12.05 Demonstrate knowledge of amperage, voltage control and power factor control techniques.	
	12.06 Demonstrate knowledge of breaker controls and computer load shed considerations.	
	12.07 Demonstrate knowledge of high voltage, distribution equipment, ground fault protection methods.	
	12.08 Demonstrate knowledge of safety procedures including identification of equipment used for testing high voltage.	
	12.09 Demonstrate knowledge of pole line isolation switches.	
	12.10 Demonstrate knowledge of current transformers (CT's) and potential transformers (PT's).	
13.0	Perform preventative and corrective maintenance on basic electrical power and control components--The student will be able to:	
	13.01 Use technical data and manuals to perform preventative maintenance.	
	13.02 Demonstrate ability to select and apply appropriate tools and testing equipment.	

CTE Standards and Benchmarks		National Standards
13.03	Perform corrective preventative maintenance and certify completion.	
13.04	Determine the need for corrective maintenance by applying trouble-shooting and analysis techniques.	
13.05	Replace parts and calibrate or adjust as necessary to bring equipment, systems, components or machines to specifications.	
13.06	Prepare forms and reports of preventive and corrective maintenance.	
14.0	Demonstrate knowledge of electrical test equipment--The student will be able to:	
14.01	Demonstrate the ability to use an analog multimeter.	
14.02	Demonstrate the ability to use a digital multimeter.	
14.03	Demonstrate the ability to use a “wiggy” voltmeter.	
14.04	Demonstrate the ability to use a clamp-on ammeter.	
14.05	Demonstrate the ability to use a megohmmeter.	
14.06	Demonstrate the ability to use an oscilloscope.	
14.07	Demonstrate the ability to use a high voltage tester.	
14.08	Use test equipment to systematically troubleshoot a defective system.	
15.0	Demonstrate knowledge of hydraulic and pneumatic systems--The student will be able to:	
15.01	Identify principles and practical applications of hydraulic and pneumatic power.	
15.02	Identify control valves in a hydraulic and pneumatic system.	
15.03	Identify pressure and safety relief valves and vacuum breakers.	
15.04	Identify cylinders and motors.	
15.05	Remove and replace hydraulic and pneumatic systems and components.	
15.06	Identify strainers and filters in hydraulic and pneumatic systems.	
15.07	Identify reservoirs and accumulators in hydraulic and pneumatic systems.	
15.08	Identify hydraulic and pneumatic pimps on a system.	
15.09	Identify piping, tubing, and fittings on a hydraulic pneumatic system.	
15.10	Identify system interfaces.	
15.11	Identify the procedures for pneumatic and hydraulic system maintenance.	
15.12	Locate control valve failures.	

CTE Standards and Benchmarks	National Standards
15.13 Demonstrate knowledge of regulators, volume boosters, relays and repeaters.	
15.14 Identify the components to produce instrument air.	
15.15 Demonstrate knowledge of current-to-pressure and pressure-to-current transducers.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0652
Occupational Completion Point: B
Instrument Mechanics – 350 Hours – SOC Code 49-2094

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Identify the basic principles and terminology of process control--The student will be able to:	
16.01	Identify the purpose of automatic control systems.	
16.02	Identify the elements of process control.	
16.03	Identify measured and manipulated variables in a control loop.	
16.04	Demonstrate knowledge of proportional control.	
16.05	Demonstrate knowledge of on/off control.	
16.06	Determine the effects of gain, reset and derivative in a proportional control scheme.	
16.07	Demonstrate knowledge of the basic laws of physics pertaining to instrumentation.	
16.08	Demonstrate knowledge of the terminology associated with instrumentation and process control.	
17.0	Identify the primary components of a process control system--The student will be able to:	
17.01	Identify primary control elements in process loops.	
17.02	Identify final control elements in process loops.	
17.03	Identify electronic, pneumatic, and digital transmitters in process loops.	
17.04	Identify controllers in process loops.	
17.05	Identify control loop applications (level, flow, temp, pressure, or analytical).	
17.06	Define the static and dynamic characteristics of instruments.	
17.07	Demonstrate knowledge necessary to interface individual process loops into microprocessor based control schemes.	
18.0	Demonstrate knowledge of using instrumentation drawings--The student will be able to:	

CTE Standards and Benchmarks	National Standards
18.01 Demonstrate ability to use loop sheets.	
18.02 Demonstrate ability to use flow sheets/P&IDs.	
18.03 Demonstrate ability to use process logic diagrams.	
18.04 Demonstrate ability to use installation drawings.	
18.05 Demonstrate ability to use building layout or location drawings.	
18.06 Troubleshoot using drawings.	
18.07 Identify process safety devices and explain their purpose.	
19.0 Demonstrate knowledge of using instrumentation test instruments--The student will be able to:	
19.01 Operate basic hydraulic measuring instruments.	
19.02 Operate dead weight testers.	
19.03 Operate manometers.	
19.04 Operate basic pneumatic measuring instruments.	
19.05 Operate vacuum pumps.	
19.06 Operate pressure and vacuum gauges.	
19.07 Operate basic thermal measuring instruments.	
19.08 Operate temperature baths.	
19.09 Operate electronic calibration instruments.	
19.10 Operate thermometers.	
19.11 Calibrate instruments using test instruments.	
19.12 Operate instrument standards.	
20.0 Demonstrate knowledge of instrumentation installation techniques--The student will be able to:	
20.01 Apply proper OSHA safety standards.	
20.02 Make electrical connections for instrument equipment.	
20.03 Identify and use hand tools properly.	
20.04 Identify and use power tools properly.	
20.05 Demonstrate acceptable tubing bending and installation techniques.	

CTE Standards and Benchmarks	National Standards
20.06 Identify the proper method for instrument wire installation in a cable tray.	
20.07 Demonstrate the ability to properly install various instrumentation devices.	
20.08 Demonstrate knowledge of “clean design” for instrument installations.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0654
Occupational Completion Point: C
Electrician Maintenance – 300 Hours – SOC Code 47-2111

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
21.0	Demonstrate knowledge of programmable logic controllers (PLC)--The student will be able to:	
21.01	Demonstrate knowledge of the terminology and operating components of PLC systems.	
21.02	Demonstrate knowledge of the addressing schemes used in various PLC systems.	
21.03	Understand and use ladder logic for various PLC systems.	
21.04	Program basic relay logic in ladder logic.	
21.05	Program timers and counters in ladder logic.	
21.06	Program shift registers and other data manipulation routines.	
21.07	Program for message displays and other output devices.	
21.08	Interface PLS's to perform communications.	
21.09	Load and save files on storage media.	
21.10	Prepare and update documentation.	
21.11	Perform local/remote interfacing.	
21.12	Troubleshoot defective PLC systems.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0656
Occupational Completion Point: D
Instrument Technician (Utilities) – 400 Hours – SOC Code 49-2094

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
22.0	Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS)--The student will be able to:	
22.01	Describe the principles and purpose of a DCS system.	
22.02	Describe the architecture and components of a DCS system.	
22.03	Configure control points on a DCS system.	
22.04	Perform data storage routines on a DCS system.	
22.05	Print graphs of control point responses from a DCS system.	
22.06	Perform data communications through PLC or discrete input/output interface units.	
22.07	Perform preventive maintenance and calibrate on DCS system devices.	
22.08	Troubleshoot and repair faults in DCS systems.	
23.0	Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control devices--The student will be able to:	
23.01	Demonstrate knowledge of the terminology, physics, methods and principles of level measurement and control.	
23.02	Identify level measurement purpose and requirements.	
23.03	Identify level measurement instruments.	
23.04	Identify solid level measuring systems.	
23.05	Identify instrument calibration standards.	
23.06	Identify safe standards, installation techniques and maintenance practices as applicable to level measurement.	
23.07	Identify common causes of level measurement instrument and sensor failures.	

CTE Standards and Benchmarks		National Standards
	23.08 Troubleshoot and repair level measurement and control system failures.	
	23.09 Identify ultrasonic level devices.	
	23.10 Identify principles of operation for radiation type, level control devices.	
	23.11 Determine correct applications for direct level measurement devices: floats, displacers, conductivity probes, etc.)	
	23.12 Determine correct applications for indirect level measurement devices: (hydraulic pressure, bubble tubes, radioactive emitters and detectors, etc.)	
	23.13 Design and operate a level control loop.	
	23.14 Calibrate level elements, transmitters and controllers.	
	23.15 Demonstrate knowledge of final control elements and applications for level loops.	
24.0	Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices--The student will be able to:	
	24.01 Demonstrate knowledge of the terminology, physics, methods and principles of pressure measurement and control.	
	24.02 Identify pressure measurement instruments.	
	24.03 Identify pressure measurement purpose and requirements.	
	24.04 Identify applications of vacuum/pressure measuring methods.	
	24.05 Identify the elements of vacuum/pressure measurement systems.	
	24.06 Identify safety standards, installation techniques and maintenance practices as applicable to vacuum/pressure measurement.	
	24.07 Identify instrument calibration standards.	
	24.08 Identify common vacuum/pressure, measuring instrument and sensor failures.	
	24.09 Troubleshoot and repair vacuum/pressure measurement and control system failures.	
	24.10 Demonstrate knowledge of elastic deformation elements.	
	24.11 Design and operate pressure loop.	
	24.12 Calibrate pressure elements, transmitters and controllers.	
	24.13 Demonstrate knowledge of differential pressure elements, principles, and applications.	
	24.14 Demonstrate knowledge of applications and requirements of vacuum breakers and pressure relief devices.	
	24.15 Demonstrate knowledge of final control elements and applications for vacuum/pressure loops.	

CTE Standards and Benchmarks		National Standards
25.0	Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices--The student will be able to:	
25.01	Demonstrate knowledge of the terminology, physics, methods and principles of temperature measurement and control.	
25.02	Identify temperature measurement purpose and requirements.	
25.03	Identify temperature measurement instruments.	
25.04	Identify bimetallic and fluid-filled temperature measuring instruments.	
25.05	Identify thermocouple and RTD temperature measuring instruments.	
25.06	Identify and operate pyrometers and thermometers.	
25.07	Identify safety standards, installation techniques and maintenance practices as applicable to temperature measurement.	
25.08	Identify instrument calibration standards.	
25.09	Identify common temperature measuring instrument and sensor failures.	
25.10	Troubleshoot and repair temperature measurement and control system failure.	
25.11	Design and operate a temperature control loop.	
25.12	Calibrate temperature elements, transmitters and controllers.	
25.13	Demonstrate knowledge of final control elements and applications for temperature loops.	
26.0	Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices--The student will be able to:	
26.01	Demonstrate knowledge of the terminology, physics, methods and principles of fluid flow measurement and control.	
26.02	Identify flow measurement purpose and requirement.	
26.03	Identify secondary measurement devices for fluid flow.	
26.04	Identify applications for variable area instruments.	
26.05	Identify open channel flow devices.	
26.06	Identify applications for positive displacement metering.	
26.07	Identify flow displacement measurement methods.	
26.08	Identify applications for magnetic flow meters.	
26.09	Identify applications for ultrasonic flow metering methods.	

CTE Standards and Benchmarks		National Standards
	26.10 Identify safety standards, installation techniques and maintenance practices as applicable to flow measurement.	
	26.11 Troubleshoot and repair flow measurement and control system failure.	
	26.12 Demonstrate knowledge of Venturi tubes, flow nozzles, orifice plates and pilot tubes to measure flow.	
	26.13 Demonstrate knowledge of mass flow measurement techniques.	
	26.14 Demonstrate knowledge of final control elements and applications for flow loops.	
	26.15 Calibrate flow elements, transmitters and controllers.	
	26.16 Design and operate a flow control loop.	
27.0	Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices--The student will be able to:	
	27.01 Identify weight and mass measuring units.	
	27.02 Identify methods for weighing materials in motion.	
	27.03 Identify weight displacement measurement methods.	
	27.04 Troubleshoot and repair weight instruments.	
	27.05 Perform operating systems checks, preventative maintenance and make adjustments to weight measurement loops.	
	27.06 Calibrate weight elements, transmitters and controllers.	
	27.07 Understand the principles of operation for consistency measuring instruments.	
28.0	Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices--The student will be able to:	
	28.01 Troubleshoot and repair pH measuring instruments.	
	28.02 Perform operating systems checks and make minor adjustments to pH measuring instruments.	
	28.03 Troubleshoot and repair liquid conductivity measuring instruments.	
	28.04 Understand basic principles of operation and the application for gas analyzer measuring instruments.	
	28.05 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: E
Operating Engineer Assistant Stationary – 400 Hours – SOC Code 17-3023

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
29.0	Demonstrate process operation skills--The student will be able to:	
29.01	Use PLC's to troubleshoot process systems.	
29.02	Identify safety isolation procedures for removing a device from a process.	
29.03	Perform operating system checks, preventive maintenance and make minor adjustments to level control loops.	
29.04	Perform operating system checks, preventive maintenance and make minor adjustments to vacuum/pressure control loops.	
29.05	Perform operating system checks, preventive maintenance and make minor adjustments to temperature control loops.	
29.06	Perform operating system checks, preventive maintenance and make minor adjustments to flow measuring instruments.	
29.07	Perform operating system checks, preventive maintenance and make minor adjustments to consistency measuring instruments.	
29.08	Perform operating system checks, preventive maintenance and make minor adjustments to liquid conductivity measuring instruments.	
29.09	Perform operating system checks to pneumatic and hydraulic systems.	
29.10	Operate control points on a DCS system.	
30.0	Demonstrate knowledge of technical reporting--The student will be able to:	
30.01	Draw and interpret schematics.	
30.02	Record data and prepare charts and graphs.	
30.03	Write reports and make oral presentations.	
30.04	Make equipment - failure reports.	

CTE Standards and Benchmarks	National Standards
30.05 Specify and requisition simple components.	
30.06 Compose technical letters and memoranda.	
30.07 Draw preventive maintenance and calibration procedures.	
30.08 Write and use maintenance work orders.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Industrial Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I150603
CIP Number	0615061200
Grade Level	30, 31
Standard Length	1600 hours
Teacher Certification	IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3019 – Drafters, All Other 17-3026 – Industrial Engineering Technicians
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The purpose of this program is to prepare students for employment as industrial engineering technicians.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, production and planning, design and installation of integrated systems and measurement, testing, and management of quality control in the manufacturing, transportation, assembly, installation, and operation of processes and products.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0600	Drafting Assistant Machining	300 hours	17-3019
B	ETI0601	Cost Control Assistant	300 hours	17-3026
C	ETI0602 ETI0603	Industrial Technician Assistant 1 Industrial Technician Assistant 2	250 hours 250 hours	17-3026
D	ETI0604 ETI0605	Industrial Engineering Technician 1 Industrial Engineering Technician 2	250 hours 250 hours	17-3026

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 Prepare charts, graphs and diagrams.
02.0 Conduct time, motion, and cost control studies.
03.0 Determine estimates for tools, materials and supplies.
04.0 Sequence operations for fabrication and assembly of products.
05.0 Identify manufacturing control procedures.
06.0 Read and interpret blueprints, schematics, and diagrams.
07.0 Demonstrate understanding of mechanics, hydraulics and schematics theory.
08.0 Demonstrate understanding of automated manufacturing processes.
09.0 Read, interpret, and write technical reports.

Florida Department of Education
Student Performance Standards

Program Title: **Industrial Technology**
PSAV Number: **I150603**

Course Number: ETI0600
Occupational Completion Point: A
Drafting Assistant Machining – 300 Hours – SOC Code 17-3019

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
01.0 Prepare charts, graphs, and diagrams--The student will be able to:	
01.01 Gather pertinent information for representation.	
01.02 Utilize design tools to draw.	
01.03 Evaluate information for description.	
01.04 Free sketch draft of diagram.	
01.05 Determine most effective means of representation.	
01.06 Develop accurate information/representation to scale.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0601
Occupational Completion Point: B
Cost Control Assistant – 300 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
02.0	Conduct time, motion, and cost control studies--The student will be able to:	
02.01	Develop employee job requirements.	
02.02	Analyze time spent on individual tasks.	
02.03	Develop cost control data.	
02.04	Evaluate production methods.	
02.05	Generate specific job requirements.	
02.06	Complete job status reports.	
03.0	Determine estimates for tools, materials and supplies--The student will be able to:	
03.01	Analyze production tooling and materials needs.	
03.02	Identify prospective suppliers.	
03.03	Obtain bids for purchase.	
03.04	Prepare and issue purchase requisition.	
03.05	Receive and inspect materials.	
03.06	Average distribution of materials based on need.	
04.0	Sequence operations for fabrication and assembly of products--The student will be able to:	
04.01	Analyze product components.	
04.02	Determine most effective production system.	
04.03	Evaluate time requirements at each production step.	
04.04	Determine tool, supply, and material needs at each work station.	
04.05	Lay out work procedures and stations.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0602
Occupational Completion Point: C (1 of 2)
Industrial Technician Assistant 1 – 250 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
05.0	Identify manufacturing control procedures--The student will be able to:	
05.01	Evaluate motivation, production, quality and cost in planning efficiency.	
05.02	Apply inspection processes in systems.	
05.03	Implement quality control procedures.	
05.04	Analyze workers and inspectors roles in quality production.	
05.05	Plan trial run and production run.	

Course Number: ETI0603
Occupational Completion Point: C (2 of 2)
Industrial Technician Assistant 2 – 250 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
06.0	Read and interpret blueprints, schematics, and diagrams--The student will be able to:	
06.01	Read detailer shop drawings.	
06.02	Read assembly drawings.	
06.03	Interpret sectional drawings.	
06.04	Read and interpret dimensions by tolerance.	
06.05	Identify symbols and abbreviations.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0604
Occupational Completion Point: D (1 of 2)
Industrial Engineering Technician 1 – 250 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
07.0	Demonstrate understanding of mechanics, hydraulics and schematics theory--The student will be able to:	
07.01	Demonstrate an understanding of measuring systems and ratios.	
07.02	Locate the center of gravity of a mass.	
07.03	Explain working forces of torque, tension, and compression.	
07.04	Explain the laws of motion.	
07.05	Explain how to calculate work.	
07.06	Explain the function of simple machines including levers, inclined plane, wedge wheel and axle, pulley and screw.	
07.07	Explain the types of power and the method of producing power including compound gears.	
07.08	Calculate volume mathematically and by displacement.	
07.09	Explain the laws of friction.	
07.10	Identify common schematic symbols and diagrams.	
07.11	Diagram an air supply system.	
07.12	Explain system maintenance techniques.	
07.13	Explain proper troubleshooting procedures.	
07.14	Read a hydraulic schematic.	
07.15	Identify hydraulic components.	
07.16	Explain hydraulic system troubleshooting techniques.	
07.17	Relate force, weight, mass and density to a pneumatic system.	

CTE Standards and Benchmarks	National Standards
07.18 Explain the operation of reciprocating compressors.	
07.19 Explain the operation of positive-displacement rotary compressors.	
07.20 Explain primary and secondary air treatment.	
07.21 Explain the operation of valves, cylinders, and motors.	

Course Number: ETI0605
Occupational Completion Point: D (2 of 2)
Industrial Engineering Technician 2 – 250 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
08.0 Demonstrate understanding of automated manufacturing processes--The student will be able to:	
08.01 Analyze and evaluate transducers.	
08.02 Analyze motor control systems.	
08.03 Analyze synchros and resolvers.	
08.04 Analyze pulse encoders.	
08.05 Analyze farred scales.	
09.0 Read, interpret, and write technical reports--The student will be able to:	
09.01 Draw and interpret schematics.	
09.02 Record data.	
09.03 Write reports.	
09.04 Maintain test logs.	
09.05 Compose technical letters.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Related Industrial Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I469929
CIP Number	0615061202
Grade Level	30, 31
Standard Length	450 hours
Teacher Certification	ANY INDUS ED G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3026 – Industrial Engineering Technicians
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to applied general education skills (English, mathematics, physics); tools, machinery and equipment appropriate to various trade and industrial occupations; technical recording and reporting; and a variety of miscellaneous skills to provide a broad base of knowledge that supports trade or industry specific education and training in specialty areas.
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 one 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0085	Engineering Technician	450 hours	17-3026

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 appropriate trade or industry related English skills.
02.0 Apply trade or industry related mathematical concepts and performs trade or industry related calculations.
03.0 Demonstrate trade or industry related applied physics skills.
04.0 Apply and use safety rules and standards.
05.0 Apply trade or industry related shop or laboratory skills.
06.0 Demonstrate knowledge and use of trade or industry related tools, machinery and equipment.
07.0 Demonstrate a basic knowledge of trade or industry related shop or working drawings.
08.0 Demonstrate the ability to operate and use appropriate trade and industry computer hardware and software.
09.0 Demonstrate proficiency in technical recording and reporting.
10.0 Demonstrate and apply knowledge of miscellaneous trade and industry related skills.

Florida Department of Education
Student Performance Standards

Program Title: **Related Industrial Technology**
PSAV Number: **I469929**

Course Number: ETI0085
Occupational Completion Point: A
Engineering Technician – 450 Hours – SOC Code 17-3026

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Demonstrate appropriate trade or industry related English skills--The student will be able to:	
01.01	Identify and define frequently used trade or industry related terms by sight.	
01.02	Determine the main idea of trade or industry related memos and instructions.	
01.03	Identify and list the order of events in a set of trade or industrial specifications/instructions.	
01.04	Write a statement of how to follow a given set of written trade or industrial instructions.	
01.05	Obtain appropriate trade or industry related information from reference material.	
01.06	Identify sources from which to obtain trade or industry related information.	
01.07	Demonstrate basic trade or industry related English writing skills.	
01.08	Write a paragraph presenting trade or industry related information in chronological order.	
01.09	Write a trade or industry related request for personnel, request for materials or supplies or request for information.	
01.10	Write a clear, concise and sequenced series of brief statements describing the steps of a trade or industry related process or event.	
01.11	Use a proper form when writing a simple trade or industry related business letter and addressing an envelope for it.	
01.12	Write a trade or industry related letter of request, adjustment, complaint, application or opinion, which contains necessary and accurate information.	
01.13	Proofread trade or industry related reports for spelling.	
01.14	Write a trade or industry related memorandum using a proper format.	
02.0	Apply trade or industry related mathematical concepts and perform appropriate trade or industry related calculations--The student will be able to:	

CTE Standards and Benchmarks	National Standards
02.01 Read and interpret measuring devices.	
02.02 Add 100 addition combinations.	
02.03 Add two digit numbers.	
02.04 Add three-digit numbers.	
02.05 Subtract 100 subtraction combinations.	
02.06 Subtract two, three and four-digit numbers.	
02.07 Solve one-digit divisor problems.	
02.08 Solve two-digit divisor problems.	
02.09 Solve three-digit divisor problems.	
02.10 Solve multiplication facts.	
02.11 Multiply by a one-digit factor.	
02.12 Multiply by a two-digit factor.	
02.13 Identify parts of a fraction.	
02.14 Solve fractional word problems.	
02.15 Convert fractions.	
02.16 Solve decimal notations.	
02.17 Solve number word problems.	
02.18 Round to nearest whole number.	
02.19 Add decimals.	
02.20 Divide a decimal by a decimal.	
02.21 Divide a whole number by a decimal.	
02.22 Write fractions as decimals and percents.	
02.23 Write percents as fractions and decimals.	
02.24 Solve percent problems.	
02.25 Compute board feet.	
02.26 Compute cost of materials.	

CTE Standards and Benchmarks	National Standards
02.27 Solve basic ratio and proportion problems.	
02.28 Operate simple hand-held calculators.	
02.29 Convert board feet to linear feet and vice versa.	
02.30 Read, interpret and apply metric conversion tables.	
02.31 Solve basic algebraic problems.	
02.32 Solve basic geometric problems.	
02.33 Solve basic trigonometric problems.	
02.34 Name the seven basic units in the International System of units (SI) and give the symbol and quantity measured for each.	
02.35 Name the prefix symbol for the multiple 10 to the 18th.	
02.36 Calculate a weight in pounds, given a mass in kilograms.	
02.37 Identify the term angle.	
02.38 Measure an angle, given a protractor.	
02.39 Define the term degree.	
02.40 Define the term radian.	
02.41 Define the term sine of an angle.	
02.42 Define the term cosine of an angle.	
02.43 Define the term tangent of an angle.	
02.44 Apply the Pythagorean theorem to determine the third side of a triangle when given a right triangle with two known sides.	
02.45 List at least four common examples of scalar quantities.	
02.46 List at least four common examples of vector quantities.	
02.47 Draw a technically acceptable graph from a table of experimental data suitable for plotting on rectangular-coordinate graph paper; the resulting graph may be linear or nonlinear.	
02.48 Write a given decimal number in scientific notation.	
02.49 Write a number given in scientific notation in decimal form.	
02.50 Add, subtract, multiply or divide using power-of-ten numbers.	
02.51 Find logarithms and antilogarithms of given numbers.	

CTE Standards and Benchmarks	National Standards
02.52 Multiply and divide numbers and solve equations using the three theorems of logarithms for products and quotients.	
02.53 Measure linear dimensions with a vernier caliper.	
03.0 Demonstrate trade or industry related applied physics skills--The student will be able to:	
03.01 Demonstrate applied skills in mechanics.	
03.02 Apply and solve vectors.	
03.03 Solve force and motion problems.	
03.04 Solve work, energy and power problems.	
03.05 Solve friction problems.	
03.06 Solve circular motion problems.	
03.07 Solve rotational motion problems.	
03.08 Solve problems involving the properties of solids.	
03.09 Solve problems involving the properties of liquids.	
03.10 Solve problems involving the properties of gases.	
03.11 Demonstrate applied skills in heat, light and sound.	
03.12 Solve temperature and heat problems.	
03.13 Solve change-of-state problems.	
03.14 Solve heat transfer problems.	
03.15 Solve thermodynamic problems.	
03.16 Solve refrigeration and air conditioning problems.	
03.17 Solve harmonic motion problems.	
03.18 Solve sound wave problems.	
03.19 Solve light problems.	
03.20 Solve optical problems.	
03.21 Demonstrate applied skills in electricity and magnetism.	
03.22 Solve electric circuit problems.	
03.23 Solve electromagnetic problems.	

CTE Standards and Benchmarks		National Standards
03.24	Solve alternating current problems.	
03.25	Solve generator and motor problems.	
03.26	Solve electrostatic problems.	
03.27	Solve magnetism problems.	
03.28	Apply knowledge of strengths of materials.	
03.29	Solve equilibrium problems.	
03.30	Solve stress and strain problems.	
03.31	Solve centroid and inertia problems.	
03.32	Solve connection and joint problems.	
03.33	Solve problems with beam stresses.	
03.34	Solve torsion problems.	
03.35	Solve compression problems.	
03.36	Solve tension problems.	
03.37	Solve force combination problems.	
04.0	Apply and use safety rules and standards--The student will be able to:	
04.01	Demonstrate knowledge and use of general safety rules.	
04.02	Apply general shop or laboratory safety rules and procedures.	
04.03	Demonstrate the operation of shop safety devices.	
04.04	Apply fire safety rules and procedures.	
04.05	Apply rules and procedures for electrical safety.	
04.06	Apply safety rules and procedures applicable to stationary or moving machinery and the use and maintenance or machine safety guards.	
04.07	Apply safety rules and procedures applicable to the use of moving transports (forklifts, conveyors, small electric trucks and flatbeds, etc.) and those to be followed where such transports are being operated.	
04.08	Apply safety rules and procedures to be followed when operating or using hoists, cranes, elevators and other lifting equipment.	
04.09	Apply safety rules and procedures to be followed when constructing or using scaffolding.	
04.10	Demonstrate safety procedures to be followed in areas where heavy equipment (earth haulers, dump trucks, cranes, scrapers, bulldozers, various heavy trucks, etc.) is being operated.	

CTE Standards and Benchmarks		National Standards
	04.11 Demonstrate minimal first aid skills.	
	04.12 Identify safety headgear and where, how and why it is to be used.	
	04.13 Identify safety straps and belts and where, how and why they are to be used.	
	04.14 Identify safety clothing (gloves, nets, aprons, goggles, soft-soled shoes or caulked boots, etc.) and where, how and why it is to be used.	
	04.15 Determine and demonstrate how to apply the Occupational Safety Health Administration (OSHA) regulations regarding manufacturing enclosures and machinery.	
	04.16 Determine and demonstrate how to apply the Occupational Safety Health Administration (OSHA) regulations regarding air and noise pollution, their control and the maximum levels allowable.	
	04.17 Determine and demonstrate how to apply the Occupational Safety Health Administration (OSHA) regulations regarding safeguards required when using small hand and power tools and larger machine tools.	
	04.18 Determine the rules applicable to the requirements for claims involving disability and unemployment insurance.	
05.0	Apply trade or industry related shop or laboratory skills--The student will be able to:	
	05.01 Apply appropriate reading and writing skills in the writing and preparation of shop or laboratory reports or logbooks and in the technical recording and reporting of shop or laboratory data.	
	05.02 Apply appropriate mathematical concepts and calculations to solve given shop or laboratory projects or assignments.	
	05.03 Apply appropriate physics concepts and calculations in the solution of given shop or laboratory project or assignments.	
	05.04 Apply appropriate safety rules, regulations and procedures in a shop or laboratory setting.	
	05.05 Demonstrate the ability to research, locate and apply the appropriate specifications to given trade or industry related projects.	
	05.06 Apply knowledge of working drawings to produce usable shop or laboratory products for various trades or industries.	
06.0	Demonstrate knowledge and use of trade or industry related tools, machinery, and equipment--The student will be able to:	
	06.01 Identify and explain the use of the hand tools used in the construction industries.	
	06.02 Demonstrate knowledge and use of the smaller power tools.	
	06.03 Identify and explain the use of the smaller power tools used in the construction industries.	
	06.04 Identify and explain the use of the larger tools and machinery used in the construction industries.	
	06.05 Demonstrate knowledge and use of heavy machinery and equipment.	

CTE Standards and Benchmarks		National Standards
	06.06 Identify and explain the use of the heavy machinery and equipment used in the construction industries.	
07.0	Demonstrate a basic knowledge of trade and industry related working drawings--The student will be able to:	
	07.01 Read and interpret drafting symbols.	
	07.02 Read and apply appropriate information from simple trade and industry drawings.	
	07.03 Locate, read and apply trade and industry specifications.	
08.0	Demonstrate the ability to operate and use appropriate trade and industry computer hardware and software--The student will be able to:	
	08.01 Operate computer equipment and peripherals.	
	08.02 Interpret printed output.	
	08.03 Demonstrate post-processing file management skills.	
	08.04 Create computer-output microfiche (COM) files.	
	08.05 Create photo-processing files.	
	08.06 Create numerical control files.	
09.0	Demonstrate proficiency in technical recording and reporting--The student will be able to:	
	09.01 Record data and design curves and graphs.	
	09.02 Write reports and make oral presentations.	
	09.03 Maintain test and trade or industry data logs.	
	09.04 Make equipment-failure reports.	
	09.05 Specify and requisition simple parts and supplies.	
	09.06 Compose technical letters and memoranda.	
	09.07 Write formal reports of laboratory experiences.	
	09.08 Drift preventive maintenance and calibration procedures.	
10.0	Demonstrate and apply knowledge of miscellaneous trade and industry related skills--The student will be able to:	
	10.01 Demonstrate knowledge and use of scheduling techniques.	
	10.02 Create trade and industry related program education and review technique (PERT) charts to the scheduling of a simple hypothetical project.	
	10.03 Create trade and industry related critical path method (CPM) charts to the scheduling of a simple hypothetical project.	

CTE Standards and Benchmarks	National Standards
10.04 Create trade and industry related Gantt charts or lists to the scheduling of simple hypothetical project.	
10.05 Demonstrate knowledge and use of electronic calculators and other general work-support tools.	
10.06 Demonstrate knowledge and use of trade and industry related reference materials.	
10.07 Demonstrate the ability to read and interpret appropriate trade and industrial blueprints.	
10.08 Demonstrate knowledge and ability in trade and industry related problem solving.	
10.09 Demonstrate knowledge and use of trade or industry terms and terminology.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Major Appliance and Refrigeration Repair**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I470106
CIP Number	0647010601
Grade Level	30, 31
Standard Length	1500 hours
Teacher Certification	APPLI REPR @7 7G GAS FITTER 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9031 – Home Appliance Repairers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 machining positions.

The content includes but is not limited to broad, transferable skills, stresses the understanding of all aspects of the machining industry, and demonstrates such elements of the industry as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EER0310	Appliance Helper	300 hours	49-9031
B	EER0315	Laundry Technician	300 hours	49-9031
C	EER0317	Kitchen Technician	450 hours	49-9031
D	ACR0046	Refrigeration Technician	450 hours	49-9031

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 Apply proper laboratory practices.
02.0 Apply electrical fundamentals.
03.0 Apply gas fundamentals.
04.0 Install, troubleshoot and repair electric clothes dryers.
05.0 Install, troubleshoot and repair gas clothes dryers.
06.0 Install, troubleshoot and repair clothes washers.
07.0 Install, troubleshoot and repair electric ranges.
08.0 Install, troubleshoot and repair microwave ovens.
09.0 Install, troubleshoot and repair gas ranges.
10.0 Install, troubleshoot and repair dishwashers.
11.0 Utilize fundamentals of refrigeration.
12.0 Work with tubing and fittings.
13.0 Install, troubleshoot and repair refrigerators, icemakers and freezers.
14.0 Install, troubleshoot and repair window air conditioners.

Florida Department of Education
Student Performance Standards

Program Title: **Major Appliance and Refrigeration Repair**
PSAV Number: **I470106**

Course Number: EER0310
Occupational Completion Point: A
Appliance Helper – 300 Hours – SOC Code 49-9031
Course Description:

CTE Standards and Benchmarks	
01.0	Apply proper laboratory practices--The student will be able to:
01.01	Use industry accepted safety practices.
01.02	Explain appropriate first aid for electrical shock and potential shop accidents.
01.03	Perform appropriate record keeping functions.
01.04	Explain and demonstrate the proper use and care of hand tools.
01.05	Explain and demonstrate the proper use and care of meters and test equipment.
01.06	Explain and demonstrate the proper use and care of power tools.
02.0	Apply electrical fundamentals--The student will be able to:
02.01	Explain electron theory.
02.02	Identify circuits from schematics and diagrams using commonly accepted symbols.
02.03	Explain Ohm's Law.
02.04	Measure resistance.
02.05	Measure voltage.
02.06	Measure amperage.
02.07	Measure wattage.
02.08	Explain and construct series circuits.
02.09	Explain and construct parallel circuits.
02.10	Explain and construct combination circuits.

CTE Standards and Benchmarks	
02.11	Explain inductance and magnetism and their relationship to electric motors.
02.12	Describe how electric motors function.
02.13	Explain the function of capacitors and how to troubleshoot them.
02.14	Explain the function of relay and switches and how to troubleshoot them.
02.15	Explain the function of capacitors and transformers in major appliances.
02.16	Explain the concept and rationale of motor protection.
02.17	Describe how a compressor functions.
03.0	Apply gas fundamentals--The student will be able to:
03.01	Explain common use terms.
03.02	Explain different types of gas.
03.03	Explain specific gravity.
03.04	Diagram and explain basic components of a gas burner.
03.05	Explain requirements for burning.
03.06	Perform pressure tests on gas systems.

Florida Department of Education
Student Performance Standards

Course Number: EER0315
Occupational Completion Point: B
Laundry Technician – 300 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
04.0	Install, troubleshoot, and repair electric clothes dryer--The student will be able to:
04.01	Install an electric dryer.
04.02	Identify components and their function.
04.03	Troubleshoot timers and components.
04.04	Remove and replace manual timer, electronic controls or components.
04.05	Troubleshoot drive motors and components.
04.06	Remove and replace drive motor or component.
04.07	Troubleshoot heating elements and components.
04.08	Remove and replace element or component.
04.09	Remove and replace thermostats.
04.10	Troubleshoot thermostats.
04.11	Troubleshoot bearings and components.
04.12	Remove and replace bearing or component.
04.13	Troubleshoot belts and pulleys.
04.14	Remove and replace belt or pulley.
04.15	Troubleshoot rollers and glides.
04.16	Remove and replace roller or glides.
04.17	Troubleshoot filters.
04.18	Remove and replace filter.
04.19	Troubleshoot seals.

CTE Standards and Benchmarks	
04.20	Remove and replace seals.
04.21	Troubleshoot push-to-start switch.
04.22	Remove and replace push-to-start switch.
04.23	Troubleshoot door switches.
04.24	Remove and replace door switches.
04.25	Troubleshoot selector switches.
04.26	Remove and replace selector switches.
04.27	Remove and replace sensor and electronic control.
04.28	Troubleshoot sensor and electronic control.
04.29	Perform operational check.
04.30	Instruct consumer on use and care.
05.0	Install, troubleshoot and repair gas clothes dryers--The student will be able to:
05.01	Install a gas dryer.
05.02	Identify components and their function.
05.03	Read and interpret schematics and diagrams.
05.04	Troubleshoot electric ignition components.
05.05	Remove and replace electric ignition components.
05.06	Troubleshoot timers and electronic controls and components.
05.07	Remove and replace timer electronic control or component.
05.08	Troubleshoot drive motors.
05.09	Remove and replace drive motor.
05.10	Troubleshoot gas burner.
05.11	Remove and replace gas burner.
05.12	Troubleshoot thermostats.
05.13	Remove and replace thermostat.
05.14	Troubleshoot gas valves.

CTE Standards and Benchmarks	
05.15	Remove and replace gas valve.
05.16	Troubleshoot thermocouples.
05.17	Remove and replace thermocouple.
05.18	Troubleshoot flame switch.
05.19	Remove and replace flame switch.
05.20	Troubleshoot bearing assemblies and components.
05.21	Remove and replace bearing or component.
05.22	Troubleshoot belts and pulleys.
05.23	Remove and replace belt or pulley.
05.24	Troubleshoot rollers and glides.
05.25	Remove and replace roller or glide.
05.26	Troubleshoot seals.
05.27	Remove and replace seals.
05.28	Troubleshoot door switches.
05.29	Remove and replace door switch.
05.30	Troubleshoot selector switches.
05.31	Remove and replace selector switch.
05.32	Troubleshoot motor switches.
05.33	Remove and replace motor switch.
05.34	Perform operational check.
05.35	Instruct consumer on use and care.
06.0	Install, troubleshoot and repair clothes washers--The student will be able to:
06.01	Install a clothes washer.
06.02	Identify components and their function.
06.03	Read and interpret schematics and diagrams.
06.04	Troubleshoot manual timers, electronic controls and components.

CTE Standards and Benchmarks
06.05 Remove and replace timer or component.
06.06 Troubleshoot selector switches.
06.07 Remove and replace selector switch.
06.08 Troubleshoot water level switches and components.
06.09 Remove and replace water level switch or component.
06.10 Troubleshoot water inlet valves and components.
06.11 Remove and replace water inlet valve or component.
06.12 Troubleshoot hoses.
06.13 Remove and replace hoses.
06.14 Troubleshoot water pumps and components.
06.15 Remove and replace water pump or component.
06.16 Troubleshoot filters to include front load washers.
06.17 Remove and replace filters to include front load washers
06.18 Troubleshoot drive motors and components.
06.19 Remove and replace drive motor or component.
06.20 Troubleshoot belts and pulleys.
06.21 Remove and replace belt or pulley.
06.22 Troubleshoot transmissions and components.
06.23 Remove and replace transmission or component.
06.24 Troubleshoot bearings.
06.25 Remove and replace bearings.
06.26 Troubleshoot water and oil seals.
06.27 Remove and replace water and oil seals.
06.28 Troubleshoot clutches.
06.29 Remove and replace clutch.
06.30 Troubleshoot brakes.

CTE Standards and Benchmarks
06.31 Remove and replace brake.
06.32 Troubleshoot lid switches and components.
06.33 Remove and replace lid switch or component.
06.34 Perform operational check.
06.35 Instruct consumer on use and care.

Florida Department of Education
Student Performance Standards

Course Number: EER0317
Occupational Completion Point: C
Kitchen Technician – 450 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
07.0	Install, troubleshoot, and repair electric ranges--The student will be able to:
07.01	Install an electric range.
07.02	Describe the operation and application of components.
07.03	Read and interpret schematics and diagrams.
07.04	Troubleshoot clocks/timers.
07.05	Remove and replace clocks/timers.
07.06	Troubleshoot surface unit switches and components.
07.07	Remove and replace surface switches or components.
07.08	Troubleshoot oven thermostats and components.
07.09	Remove and replace oven thermostats or components.
07.10	Troubleshoot oven selector switches and components.
07.11	Remove and replace oven selector switches or components including induction cook-tops and ranges.
07.12	Troubleshoot surface units and components including induction cook-tops and ranges.
07.13	Remove and replace surface units or components including induction cook-tops and ranges.
07.14	Troubleshoot bake and broil elements.
07.15	Remove and replace bake and broil elements.
07.16	Troubleshoot electronic controls.
07.17	Remove and replace electronic controls.
07.18	Troubleshoot time delay relays.
07.19	Remove and replace time delay relay.

CTE Standards and Benchmarks	
07.20	Troubleshoot oven sensors and components.
07.21	Remove and replace oven sensor or component.
07.22	Troubleshoot door locks and components.
07.23	Remove and replace door lock or component.
07.24	Troubleshoot fans.
07.25	Remove and replace fan.
07.26	Troubleshoot gaskets and seals.
07.27	Remove and replace gasket or seals.
07.28	Perform operational check.
07.29	Instruct consumer on use and care.
08.0	Install, troubleshoot, and repair microwave ovens--The student will be able to:
08.01	Install a microwave oven.
08.02	Describe the operation and application of components.
08.03	Read and interpret schematics and diagrams.
08.04	Troubleshoot clocks/timers/electronic controls.
08.05	Remove and replace clocks/timers/electronic controls.
08.06	Troubleshoot door switches.
08.07	Remove and replace door switches.
08.08	Troubleshoot relays.
08.09	Remove and replace relays.
08.10	Troubleshoot thermal protectors.
08.11	Remove and replace thermal protectors.
08.12	Troubleshoot the power transformer.
08.13	Remove and replace the power transformer.
08.14	Troubleshoot the high voltage diode.
08.15	Remove and replace the high voltage diode.

CTE Standards and Benchmarks	
08.16	Troubleshoot the capacitor.
08.17	Remove and replace the capacitor.
08.18	Troubleshoot the magnetron.
08.19	Remove and replace the magnetron.
08.20	Troubleshoot the fan.
08.21	Remove and replace the fan.
08.22	Troubleshoot the stirrer blade and motor.
08.23	Remove and replace the stirrer blade and motor.
08.24	Troubleshoot the turntable motor.
08.25	Remove and replace the turntable motor.
08.26	Perform operational check.
08.27	Instruct consumer on use and care.
09.0	Install, troubleshoot, and repair gas ranges--The student will be able to:
09.01	Install a gas range.
09.02	Identify components and their function.
09.03	Read and interpret schematics and diagrams.
09.04	Troubleshoot clocks/timers/electronic controls.
09.05	Remove and replace clocks/timers/electronic controls.
09.06	Troubleshoot oven thermostats.
09.07	Remove and replace oven thermostats.
09.08	Troubleshoot oven selector switches.
09.09	Remove and replace oven selector switches.
09.10	Troubleshoot self-clean relays.
09.11	Remove and replace self-clean relays.
09.12	Troubleshoot oven sensors.
09.13	Remove and replace oven sensor.

CTE Standards and Benchmarks	
09.14	Troubleshoot door locks.
09.15	Remove and replace door lock.
09.16	Troubleshoot fans.
09.17	Remove and replace fan.
09.18	Troubleshoot gas valves for surface burners.
09.19	Remove and replace gas valve for surface burner.
09.20	Troubleshoot gas valve for oven.
09.21	Remove and replace gas valve for oven.
09.22	Troubleshoot electric igniters.
09.23	Remove and replace electric igniter.
09.24	Troubleshoot safety valves.
09.25	Remove and replace safety valve.
09.26	Troubleshoot pressure regulators.
09.27	Remove and replace pressure regulator.
09.28	Troubleshoot door seals/gaskets.
09.29	Remove and replace door seal/gasket.
09.30	Perform operational check.
09.31	Instruct consumer on use and care.
10.0	Install, troubleshoot, and repair dishwashers--The student will be able to:
10.01	Install a dishwasher.
10.02	Identify components and their function.
10.03	Read and interpret schematics and diagrams.
10.04	Troubleshoot timers and electronic control or components.
10.05	Remove and replace timer and electronic control or component.
10.06	Troubleshoot selector switches.
10.07	Remove and replace selector switch.

CTE Standards and Benchmarks
10.08 Troubleshoot float switches.
10.09 Remove and replace float switch.
10.10 Troubleshoot door switches.
10.11 Remove and replace door switch.
10.12 Troubleshoot motors and components.
10.13 Remove and replace motor and component.
10.14 Troubleshoot heating elements.
10.15 Remove and replace heating element.
10.16 Troubleshoot relays.
10.17 Remove and replace relay.
10.18 Troubleshoot water valves and components.
10.19 Remove and replace water valve or component.
10.20 Troubleshoot hoses.
10.21 Remove and replace hoses.
10.22 Troubleshoot pumps and components.
10.23 Remove and replace pump or component.
10.24 Troubleshoot seals.
10.25 Remove and replace seals.
10.26 Troubleshoot dispensers and components.
10.27 Remove and replace dispenser or component.
10.28 Troubleshoot spray arms.
10.29 Remove and replace spray arm.
10.30 Troubleshoot blower motors.
10.31 Remove and replace blower motor.
10.32 Troubleshoot thermostats.
10.33 Remove and replace thermostat.
10.34 Perform operational check.
10.35 Instruct consumer on use and care.

Florida Department of Education
Student Performance Standards

Course Number: ACR0046
Occupational Completion Point: D
Refrigeration Technician – 450 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
11.0	Utilize the fundamentals of refrigeration--The student will be able to:
11.01	Explain commonly used terms.
11.02	Perform heat transfer, measuring and temperature conversions.
11.03	Perform pressure measuring and conversion calculations.
11.04	Explain the concept of state of matter.
11.05	Explain the differences in refrigerants and their uses.
11.06	Diagram and explain the functions of the components of basic refrigeration systems.
11.07	Identify purpose and importance of CFC recover/recycling.
11.08	Identify operation of recovery system components.
11.09	Recover and recycle refrigerants.
12.0	Work with tubing and fittings--The student will be able to:
12.01	Identify types and uses of solders and brazing alloys.
12.02	Identify types and sizes of tubing and fittings.
12.03	Measure, cut, flare, swage and bend tubing.
12.04	Soft solder with acetylene.
12.05	Braze with acetylene and oxyacetylene.
12.06	Fabricate replacement sections of tubing for appliances.
13.0	Install, troubleshoot, and repair refrigeration icemakers and freezers--The student will be able to:
13.01	Install a refrigerator and a freezer.

CTE Standards and Benchmarks	
13.02	Identify components, electronic controls, variable speed compressors and their functions.
13.03	Read and interpret schematics and diagrams.
13.04	Troubleshoot gaskets and seals.
13.05	Remove and replace gaskets and seals.
13.06	Troubleshoot light and fan switches.
13.07	Remove and replace light and fan switches.
13.08	Troubleshoot fans.
13.09	Remove and replace fans.
13.10	Troubleshoot the manual and electronic adaptive controls defrost timers.
13.11	Remove and replace the manual and electronic adaptive control defrost timers.
13.12	Troubleshoot the defrost thermostats and thermistors.
13.13	Remove and replace the defrost thermostats and thermistors.
13.14	Troubleshoot the defrost heater.
13.15	Remove and replace the defrost heater.
13.16	Troubleshoot the cold control.
13.17	Remove and replace cold control.
13.18	Troubleshoot icemakers.
13.19	Remove and repair icemakers.
13.20	Use test equipment to determine operating conditions of a refrigeration system.
13.21	Troubleshoot refrigeration system.
13.22	Remove and replace compressors.
13.23	Remove and replace condensers, evaporators, metering devices and dryers.
13.24	Perform operational check.
13.25	Instruct consumers on use and care.
14.0	Install, troubleshoot, and repair window air conditioners-–The student will be able to:
14.01	Install a window air conditioner.

CTE Standards and Benchmarks	
14.02	Identify components and their functions to include multi-split systems and electronic controls.
14.03	Read and interpret schematics and diagrams.
14.04	Troubleshoot selector switches.
14.05	Remove and replace selector switches.
14.06	Troubleshoot the thermostats.
14.07	Remove and replace the thermostats.
14.08	Troubleshoot capacitors.
14.09	Remove and replace capacitors.
14.10	Troubleshoot the fan motor.
14.11	Remove and replace the fan motor.
14.12	Troubleshoot the heater.
14.13	Remove and replace the heater.
14.14	Troubleshoot the deicer.
14.15	Remove and replace the deicer.
14.16	Troubleshoot the reversing valve.
14.17	Remove and replace the reversing valve.
14.18	Troubleshoot the compressor.
14.19	Remove and replace the compressor.
14.20	Use test equipment to determine operating conditions of refrigeration systems.
14.21	Perform operational check.
14.22	Instruct consumer on use and care.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Electronic System Assembly**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I470129
CIP Number	0647019903
Grade Level	30, 31
Standard Length	450 hours
Teacher Certification	ELECTRONIC @7 7G TEC ELEC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2022 – Electrical and Electronic Equipment Assemblers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 System Assembly positions.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, blueprint reading, selection and use of tools/materials, wire preparation for soldering, soldering skills, types of circuit boards, types of terminals, types of solder cups, component assembly, and solderless connections.

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 one occupational completion point.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0020	Electrical, Electronic Assembler	450 hours	51-2022

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 interpreting written, graphic and/or oral instruction.
02.0 Demonstrate proficiency in developing basic electronic assembly skills.
03.0 Demonstrate proficiency in preparing wire for soldering and/or assembly.
04.0 Demonstrate proficiency in applying soldering techniques.
05.0 Demonstrate proficiency in connecting component and lead wires.
06.0 Demonstrate proficiency in installing electronic component assembly.
07.0 Demonstrate proficiency in preparing material for solderless connections.

Florida Department of Education
Student Performance Standards

Program Title: **Electronic System Assembly**
PSAV Number: **I470129**

Course Number: EEV0020
Occupational Completion Point: A
Electrical, Electronic Assembler – 450 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
01.0 Demonstrate proficiency in interpreting written, graphic and/or oral instruction--The student will be able to:	
01.01 Read and interpret written and oral instructions.	
01.02 Read and interpret graphic instructions.	
01.03 Follow accepted safety rules.	
01.04 Read and interpret electronic chassis assembly.	
01.05 Read and interpret color coding.	
02.0 Demonstrate proficiency in developing basic electronic assembly skills--The student will be able to:	
02.01 Use hand tools.	
02.02 Use mechanical and other strippers.	
02.03 Use soldering irons.	
02.04 Select soldering materials.	
02.05 Select types of wire.	
02.06 Identify and select electronic component parts.	
02.07 Select types of terminals.	
02.08 Select types of cleaning tools and materials.	
02.09 Use desoldering tools.	
03.0 Demonstrate proficiency in preparing wire for soldering and/or assembly--The student will be able to:	

CTE Standards and Benchmarks		National Standards
	03.01 Strip wires for soldering.	
	03.02 Tin by hand and/or solder pot.	
04.0	Demonstrate proficiency in applying soldering techniques--The student will be able to:	
	04.01 Apply heat applications.	
	04.02 Apply solder applications.	
	04.03 Rework unsatisfactory connectors.	
	04.04 Maintain solder connection appearance.	
05.0	Demonstrate proficiency in connecting component and lead wires--The student will be able to:	
	05.01 Solder component leads to printed circuit boards.	
	05.02 Solder component lead wires to turret terminals.	
	05.03 Solder lead wires to bifurcated terminals.	
	05.04 Solder lead wires to hook and perforated terminals.	
	05.05 Solder lead wires into connector solder cups.	
06.0	Demonstrate proficiency in installing electronic component assembly--The student will be able to:	
	06.01 Mount components onto a chassis.	
	06.02 Mount components onto a panel.	
	06.03 Mount components onto a circuit board.	
07.0	Demonstrate proficiency in preparing materials for solderless connections--The student will be able to:	
	07.01 Prepare wire for cables.	
	07.02 Strip, terminalize, lay and lace harness.	
	07.03 Use heat shrinkable tubing.	
	07.04 Strip wires for wrapping.	
	07.05 Route and wrap for pin connections.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Industrial Machinery Maintenance and Repair**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I470303
CIP Number	0647030300
Grade Level	30, 31
Standard Length	1,350 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 industrial-machinery maintenance positions.

The content includes but is not limited to understanding all aspects of the industrial-machinery maintenance-technology industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 three 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0450	Industrial Machinery Maintenance Assistant	450 hours	49-9041
B	ETI0456 ETI0457	Machinery Maintenance Mechanic Machinery Maintenance Technician	300 hours 150 hours	49-9041 49-9041
C	ETI0458	Industrial Maintenance Specialist	450 hours	49-9041

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 Apply safety rules and procedures.
02.0 Explain the basic elements of physics as related to industrial machinery maintenance and repair.
03.0 Explain basic electricity and electronics.
04.0 Perform mathematical calculations.
05.0 Read plans and drawings.
06.0 Perform measuring and layout operations.
07.0 Use and maintain hand tools.
08.0 Use and maintain portable power tools.
09.0 Handle and apply lubricants.
10.0 Perform benchwork skills.
11.0 Perform gas and electric arc welding and cutting operations.
12.0 Perform rigging functions.
13.0 Install and remove machinery.
14.0 Demonstrate conveyor-maintenance techniques.
15.0 Identify common troubles and basic troubleshooting techniques.
16.0 Plan an elementary predictive-preventive-maintenance (PPM) schedule.
17.0 Perform gas- and arc-welding procedures.
18.0 Perform machine-shop operations.
19.0 Maintain piping and tubing systems.
20.0 Troubleshoot electrical circuits.
21.0 Install and maintain drive components.
22.0 Maintain reciprocating, positive-displacement, and rotary air compressors.
23.0 Maintain and repair hydraulic-system components.
24.0 Troubleshoot hydraulic systems.
25.0 Maintain and troubleshoot pneumatic systems.
26.0 Maintain and troubleshoot fluid-drive systems.
27.0 Maintain and troubleshoot robotic systems.
28.0 Perform pump maintenance and repair.
29.0 Explain the operation of industrial-pollution control systems.
30.0 Troubleshoot air-conditioning and refrigeration systems.
31.0 Identify boilers.
32.0 Maintain internal combustion engines.
33.0 Prepare for machinery startup.
34.0 Apply vibration-analysis skills.
35.0 Perform machinery balancing.
36.0 Demonstrate predictive-preventive-maintenance (PPM) technologies.

37.0 Use computer-maintenance-management systems (CMMS).
38.0 Perform failure analysis (FA).
39.0 Improve rotating-equipment performance.
40.0 Generate machine improvements and maintenance management.

Florida Department of Education
Student Performance Standards

Program Title: **Industrial Machinery Maintenance and Repair**
PSAV Number: **I470303**

Course Number: ETI0450
Occupational Completion Point: A
Industrial Machinery Maintenance Assistance – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Apply safety rules and procedures--The student will be able to:	
01.01	Practice shop safety rules and procedures.	
01.02	Practice personal safety rules and procedures.	
01.03	Practice fire safety rules and procedures.	
01.04	Practice electrical safety rules and procedures.	
01.05	Practice tool safety rules and procedures.	
01.06	Practice ladder and scaffolding safety rules and procedures.	
01.07	Maintain a clean work and shop area.	
01.08	Perform tag lockout procedures.	
01.09	Identify Occupational Safety and Health Administration (OSHA) requirements and procedures.	
01.10	Use Materials Safety Data Sheets (MSDS).	
02.0	Explain the basic elements of physics as related to industrial machinery maintenance and repair--The student will be able to:	
02.01	Explain the standards of measurement and the impact of action and working forces, including tension, compression, torque, and shear.	
02.02	Identify the principles and laws of motion and explain how they affect acceleration and deceleration.	
02.03	Explain the relationship of work, power, and energy to the types of collisions and conservation of momentum.	
02.04	Explain the operation of simple machines, including the lever, inclined plane, screw, wedge, wheel and axle, pulley, and jacking screws.	

CTE Standards and Benchmarks		National Standards
02.05	Identify the ways of producing power for mechanical efficiency, in terms of gear ratios, work forces, and the types of work done by a crane hook, forklift truck, and screw or bolt.	
02.06	Use linear, liquid, and weight units of measurement to measure areas, areas within areas, and volume.	
02.07	Describe the mechanical and chemical properties of materials commonly used in industry.	
02.08	Explain the laws and conditions governing static and kinetic friction, the problems caused by friction, and the effects of the angle of repose.	
02.09	Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
02.10	Draw conclusions or make inferences from data.	
02.11	Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.	
02.12	Explain pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and Kilopascal (kPa).	
03.0	Explain basic electricity and electronics--The student will be able to:	
03.01	Define electrical/electronics terms.	
03.02	Explain the theory and application of magnetism.	
03.03	Explain Ohm's law.	
03.04	Describe direct current (DC) and alternating current (AC) circuits.	
03.05	Identify the advantages and disadvantages of alternating current (AC) and direct current (DC) motors for various applications.	
03.06	Describe the use of programmable logic controllers (PLCs) in the industry.	
04.0	Perform mathematical calculations--The student will be able to:	
04.01	Make job-related decimal and fraction calculations.	
04.02	Solve job-related problems by adding, subtracting, multiplying, and dividing numbers.	
04.03	Solve job-related problems using a hand-held calculator.	
04.04	Solve job-related problems using basic formulas.	
04.05	Solve job-related problems using basic geometry.	
04.06	Measure a work piece and compare the measurements with blueprint specifications.	
04.07	Solve job-related problems using mathematical handbooks, charts, and tables.	
04.08	Convert measurements from English to metric and from metric to English units.	

CTE Standards and Benchmarks		National Standards
	04.09 Solve job-related problems using proportions.	
	04.10 Solve job-related problems using statistics.	
05.0	Read plans and drawings--The student will be able to:	
	05.01 Identify dimensions.	
	05.02 Identify lists of materials and specifications.	
	05.03 Identify section and detail views.	
	05.04 Sketch and dimension a part.	
	05.05 Disassemble and assemble parts using an exploded-view drawing.	
	05.06 Interpret blueprint abbreviations.	
	05.07 Identify dimensioning of radii, round holes, fillets, and chamfers.	
	05.08 Identify screw threads and bolt types.	
	05.09 Apply dimensional tolerances.	
	05.10 Identify the metal-fabrication symbols used in blueprints.	
06.0	Perform measuring and layout operations--The student will be able to:	
	06.01 Perform basic geometric-construction operations.	
	06.02 Safely use marking gauges, center punches, scribes, surface gauges, squares, dividers, dial indicators, protractors, surface plates, depth gauges, and circumference rules.	
	06.03 Develop patterns using parallel lines, radial lines, and triangulation.	
	06.04 Make metal-fabrication sketches.	
	06.05 Read and measure with steel rules.	
	06.06 Read and measure with micrometers.	
	06.07 Read and measure with vernier tools.	
	06.08 Read and measure with dial calipers.	
	06.09 Read and measure with dial indicators.	
07.0	Use and maintain hand tools--The student will be able to:	
	07.01 Demonstrate the safe use of hand tools such as screwdrivers, hammers, wrenches, pliers, hacksaws, punches, chisels, drills, files, tin snips, taps, and dies.	

CTE Standards and Benchmarks		National Standards
07.02	Use measuring devices.	
07.03	Use wrenches and screwdrivers.	
07.04	Use pipefitting tools.	
07.05	Use sheet-metal tools.	
07.06	Safely use ropes, slings, pulleys, and block and tackle.	
07.07	Select the proper tool for each job application.	
07.08	Select correct tools for metric and standard fasteners.	
07.09	Identify state-of-the-art innovations and explore their uses.	
07.10	Identify and select fasteners for various applications, taking into account the effects of corrosion on each, including threaded fasteners, nuts, washers, rivets, locking pins, keys, self-tapping screws, locking-nut fasteners, and self-retaining nuts.	
07.11	Describe the techniques and liability issues regarding retrofitting fasteners for ease of removal.	
08.0	Use and maintain portable power tools--The student will be able to:	
08.01	Demonstrate the safe use of portable power tools, drills, belt and disc sanders, grinders, circular saws, saber saws, metal shears, electric and pneumatic impact wrenches, rotary and pneumatic chipping hammers, drill presses, and bench grinders.	
08.02	Use and maintain light- and heavy-duty drills.	
08.03	Use and maintain electric hammers.	
08.04	Use and maintain pneumatic drills and hammers.	
08.05	Use and maintain power screwdrivers and nut runners.	
08.06	Use and maintain linear motion saws.	
08.07	Use and maintain circular saws.	
08.08	Use and maintain belt, pad, and disc sanders.	
08.09	Use and maintain grinders and shears.	
09.0	Handle and apply lubricants--The student will be able to:	
09.01	Explain the functions of lubrication.	
09.02	Explain the properties of oil lubricants and the factors determining the selection of lubricants.	
09.03	Identify the types, advantages, and functions of lubricant additives.	

CTE Standards and Benchmarks		National Standards
	09.04 Explain the types of circulating oils and their purposes.	
	09.05 Identify grease application.	
	09.06 Identify lubricating systems and methods.	
	09.07 Explain lubricant storage and handling methods.	
	09.08 Explain the types of oil filters and their uses.	
	09.09 Lubricate a piece of industrial equipment.	
	09.10 Define the role of preventive maintenance in total equipment maintenance.	
	09.11 Describe the major tasks of preventive maintenance: cleaning, inspection, lubrication, minor repair, and information feedback.	
	09.12 Review a typical maintenance program.	
10.0	Perform benchwork skills--The student will be able to:	
	10.01 Identify safety and shop rules.	
	10.02 Cut materials by using hand hacksaws.	
	10.03 Cut threads by using hand taps.	
	10.04 Cut threads by using dies.	
	10.05 Repair threads by chasing and thread inserts.	
	10.06 Install dowel pins using tapered and straight reamers.	
	10.07 Ream holes by using tapered and straight reamers.	
	10.08 Hand-sharpen cutting tools by using abrasive stones.	
	10.09 Hone and lap surfaces.	
	10.10 Remove damaged screws and other hardware.	
	10.11 Deburr workpieces.	
11.0	Perform gas and electric welding and cutting operations--The student will be able to:	
	11.01 Identify the properties of the most commonly used metals and alloys, including hardness and malleability.	
	11.02 Identify the processes and effects of tempering, annealing, and case hardening.	
	11.03 Identify welding cylinders, regulators, hoses, pressure gauges, and torches.	
	11.04 Describe welding-equipment safety procedures.	

CTE Standards and Benchmarks	National Standards
11.05 Demonstrate proper flame settings.	
11.06 Demonstrate basic gas-welding skills.	
11.07 Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.	
11.08 Demonstrate freehand and guide cutting of various metal thicknesses.	
11.09 Identify the uses of the following welding techniques: laser, ultrasonic, resistance, and percussion.	
11.10 Perform basic electric arc welding procedures.	
12.0 Perform rigging functions--The student will be able to:	
12.01 Demonstrate the safety procedures for performing rigging and lifting operations.	
12.02 Identify and inspect fiber and wire rope.	
12.03 Tie knots and hitches.	
12.04 Identify and use the components of rigging hardware.	
12.05 Perform rigging and lifting operations.	
12.06 Demonstrate the proper operation of a forklift.	
13.0 Install and remove machinery--The student will be able to:	
13.01 Identify the safety procedures for installing and removing machinery.	
13.02 Identify the equipment required for machine installation and removal.	
13.03 Prepare an area for machine installation per the manufacturer's specifications.	
13.04 Rig, lift, and transport machinery to the installation site.	
13.05 Install electrical hookups to machinery.	
13.06 Install air hydraulic hookups to machinery.	
13.07 Perform an assigned machine retrofit per the manufacturer's specifications.	
13.08 Perform an assigned machine removal and transport per specification requirements.	
13.09 Explain the importance of vibration detection.	
14.0 Demonstrate conveyor-maintenance techniques--The student will be able to:	
14.01 Identify the types of conveyors.	
14.02 Identify the safety requirements and precautions for conveyor-maintenance operations.	

CTE Standards and Benchmarks	National Standards
14.03 Adjust the tracking of a belt.	
14.04 Check a belt for wear.	
14.05 Identify the types of splices.	
14.06 Identify splicing equipment and procedures.	
14.07 Demonstrate conveyor-maintenance techniques, including making splices with splicing equipment.	
15.0 Identify common troubles and basic troubleshooting techniques--The student will be able to:	
15.01 Analyze the possible causes of common troubles in industrial machinery performance.	
15.02 Identify basic troubleshooting techniques for bearings.	
15.03 Identify basic troubleshooting techniques for pumps.	
15.04 Identify basic troubleshooting techniques for drive systems.	
15.05 Identify basic troubleshooting techniques for electrical circuits.	
15.06 Identify basic troubleshooting techniques for hydraulics.	
15.07 Identify basic troubleshooting techniques for pneumatics.	
15.08 Identify basic troubleshooting techniques for PLCs.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0456
Occupational Completion Point: B (1 of 2)
Machinery Maintenance Mechanic – 300 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Plan an elementary predictive-preventive-maintenance (PPM) schedule--The student will be able to:	
16.01	List the types of predictive-preventive maintenance.	
16.02	Describe the purpose of preventive-maintenance schedules.	
16.03	Create a preventive-maintenance schedule form using a machine manual or the manufacturer recommendations.	
16.04	Identify troubles caused by the lack of preventive maintenance.	
16.05	Create a maintenance log and make entries for a machine or equipment.	
16.06	Create a preventive-maintenance schedule from a maintenance-failures log.	
17.0	Perform gas- and arc-welding procedures--The student will be able to:	
17.01	Demonstrate the safety procedures for performing gas and arc welding and for transporting equipment.	
17.02	Identify the components of an oxyfuel rig.	
17.03	Set up and shut down an oxyfuel rig.	
17.04	Weld beads in a flat position.	
17.05	Weld an outside corner joint using a filler rod.	
17.06	Cut metal of various thicknesses'.	
17.07	Weld beads in a flat position using E-6010 and E-7018 electrodes.	
17.08	Weld beads in horizontal and in vertical positions using E-6010 and E-7018 electrodes.	
17.09	Weld beads in an overhead position using E-6010 and E-7018 electrodes.	
17.10	Weld beads using a MIG welder.	
17.11	Weld beads using a TIG welder.	

CTE Standards and Benchmarks	National Standards
17.12 Solder and braze metals.	
17.13 Cut stainless steel and aluminum with a plasma-arc rig.	
18.0 Perform machine-shop operations--The student will be able to:	
18.01 Demonstrate safety in performing machine-shop operations.	
18.02 Identify the types of cutting tools.	
18.03 Bore a hole to a specified size.	
18.04 Chase an external V-thread.	
18.05 Identify the different types of work-holding devices.	
18.06 Prepare metal for finishing.	
18.07 Set up, use, and adjust an arbor press.	
18.08 Set up, use, and adjust a hydraulic press.	
18.09 Set up, use, and adjust broaching tools.	
18.10 Cut keyways with an end mill.	
19.0 Maintain piping and tubing systems--The student will be able to:	
19.01 Identify the components of a piping system.	
19.02 Explain the maintenance considerations of metallic and nonmetallic piping systems.	
19.03 Describe the safety requirements for working with piping and tubing systems.	
19.04 Join copper tubing.	
19.05 Join common fittings.	
19.06 Join metallic pipe.	
19.07 Join plastic pipe.	
19.08 Explain valve operation and maintenance.	
19.09 Explain the importance of strainers, filters, and traps in piping systems.	
19.10 Bend back-to-back, stub-ups, and doglegs in electrical metallic tubing (EMT).	
20.0 Troubleshoot electrical circuits--The student will be able to:	
20.01 Describe the safety requirements and precautions for troubleshooting electrical circuits.	

CTE Standards and Benchmarks	National Standards
20.02 Disconnect and reconnect electric motors.	
20.03 Identify the parts and function of electrical control equipment.	
20.04 Define digital devices and PLC logic/ladder logic to troubleshoot.	
20.05 Identify the function of input and output devices and the controller.	
20.06 Explain how to troubleshoot a sequence of events.	
20.07 Use and maintain electrical test equipment for troubleshooting.	
21.0 Install and maintain drive components--The student will be able to:	
21.01 Demonstrate safety procedures for installing and maintaining drive components.	
21.02 Identify the types of bearings, their cross-referencing, and their uses.	
21.03 Remove, inspect, and/or replace bearings.	
21.04 Remove and replace seals.	
21.05 Perform shaft alignment.	
21.06 Identify the types of belts.	
21.07 Identify the types of chains.	
21.08 Perform tension adjustments and alignment on belt and chain drives.	
21.09 Troubleshoot belt and chain drives.	
21.10 Identify the types of gears.	
21.11 Remove, replace, and align gears, sprockets, and couplings.	
21.12 Remove, replace, or repair V-joints and jack shafts.	
21.13 Adjust gear backlash.	
21.14 Troubleshoot gear drives.	
21.15 Disassemble, inspect, reassemble, and adjust clutches.	
21.16 Identify the types of variable-speed drives.	
21.17 Troubleshoot variable-speed drives.	
21.18 Identify the types of cams and link mechanisms.	
21.19 Troubleshoot cam-and-link mechanism problems.	

CTE Standards and Benchmarks		National Standards
22.0	Maintain reciprocating, positive-displacement, and rotary air compressors--The student will be able to:	
22.01	Relate force, weight, mass, and density to a pneumatic system.	
22.02	Demonstrate the safety procedures for maintaining reciprocating, positive-displacement, and rotary air compressors.	
22.03	Demonstrate the operation of reciprocating compressors.	
22.04	Demonstrate the operation of positive-displacement and rotary air compressors.	
22.05	Demonstrate primary and secondary air treatment.	
22.06	Demonstrate the operation of valves, cylinders, and motors.	
22.07	Check oil level.	
22.08	Change oil.	
22.09	Drain water from tank.	
22.10	Test for efficiency of compressor.	
22.11	Inspect storage tank for quality.	
22.12	Test pressure control switch.	
23.0	Maintain and repair hydraulic-system components--The student will be able to:	
23.01	Explain the safety procedures for installing hydraulic lines.	
23.02	Explain Pascal's law.	
23.03	Explain Bernoulli's principle.	
23.04	Explain how heat and pressure relate to power and transmission.	
23.05	Describe the physical and chemical properties of a fluid.	
23.06	Install and maintain a contaminant-removal system.	
23.07	Determine reservoir requirements.	
23.08	Classify and select pumps for specific applications.	
23.09	Compute hose requirements.	
23.10	Install hydraulic lines.	
23.11	Select and install control valves.	
24.0	Troubleshoot hydraulic systems--The student will be able to:	

CTE Standards and Benchmarks		National Standards
	24.01 Explain the safety procedures for troubleshooting hydraulic systems.	
	24.02 Read a hydraulic schematic.	
	24.03 Install hydraulic components.	
	24.04 Connect electrically controlled valves.	
	24.05 Explain hydraulic-system troubleshooting techniques.	
	24.06 Repair and replace valves.	
	24.07 Repair and replace cylinders.	
	24.08 Repair and replace pumps and motors.	
25.0	Maintain and troubleshoot pneumatic systems--The student will be able to:	
	25.01 Explain the safety procedures for troubleshooting pneumatic systems.	
	25.02 Diagram an air supply system.	
	25.03 Install system components.	
	25.04 Demonstrate system-maintenance techniques.	
	25.05 Explain proper troubleshooting procedures.	
	25.06 Troubleshoot air compressors.	
	25.07 Troubleshoot, repair, and install control valves.	
	25.08 Troubleshoot air motors.	
26.0	Maintain and troubleshoot fluid-drive systems--The student will be able to:	
	26.01 Explain the safety procedures for maintaining and troubleshooting fluid-drive systems.	
	26.02 Install adjustable-speed drives.	
	26.03 Troubleshoot adjustable-speed drives.	
	26.04 Explain the operation of fluid couplings.	
	26.05 Install fluid couplings.	
	26.06 Install torque converters.	
	26.07 Perform preventive maintenance.	
	26.08 Apply a "dynamic" magnetic/mechanical braking device to a motor.	

CTE Standards and Benchmarks		National Standards
26.09	Mount the equipment.	

Course Number: ETI0457
Occupational Completion Point: B (2 of 2)
Machinery Maintenance Technician – 150 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
27.0	Maintain and troubleshoot robotic systems--The student will be able to:	
27.01	Identify uses of robotics in industry.	
27.02	Identify safety procedures related to robotic systems.	
27.03	Identify mechanical, hydraulic, pneumatic, and electric/electronic components of robotic systems.	
27.04	Perform routine maintenance and calibration of robotic systems.	
27.05	Remove, replace and adjust robotic system components.	
28.0	Perform pump maintenance and repair--The student will be able to:	
28.01	Demonstrate the safety procedures for performing pump maintenance.	
28.02	Determine pump capacity and system requirements.	
28.03	Perform pump maintenance.	
28.04	Identify packing and seal requirements.	
28.05	Explain the operating principles of centrifugal, propeller and turbine rotary, reciprocating, diaphragm, positive placement, and vacuum pumps.	
28.06	Disassemble and reassemble a pump.	
29.0	Explain the operation of industrial-pollution control systems--The student will be able to:	
29.01	Explain the operation of air-pollution control systems.	
29.02	Explain the operation of water-pollution control systems.	
29.03	Explain the operation of solid-waste pollution control systems.	

CTE Standards and Benchmarks		National Standards
	29.04 Explain the operation of noise-pollution control systems.	
30.0	Troubleshoot air-conditioning and refrigeration systems--The student will be able to:	
	30.01 Explain the principles of refrigeration.	
	30.02 Identify the major components.	
	30.03 Describe the functions of electrical systems.	
	30.04 Troubleshoot air-conditioning and refrigeration systems.	
	30.05 Explain the requirement for recovery of hazardous materials and related safety procedures.	
31.0	Identify boilers--The student will be able to:	
	31.01 Identify the various types and components of heat exchangers.	
	31.02 Identify the various types and components of boilers.	
	31.03 Identify the various types and components of fractioning columns.	
	31.04 Identify the uses of steam.	
32.0	Maintain internal combustion engines--The student will be able to:	
	32.01 Explain the basic principles of operation of the two-stroke-cycle combustion engine.	
	32.02 Identify the types of engines.	
	32.03 Locate engine serial and model numbers.	
	32.04 Identify engine assemblies and systems.	
	32.05 Troubleshoot and evaluate engine performance.	
	32.06 Perform routine maintenance on engine operating systems including air intake and exhaust, fuel, lubrication, ignition, starting and governing.	
	32.07 Perform engine tune-up and adjustment procedures.	
	32.08 Remove and replace engine assemblies.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0458
Occupational Completion Point: C
Industrial Maintenance Specialist – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
33.0 Prepare for machinery startup--The student will be able to:	
33.01 Describe the requirements and precautions for machinery startup.	
33.02 Align machinery using wire line, transit, dial indicators, a computer, and laser-alignment devices.	
33.03 Position and secure machinery on a foundation.	
33.04 Level machinery and install balance-vibration dampeners.	
33.05 Identify pipe-stress standards for machine-maintenance applications.	
33.06 Perform finish alignment and check for pipe stresses in machinery- maintenance applications.	
34.0 Apply vibration-analysis skills--The student will be able to:	
34.01 Collect vibration data.	
34.02 Interpret vibration data.	
34.03 Determine velocity, acceleration, spike energy, frequency, amplitude, and other vibration sources.	
34.04 Describe the safety requirements and precautions for vibration analysis.	
34.05 Operate and use vibration software.	
34.06 Predict and verify the condition of machinery in an industrial setting using vibration tools.	
34.07 Explain the approximately 25 sources of vibration.	
34.08 Explain the bearing frequency (BIFO) formulas.	
34.09 Demonstrate proficiency in vibration detection.	
35.0 Perform machinery balancing--The student will be able to:	
35.01 Describe the safety requirements and precautions for balancing procedures and equipment.	

CTE Standards and Benchmarks	National Standards
35.02 Identify the principles of static balancing.	
35.03 Perform a vector balance in the classroom.	
35.04 Identify balancing standards, ISO 1940 or equal.	
35.05 Perform a stand balance in a shop.	
35.06 Perform a field balance in an industrial setting.	
35.07 Use portable or stationary balancing equipment.	
36.0 Demonstrate predictive-preventive-maintenance (PPM) technologies--The student will be able to:	
36.01 Explain the use of infrared thermography.	
36.02 Explain the use of ultrasound technology.	
36.03 Explain the use of advanced alignment techniques (optical and Essinger bars).	
36.04 Explain the use of oil ferrography and the types of oil sampling.	
36.05 Explain the use of shock pulse equipment.	
36.06 Describe the safety requirements for PPM technologies.	
36.07 Demonstrate the use of one of the above predictive-maintenance procedures.	
36.08 Plan an advanced PPM schedule.	
37.0 Use computer-maintenance-management systems (CMMS)--The student will be able to:	
37.01 Operate CMMS software.	
37.02 Enter and close a maintenance work order with CMMS.	
37.03 Schedule a series of maintenance tasks.	
37.04 Write a detailed maintenance job plan.	
37.05 Order parts and supplies for a maintenance work order.	
37.06 Determine the personnel resources needed for a maintenance job.	
38.0 Perform failure analysis (FA)--The student will be able to:	
38.01 Conduct/lead a failure analysis meeting to determine the root cause of a failure.	
38.02 Create a failure-analysis form and write a minimum of two different types of failure-analysis reports.	
38.03 Explain the types of bearing failures.	

CTE Standards and Benchmarks		National Standards
38.04	Explain the types of shaft fatigues and failures.	
38.05	Explain the types of lubrication breakdowns.	
38.06	Estimate the cost and the impact on production of a specific failure.	
39.0	Improve rotating-equipment performance--The student will be able to:	
39.01	Calculate shaft-deflection ratios and use the results to improve shaft design.	
39.02	Draw or sketch equipment bases and supports of sturdy construction.	
39.03	Demonstrate and install advanced labyrinth-sealing devices.	
39.04	Demonstrate and install advanced mechanical-sealing devices.	
39.05	Run the Gates Belts or another interactive belt-design-and- tensioning computer program applied to various drives.	
39.06	Explain the benefits of synthetic oils and greases.	
39.07	Explain MTBF (mean time between equipment failure) and its cost impact when machinery life is extended.	
39.08	List seven specific machinery-improvement ideas in detail.	
40.0	Generate machine improvements and maintenance management--The student will be able to:	
40.01	Review and critique machinery and base design for improvement, before the equipment is placed on order.	
40.02	Identify the essential elements of effective maintenance management:	
	a. Reward system	
	b. Predictive-preventive maintenance	
	c. Planning	
	d. Work-order systems	
	e. Organizations	
	f. Goals and tracking	
	g. Facilities	
	h. Storerooms	
	i. Contractors	
	j. Shutdowns	
40.03	Write a report on the design and effective use of at least two of the essential elements of management.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Millwright**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I470313
CIP Number	0647030302
Grade Level	30, 31
Standard Length	1,350 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics 49-9044 – Millwrights
Facility Code	203 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 millwright positions.

The content includes but is not limited to understanding all aspects of the industrial-machinery maintenance and millwright industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 three 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0450	Industrial Machinery Maintenance Assistant	450 hours	49-9041
B	ETI0456 ETI0457	Machinery Maintenance Mechanic Machinery Maintenance Technician	300 hours 150 hours	49-9041 49-9041
C	ETI0459	Millwright	450 hours	49-9044

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 Apply safety rules and procedures.
02.0 Explain the basic elements of physics as related to industrial machinery maintenance and repair.
03.0 Explain basic electricity and electronics.
04.0 Perform mathematical calculations.
05.0 Read plans and drawings.
06.0 Perform measuring and layout operations.
07.0 Use and maintain hand tools.
08.0 Use and maintain portable power tools.
09.0 Handle and apply lubricants.
10.0 Perform benchwork skills.
11.0 Perform gas and electric arc welding and cutting operations.
12.0 Perform rigging functions.
13.0 Install and remove machinery.
14.0 Demonstrate conveyor-maintenance techniques.
15.0 Identify common troubles and basic troubleshooting techniques.
16.0 Plan an elementary predictive-preventive-maintenance (PPM) schedule.
17.0 Perform gas- and arc-welding procedures.
18.0 Perform machine-shop operations.
19.0 Maintain piping and tubing systems.
20.0 Troubleshoot electrical circuits.
21.0 Install and maintain drive components.
22.0 Maintain reciprocating, positive-displacement, and rotary air compressors.
23.0 Maintain and repair hydraulic-system components.
24.0 Troubleshoot hydraulic systems.
25.0 Maintain and troubleshoot pneumatic systems.
26.0 Maintain and troubleshoot fluid-drive systems.
27.0 Maintain and troubleshoot robotic systems.
28.0 Perform pump maintenance and repair.
29.0 Explain the operation of industrial-pollution control systems.
30.0 Troubleshoot air-conditioning and refrigeration systems.
31.0 Identify boilers.
32.0 Maintain internal combustion engines.
33.0 Perform metal fabrication.
34.0 Perform precision layout.
35.0 Perform advanced rigging.
36.0 Install, remove and align machinery.

Florida Department of Education
Student Performance Standards

Program Title: **Millwright**
PSAV Number: **I470303**

Course Number: ETI0450
Occupational Completion Point: A
Industrial Machinery Maintenance Assistance – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Apply safety rules and procedures--The student will be able to:	
01.01	Practice shop safety rules and procedures.	
01.02	Practice personal safety rules and procedures.	
01.03	Practice fire safety rules and procedures.	
01.04	Practice electrical safety rules and procedures.	
01.05	Practice tool safety rules and procedures.	
01.06	Practice ladder and scaffolding safety rules and procedures.	
01.07	Maintain a clean work and shop area.	
01.08	Perform tag lockout procedures.	
01.09	Identify Occupational Safety and Health Administration (OSHA) requirements and procedures.	
01.10	Use Materials Safety Data Sheets (MSDS).	
02.0	Explain the basic elements of physics as related to industrial machinery maintenance and repair--The student will be able to:	
02.01	Explain the standards of measurement and the impact of action and working forces, including tension, compression, torque, and shear.	
02.02	Identify the principles and laws of motion and explain how they affect acceleration and deceleration.	
02.03	Explain the relationship of work, power, and energy to the types of collisions and conservation of momentum.	
02.04	Explain the operation of simple machines, including the lever, inclined plane, screw, wedge, wheel and axle, pulley, and jacking screws.	

CTE Standards and Benchmarks		National Standards
02.05	Identify the ways of producing power for mechanical efficiency, in terms of gear ratios, work forces, and the types of work done by a crane hook, forklift truck, and screw or bolt.	
02.06	Use linear, liquid, and weight units of measurement to measure areas, areas within areas, and volume.	
02.07	Describe the mechanical and chemical properties of materials commonly used in industry.	
02.08	Explain the laws and conditions governing static and kinetic friction, the problems caused by friction, and the effects of the angle of repose.	
02.09	Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
02.10	Draw conclusions or make inferences from data.	
02.11	Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.	
02.12	Explain pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and Kilopascal (kPa).	
03.0	Explain basic electricity and electronics--The student will be able to:	
03.01	Define electrical/electronics terms.	
03.02	Explain the theory and application of magnetism.	
03.03	Explain Ohm's law.	
03.04	Describe direct current (DC) and alternating current (AC) circuits.	
03.05	Identify the advantages and disadvantages of alternating current (AC) and direct current (DC) motors for various applications.	
03.06	Describe the use of programmable logic controllers (PLCs) in the industry.	
04.0	Perform mathematical calculations--The student will be able to:	
04.01	Make job-related decimal and fraction calculations.	
04.02	Solve job-related problems by adding, subtracting, multiplying, and dividing numbers.	
04.03	Solve job-related problems using a hand-held calculator.	
04.04	Solve job-related problems using basic formulas.	
04.05	Solve job-related problems using basic geometry.	
04.06	Measure a work piece and compare the measurements with blueprint specifications.	
04.07	Solve job-related problems using mathematical handbooks, charts, and tables.	
04.08	Convert measurements from English to metric and from metric to English units.	

CTE Standards and Benchmarks		National Standards
	04.09 Solve job-related problems using proportions.	
	04.10 Solve job-related problems using statistics.	
05.0	Read plans and drawings--The student will be able to:	
	05.01 Identify dimensions.	
	05.02 Identify lists of materials and specifications.	
	05.03 Identify section and detail views.	
	05.04 Sketch and dimension a part.	
	05.05 Disassemble and assemble parts using an exploded-view drawing.	
	05.06 Interpret blueprint abbreviations.	
	05.07 Identify dimensioning of radii, round holes, fillets, and chamfers.	
	05.08 Identify screw threads and bolt types.	
	05.09 Apply dimensional tolerances.	
	05.10 Identify the metal-fabrication symbols used in blueprints.	
06.0	Perform measuring and layout operations--The student will be able to:	
	06.01 Perform basic geometric-construction operations.	
	06.02 Safely use marking gauges, center punches, scribes, surface gauges, squares, dividers, dial indicators, protractors, surface plates, depth gauges, and circumference rules.	
	06.03 Develop patterns using parallel lines, radial lines, and triangulation.	
	06.04 Make metal-fabrication sketches.	
	06.05 Read and measure with steel rules.	
	06.06 Read and measure with micrometers.	
	06.07 Read and measure with vernier tools.	
	06.08 Read and measure with dial calipers.	
	06.09 Read and measure with dial indicators.	
07.0	Use and maintain hand tools--The student will be able to:	
	07.01 Demonstrate the safe use of hand tools such as screwdrivers, hammers, wrenches, pliers, hacksaws, punches, chisels, drills, files, tin snips, taps, and dies.	

CTE Standards and Benchmarks		National Standards
07.02	Use measuring devices.	
07.03	Use wrenches and screwdrivers.	
07.04	Use pipefitting tools.	
07.05	Use sheet-metal tools.	
07.06	Safely use ropes, slings, pulleys, and block and tackle.	
07.07	Select the proper tool for each job application.	
07.08	Select correct tools for metric and standard fasteners.	
07.09	Identify state-of-the-art innovations and explore their uses.	
07.10	Identify and select fasteners for various applications, taking into account the effects of corrosion on each, including threaded fasteners, nuts, washers, rivets, locking pins, keys, self-tapping screws, locking-nut fasteners, and self-retaining nuts.	
07.11	Describe the techniques and liability issues regarding retrofitting fasteners for ease of removal.	
08.0	Use and maintain portable power tools--The student will be able to:	
08.01	Demonstrate the safe use of portable power tools, drills, belt and disc sanders, grinders, circular saws, saber saws, metal shears, electric and pneumatic impact wrenches, rotary and pneumatic chipping hammers, drill presses, and bench grinders.	
08.02	Use and maintain light- and heavy-duty drills.	
08.03	Use and maintain electric hammers.	
08.04	Use and maintain pneumatic drills and hammers.	
08.05	Use and maintain power screwdrivers and nut runners.	
08.06	Use and maintain linear motion saws.	
08.07	Use and maintain circular saws.	
08.08	Use and maintain belt, pad, and disc sanders.	
08.09	Use and maintain grinders and shears.	
09.0	Handle and apply lubricants--The student will be able to:	
09.01	Explain the functions of lubrication.	
09.02	Explain the properties of oil lubricants and the factors determining the selection of lubricants.	
09.03	Identify the types, advantages, and functions of lubricant additives.	

CTE Standards and Benchmarks		National Standards
09.04	Explain the types of circulating oils and their purposes.	
09.05	Identify grease application.	
09.06	Identify lubricating systems and methods.	
09.07	Explain lubricant storage and handling methods.	
09.08	Explain the types of oil filters and their uses.	
09.09	Lubricate a piece of industrial equipment.	
09.10	Define the role of preventive maintenance in total equipment maintenance.	
09.11	Describe the major tasks of preventive maintenance: cleaning, inspection, lubrication, minor repair, and information feedback.	
09.12	Review a typical maintenance program.	
10.0	Perform benchwork skills--The student will be able to:	
10.01	Identify safety and shop rules.	
10.02	Cut materials by using hand hacksaws.	
10.03	Cut threads by using hand taps.	
10.04	Cut threads by using dies.	
10.05	Repair threads by chasing and thread inserts.	
10.06	Install dowel pins using tapered and straight reamers.	
10.07	Ream holes by using tapered and straight reamers.	
10.08	Hand-sharpen cutting tools by using abrasive stones.	
10.09	Hone and lap surfaces.	
10.10	Remove damaged screws and other hardware.	
10.11	Deburr workpieces.	
11.0	Perform gas and electric welding and cutting operations--The student will be able to:	
11.01	Identify the properties of the most commonly used metals and alloys, including hardness and malleability.	
11.02	Identify the processes and effects of tempering, annealing, and case hardening.	
11.03	Identify welding cylinders, regulators, hoses, pressure gauges, and torches.	
11.04	Describe welding-equipment safety procedures.	

CTE Standards and Benchmarks	National Standards
11.05 Demonstrate proper flame settings.	
11.06 Demonstrate basic gas-welding skills.	
11.07 Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.	
11.08 Demonstrate freehand and guide cutting of various metal thicknesses.	
11.09 Identify the uses of the following welding techniques: laser, ultrasonic, resistance, and percussion.	
11.10 Perform basic electric arc welding procedures.	
12.0 Perform rigging functions--The student will be able to:	
12.01 Demonstrate the safety procedures for performing rigging and lifting operations.	
12.02 Identify and inspect fiber and wire rope.	
12.03 Tie knots and hitches.	
12.04 Identify and use the components of rigging hardware.	
12.05 Perform rigging and lifting operations.	
12.06 Demonstrate the proper operation of a forklift.	
13.0 Install and remove machinery--The student will be able to:	
13.01 Identify the safety procedures for installing and removing machinery.	
13.02 Identify the equipment required for machine installation and removal.	
13.03 Prepare an area for machine installation per the manufacturer's specifications.	
13.04 Rig, lift, and transport machinery to the installation site.	
13.05 Install electrical hookups to machinery.	
13.06 Install air hydraulic hookups to machinery.	
13.07 Perform an assigned machine retrofit per the manufacturer's specifications.	
13.08 Perform an assigned machine removal and transport per specification requirements.	
13.09 Explain the importance of vibration detection.	
14.0 Demonstrate conveyor-maintenance techniques--The student will be able to:	
14.01 Identify the types of conveyors.	
14.02 Identify the safety requirements and precautions for conveyor-maintenance operations.	

CTE Standards and Benchmarks	National Standards
14.03 Adjust the tracking of a belt.	
14.04 Check a belt for wear.	
14.05 Identify the types of splices.	
14.06 Identify splicing equipment and procedures.	
14.07 Demonstrate conveyor-maintenance techniques, including making splices with splicing equipment.	
15.0 Identify common troubles and basic troubleshooting techniques--The student will be able to:	
15.01 Analyze the possible causes of common troubles in industrial machinery performance.	
15.02 Identify basic troubleshooting techniques for bearings.	
15.03 Identify basic troubleshooting techniques for pumps.	
15.04 Identify basic troubleshooting techniques for drive systems.	
15.05 Identify basic troubleshooting techniques for electrical circuits.	
15.06 Identify basic troubleshooting techniques for hydraulics.	
15.07 Identify basic troubleshooting techniques for pneumatics.	
15.08 Identify basic troubleshooting techniques for PLCs.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0456
Occupational Completion Point: B (1 of 2)
Machinery Maintenance Mechanic – 300 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Plan an elementary predictive-preventive-maintenance (PPM) schedule--The student will be able to:	
16.01	List the types of predictive-preventive maintenance.	
16.02	Describe the purpose of preventive-maintenance schedules.	
16.03	Create a preventive-maintenance schedule form using a machine manual or the manufacturer recommendations.	
16.04	Identify troubles caused by the lack of preventive maintenance.	
16.05	Create a maintenance log and make entries for a machine or equipment.	
16.06	Create a preventive-maintenance schedule from a maintenance-failures log.	
17.0	Perform gas- and arc-welding procedures--The student will be able to:	
17.01	Demonstrate the safety procedures for performing gas and arc welding and for transporting equipment.	
17.02	Identify the components of an oxyfuel rig.	
17.03	Set up and shut down an oxyfuel rig.	
17.04	Weld beads in a flat position.	
17.05	Weld an outside corner joint using a filler rod.	
17.06	Cut metal of various thicknesses'.	
17.07	Weld beads in a flat position using E-6010 and E-7018 electrodes.	
17.08	Weld beads in horizontal and in vertical positions using E-6010 and E-7018 electrodes.	
17.09	Weld beads in an overhead position using E-6010 and E-7018 electrodes.	
17.10	Weld beads using a MIG welder.	
17.11	Weld beads using a TIG welder.	

CTE Standards and Benchmarks	National Standards
17.12 Solder and braze metals.	
17.13 Cut stainless steel and aluminum with a plasma-arc rig.	
18.0 Perform machine-shop operations--The student will be able to:	
18.01 Demonstrate safety in performing machine-shop operations.	
18.02 Identify the types of cutting tools.	
18.03 Bore a hole to a specified size.	
18.04 Chase an external V-thread.	
18.05 Identify the different types of work-holding devices.	
18.06 Prepare metal for finishing.	
18.07 Set up, use, and adjust an arbor press.	
18.08 Set up, use, and adjust a hydraulic press.	
18.09 Set up, use, and adjust broaching tools.	
18.10 Cut keyways with an end mill.	
19.0 Maintain piping and tubing systems--The student will be able to:	
19.01 Identify the components of a piping system.	
19.02 Explain the maintenance considerations of metallic and nonmetallic piping systems.	
19.03 Describe the safety requirements for working with piping and tubing systems.	
19.04 Join copper tubing.	
19.05 Join common fittings.	
19.06 Join metallic pipe.	
19.07 Join plastic pipe.	
19.08 Explain valve operation and maintenance.	
19.09 Explain the importance of strainers, filters, and traps in piping systems.	
19.10 Bend back-to-back, stub-ups, and doglegs in electrical metallic tubing (EMT).	
20.0 Troubleshoot electrical circuits--The student will be able to:	
20.01 Describe the safety requirements and precautions for troubleshooting electrical circuits.	

CTE Standards and Benchmarks	National Standards
20.02 Disconnect and reconnect electric motors.	
20.03 Identify the parts and function of electrical control equipment.	
20.04 Define digital devices and PLC logic/ladder logic to troubleshoot.	
20.05 Identify the function of input and output devices and the controller.	
20.06 Explain how to troubleshoot a sequence of events.	
20.07 Use and maintain electrical test equipment for troubleshooting.	
21.0 Install and maintain drive components--The student will be able to:	
21.01 Demonstrate safety procedures for installing and maintaining drive components.	
21.02 Identify the types of bearings, their cross-referencing, and their uses.	
21.03 Remove, inspect, and/or replace bearings.	
21.04 Remove and replace seals.	
21.05 Perform shaft alignment.	
21.06 Identify the types of belts.	
21.07 Identify the types of chains.	
21.08 Perform tension adjustments and alignment on belt and chain drives.	
21.09 Troubleshoot belt and chain drives.	
21.10 Identify the types of gears.	
21.11 Remove, replace, and align gears, sprockets, and couplings.	
21.12 Remove, replace, or repair V-joints and jack shafts.	
21.13 Adjust gear backlash.	
21.14 Troubleshoot gear drives.	
21.15 Disassemble, inspect, reassemble, and adjust clutches.	
21.16 Identify the types of variable-speed drives.	
21.17 Troubleshoot variable-speed drives.	
21.18 Identify the types of cams and link mechanisms.	
21.19 Troubleshoot cam-and-link mechanism problems.	

CTE Standards and Benchmarks		National Standards
22.0	Maintain reciprocating, positive-displacement, and rotary air compressors--The student will be able to:	
22.01	Relate force, weight, mass, and density to a pneumatic system.	
22.02	Demonstrate the safety procedures for maintaining reciprocating, positive-displacement, and rotary air compressors.	
22.03	Demonstrate the operation of reciprocating compressors.	
22.04	Demonstrate the operation of positive-displacement and rotary air compressors.	
22.05	Demonstrate primary and secondary air treatment.	
22.06	Demonstrate the operation of valves, cylinders, and motors.	
22.07	Check oil level.	
22.08	Change oil.	
22.09	Drain water from tank.	
22.10	Test for efficiency of compressor.	
22.11	Inspect storage tank for quality.	
22.12	Test pressure control switch.	
23.0	Maintain and repair hydraulic-system components--The student will be able to:	
23.01	Explain the safety procedures for installing hydraulic lines.	
23.02	Explain Pascal's law.	
23.03	Explain Bernoulli's principle.	
23.04	Explain how heat and pressure relate to power and transmission.	
23.05	Describe the physical and chemical properties of a fluid.	
23.06	Install and maintain a contaminant-removal system.	
23.07	Determine reservoir requirements.	
23.08	Classify and select pumps for specific applications.	
23.09	Compute hose requirements.	
23.10	Install hydraulic lines.	
23.11	Select and install control valves.	
24.0	Troubleshoot hydraulic systems--The student will be able to:	

CTE Standards and Benchmarks		National Standards
	24.01 Explain the safety procedures for troubleshooting hydraulic systems.	
	24.02 Read a hydraulic schematic.	
	24.03 Install hydraulic components.	
	24.04 Connect electrically controlled valves.	
	24.05 Explain hydraulic-system troubleshooting techniques.	
	24.06 Repair and replace valves.	
	24.07 Repair and replace cylinders.	
	24.08 Repair and replace pumps and motors.	
25.0	Maintain and troubleshoot pneumatic systems--The student will be able to:	
	25.01 Explain the safety procedures for troubleshooting pneumatic systems.	
	25.02 Diagram an air supply system.	
	25.03 Install system components.	
	25.04 Demonstrate system-maintenance techniques.	
	25.05 Explain proper troubleshooting procedures.	
	25.06 Troubleshoot air compressors.	
	25.07 Troubleshoot, repair, and install control valves.	
	25.08 Troubleshoot air motors.	
26.0	Maintain and troubleshoot fluid-drive systems--The student will be able to:	
	26.01 Explain the safety procedures for maintaining and troubleshooting fluid-drive systems.	
	26.02 Install adjustable-speed drives.	
	26.03 Troubleshoot adjustable-speed drives.	
	26.04 Explain the operation of fluid couplings.	
	26.05 Install fluid couplings.	
	26.06 Install torque converters.	
	26.07 Perform preventive maintenance.	
	26.08 Apply a "dynamic" magnetic/mechanical braking device to a motor.	

CTE Standards and Benchmarks	National Standards
26.09 Mount the equipment.	

Course Number: ETI0457
Occupational Completion Point: B (2 of 2)
Machinery Maintenance Technician – 150 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
27.0 Maintain and troubleshoot robotic systems--The student will be able to:	
27.01 Identify uses of robotics in industry.	
27.02 Identify safety procedures related to robotic systems.	
27.03 Identify mechanical, hydraulic, pneumatic, and electric/electronic components of robotic systems.	
27.04 Perform routine maintenance and calibration of robotic systems.	
27.05 Remove, replace and adjust robotic system components.	
28.0 Perform pump maintenance and repair--The student will be able to:	
28.01 Demonstrate the safety procedures for performing pump maintenance.	
28.02 Determine pump capacity and system requirements.	
28.03 Perform pump maintenance.	
28.04 Identify packing and seal requirements.	
28.05 Explain the operating principles of centrifugal, propeller and turbine rotary, reciprocating, diaphragm, positive placement, and vacuum pumps.	
28.06 Disassemble and reassemble a pump.	
29.0 Explain the operation of industrial-pollution control systems--The student will be able to:	
29.01 Explain the operation of air-pollution control systems.	
29.02 Explain the operation of water-pollution control systems.	
29.03 Explain the operation of solid-waste pollution control systems.	

CTE Standards and Benchmarks		National Standards
	29.04 Explain the operation of noise-pollution control systems.	
30.0	Troubleshoot air-conditioning and refrigeration systems--The student will be able to:	
	30.01 Explain the principles of refrigeration.	
	30.02 Identify the major components.	
	30.03 Describe the functions of electrical systems.	
	30.04 Troubleshoot air-conditioning and refrigeration systems.	
	30.05 Explain the requirement for recovery of hazardous materials and related safety procedures.	
31.0	Identify boilers--The student will be able to:	
	31.01 Identify the various types and components of heat exchangers.	
	31.02 Identify the various types and components of boilers.	
	31.03 Identify the various types and components of fractioning columns.	
	31.04 Identify the uses of steam.	
32.0	Maintain internal combustion engines--The student will be able to:	
	32.01 Explain the basic principles of operation of the two-stroke-cycle combustion engine.	
	32.02 Identify the types of engines.	
	32.03 Locate engine serial and model numbers.	
	32.04 Identify engine assemblies and systems.	
	32.05 Troubleshoot and evaluate engine performance.	
	32.06 Perform routine maintenance on engine operating systems including air intake and exhaust, fuel, lubrication, ignition, starting and governing.	
	32.07 Perform engine tune-up and adjustment procedures.	
	32.08 Remove and replace engine assemblies.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0458
Occupational Completion Point: C
Industrial Maintenance Specialist – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
33.0	Perform metal fabrication--The student will be able to:	
33.01	Field sketch equipment supports for applications in the millwright industry.	
33.02	Read and interpret requirements in an OSHA 1910.211-219 and ANSI B15.1.	
33.03	Create, design, draw, fabricate, and paint an OSHA-approved guard.	
33.04	Use a Cut-A-Matic to make precision cuts.	
34.0	Perform precision layout--The student will be able to:	
34.01	Locate an existing benchmark and transfer it to various positions around a work area or site.	
34.02	Use the triangle procedure to check established benchmarks with an optical level and a transit.	
34.03	Identify and establish centerlines of equipment related to building columns.	
35.0	Perform advanced rigging--The student will be able to:	
35.01	Perform and interpret all rigging hand signals.	
35.02	Interpret and apply load charts for slings, chokers, and cables.	
35.03	Determine the weight of a load.	
35.04	Determine the method of lifting.	
35.05	Identify crane capacity, including the boom angle and load-swing radius.	
35.06	Identify and take the necessary precautions to accommodate weather conditions, load capacity, equipment, and safety factors.	
35.07	Balance different types of loads.	
36.0	Install, remove, and align machinery--The student will be able to:	
36.01	Identify the equipment required for machine installation and removal in millwright applications.	

CTE Standards and Benchmarks	National Standards
36.02 Operate levers, inclined planes, screws, wedges, wheel and axle assemblies, pulleys, and jacking screws.	
36.03 Perform site-clearance operations and demolition and salvage procedures.	
36.04 Explain the principles of machine alignment.	
36.05 Explain the principles of shaft alignment.	
36.06 Explain the relationship of structural problems to misalignment.	
36.07 Explain the use of thermal growth by calculation and field-growth techniques such as Essinger bars.	
36.08 Align machinery using wire line, transit, dial indicators, a computer, and laser-alignment devices.	
36.09 Perform laser horizontal and vertical alignment.	
36.10 Perform the train alignment of three or more machines and graph the results.	
36.11 Prepare an area for machine installation according to the manufacturer's specifications for selected applications.	
36.12 Position and secure machinery on a foundation.	
36.13 Level machinery and install balance-vibration dampeners.	
36.14 Identify pipe-stress standards for millwright applications.	
36.15 Perform finish alignment and check for pipe stresses in millwright applications.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Applied Welding Technologies / New Name 2015-2016, Welding Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480500
CIP Number	0648050802
Grade Level	30, 31
Standard Length	1170 hours
Teacher Certification	WELDING @7 7G METAL WORK 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-9198 – Helpers-Production Workers 51-4121 – Welders, Cutters, Solderers, and Brazers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 welding positions.

The content includes but is not limited to planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 six 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0011	Welder Helper	250 hours	51-9198
B	PMT0012	Welder, Shielded Metal Arc	250 hours	51-4121
C	PMT0013	Welder, Gas-Metal Arc	125 hours	51-4121
D	PMT0014	Welder, Flux Cored Arc	100 hours	51-4121
E	PMT0015	Welder, Gas-Tungsten Arc	175 hours	51-4121
F	PMT0016	Welder, Pipe	270 hours	51-4121

National Standards

Programs identified as having Industry or National Standards have been crosswalked with the corresponding standards and/or benchmarks. Industry or National Standards for the Welding Technologies program can be found using the following link:

http://www.aws.org/w/a/certification/CW/

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 Apply basic shop skills.
02.0 Apply basic oxyfuel gas cutting principles and practices.
03.0 Apply basic shielded metal arc welding (SMAW) skills.
04.0 Apply intermediate oxyfuel gas cutting principles and practices.
05.0 Apply intermediate shielded metal arc welding (SMAW) skills.
06.0 Apply visual examination skills.
07.0 Apply drawing and welding symbol interpretation skill.
08.0 Identify basic metals accurately.
09.0 Demonstrate arc cutting principles and practices.
10.0 Apply basic gas metal arc welding (GMAW) skills.
11.0 Apply intermediate gas metal arc welding (GMAW) skills.
12.0 Apply flux-cored arc welding (FCAW) skills.
13.0 Apply basic gas tungsten arc welding (GTAW) skills.
14.0 Apply intermediate gas tungsten arc welding (GTAW) skills.
15.0 Fabricate and weld carbon steel pipe joints.
16.0 Perform fabrication using welding skills.

Florida Department of Education
Student Performance Standards

Program Title: **Welding Technologies**
PSAV Number: **I480500**

Course Number: PMT0011
Occupational Completion Point: A
Welder Helper/Shielded Metal Arc Basic – 250 Hours – SOC Code 51-9198

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Apply basic shop skills--The student will be able to:	
01.01	Apply communications and leadership skills.	
01.02	Apply safety and health practices.	
01.03	Apply measuring skills.	
01.04	Apply grinding skills.	
02.0	Apply basic oxyfuel gas cutting principles and practices--The student will be able to:	
02.01	Perform external inspections of equipment and accessories.	
02.02	Make minor repairs to equipment and accessories.	
02.03	Set up manual OFC operations for plain carbon steel.	
02.04	Operate manual oxyfuel cutting equipment.	
02.05	Perform straight cutting operations using manual oxyfuel cutting process on plain carbon steel.	
03.0	Apply basic shielded metal arc welding (SMAW) skills--The student will be able to:	
03.01	Perform external inspections of SMAW equipment and accessories.	
03.02	Make minor repairs to SMAW equipment and accessories.	
03.03	Set up shielded metal arc welding operations on plain carbon steel.	
03.04	Operate shielded metal arc welding equipment.	
03.05	Make fillet welds, all positions, on plain carbon steel.	
03.06	Make groove welds, all positions, on plain carbon steel.	

CTE Standards and Benchmarks	National Standards
04.0 Apply intermediate oxyfuel gas cutting principles and practices--The student will be able to:	
04.01 Apply intermediate manual oxyfuel gas cutting skills.	
04.02 Perform shape cutting operations on plain carbon steel.	
04.03 Perform bevel cutting operations on plain carbon steel.	
04.04 Remove weld metal on plain carbon steel using weld washing techniques.	
04.05 Apply machine oxyfuel gas cutting (track burner) skills.	
04.06 Perform safety inspections of equipment and accessories.	
04.07 Make minor external repairs to equipment and accessories.	
04.08 Set up for plain carbon steel machine OFC (track burner) operations.	
04.09 Operate machine oxyfuel gas cutting (track burner) equipment.	
04.10 Perform straight cutting operations on plain carbon steel.	
04.11 Perform bevel cutting operations on plain carbon steel.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0012
Occupational Completion Point: B
Welder, Shielded Metal Arc – 250 Hours – SOC Code 51-4121

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
05.0	Apply intermediate shielded metal arc welding (SMAW) skills--The student will be able to:	
05.01	Make single "V" groove welds, all positions (visual inspection criteria, using (AWS) D1.1-96, 4.8.1 visual/inspection American Welding Society) on plain carbon steel with backing.	
05.02	Perform 1G - 4G limited thickness qualification (bend) tests on plain carbon steel plate. (Specification-use AWS D1.1-96, fig 4.30, 4.31 (will meet acceptance criteria AWS D1.1-96 -4.8.3.3)	
05.03	Will perform destructive root and face bend specimens (AWS D1.1-96 Fig 4.12).	
06.0	Apply visual examination skills--The student will be able to:	
06.01	Examine cut surfaces and edges of prepared base metal parts.	
06.02	Examine tack, intermediate pass and cover pass.	
06.03	Repair unacceptable weld profiles.	
07.0	Apply drawing and welding symbol interpretation skills--The student will be able to:	
07.01	Interpret basic elements of a drawing or sketch.	
07.02	Interpret welding symbol information.	
07.03	Fabricate parts from a drawing or sketch.	
08.0	Identify basic metals accurately--The student will be able to:	
08.01	Identify metals by appearance and weight.	
08.02	Identify metals by spark test.	
08.03	Classify metals by magnetic properties.	
08.04	Identify metals by structural shapes.	
09.0	Demonstrate arc cutting principles and practices--The student will be able to:	

CTE Standards and Benchmarks		National Standards
09.01	Apply Manual Air Carbon Arc Gouging and Cutting (CAC-A) skills.	
09.02	Perform safety inspections of equipment and accessories.	
09.03	Make minor external repairs to equipment and accessories.	
09.04	Set up plain carbon steel using manual air carbon arc gouging and cutting operations.	
09.05	Operate manual air carbon arc cutting equipment.	
09.06	Perform metal removal operations on plain carbon steel.	
09.07	Apply manual Plasma Arc Cutting (PAC) skills.	
09.08	Perform safety inspections of equipment and accessories.	
09.09	Make minor repairs to equipment and accessories.	
09.10	Set up for plain carbon steel, aluminum and stainless steel using plasma arc cutting operations.	
09.11	Operate manual plasma arc cutting equipment.	
09.12	Perform shape cutting operations on plain carbon steel, aluminum and stainless steel using plasma arc cutting process.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0013
Occupational Completion Point: C
Welder, Gas Metal Arc – 125 Hours – SOC Code 51-4121

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
10.0	Apply basic gas metal arc welding (GMAW) skills--The student will be able to:	
10.01	Perform external inspections of GMAW equipment and accessories.	
10.02	Make minor repairs to GMAW equipment and accessories.	
10.03	Set up gas metal arc welding operations for plain carbon steel.	
10.04	Operate gas metal arc welding equipment.	
10.05	Make short-circuiting transfer fillet welds, all positions, on plain carbon steel.	
10.06	Make Groove welds, all positions, on plain carbon steel.	
11.0	Apply intermediate gas metal arc welding (GMAW) skills--The student will be able to:	
11.01	Make 1F Fillet- 2 Fillet spray transfer welds on plain carbon steel.	
11.02	Make 1G Groove Spray transfer welds on plain carbon steel.	
11.03	Set up (GMAW) gas metal arc welding equipment for aluminum, stainless steel.	
11.04	Make groove welds 1G Groove position on aluminum.	
11.05	Make fillet welds 1-3F position on stainless.	
11.06	Make groove welds 1-2G position on stainless.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0014
Occupational Completion Point: D
Welder, Flux Cored Arc – 100 Hours – SOC Code 51-4121

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
12.0	Apply flux-cored arc welding (FCAW) skills--The student will be able to:	
12.01	Perform safety inspections of equipment and accessories.	
12.02	Make minor repairs to equipment and accessories.	
12.03	Set up for plain carbon steel FCAW operations.	
12.04	Operate flux cored arc welding equipment, self-shielded process.	
12.05	Make fillet welds and groove welds, all positions, on plain carbon steel.	
12.06	Operate flux cored arc welding equipment, gas-shielded process, to make fillet welds, all positions, on plain carbon steel.	
12.07	Operate flux covered arc welding equipment to make groove welds all positions, on plain carbon steel.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0015
Occupational Completion Point: E
Welder, Gas Tungsten Arc – 175 Hours – SOC Code 51-4121

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
13.0	Apply basic gas tungsten arc welding (GTAW) skills--The student will be able to:	
13.01	Perform external inspections of GTAW equipment and accessories.	
13.02	Make minor repairs to GTAW equipment and accessories.	
13.03	Set up for plain carbon steel, aluminum and stainless steel GTAW operations.	
13.04	Operate gas tungsten arc welding equipment.	
13.05	Make fillet welds, all position, on plain carbon steel.	
14.0	Apply intermediate gas tungsten arc welding (GTAW) skills--The student will be able to:	
14.01	Make groove welds, all positions, on plain carbon steel.	
14.02	Make 1F - 4F Fillet welds on aluminum.	
14.03	Make 1G Groove welds on aluminum.	
14.04	Make 1F - 3F Fillet welds on stainless steel.	
14.05	Make 1G - 2G Groove welds on stainless steel.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0016
Occupational Completion Point: F
Welder, Pipe – 270 Hours – SOC Code 51-4121

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
15.0	Fabricate and weld carbon steel pipe joints--The student will be able to:	
15.01	Cut and prepare schedule 40 or 80 pipe for welding using current AWS and/or ASME specifications.	
15.02	Tack and weld carbon steel pipe in the 1G thru 6G position using SMAW process with carbon steel filler.	
15.03	Tack and weld carbon steel pipe in 1G thru 6G position using GTAW process with carbon steel and/or 309 stainless steel filler.	
16.0	Perform fabrication using welding skills--The student will be able to:	
16.01	Repair products of ferrous and non-ferrous metals.	
16.02	Fabricate products of ferrous and non-ferrous metals using working drawings and/or blueprints.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Machining**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480503
CIP Number	0648050302
Grade Level	30, 31
Standard Length	1500 hours
Teacher Certification	MACH SHOP @7 7G METAL WORK 7G TOOL DIE 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-4035 – Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic 51-4041 – Machinists
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 8 Reading: 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 machining positions.

The content includes but is not limited to broad, transferable skills, stresses the understanding of all aspects of the machining industry, and demonstrates such elements of the industry as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0020	Machinist Helper	300 hours	51-4041
B	PMT0021	Machine Operator	450 hours	51-4035
C	PMT0023	Machine Setup Operator	450 hours	51-4041
D	PMT0025	Machinist	300 hours	51-4041

National Standards

Programs identified as having Industry or National Standards have been crosswalked with the corresponding standards and/or benchmarks. Industry or National Standards for the Machining program can be found using the following link:

https://www.nims-skills.org/web/nims/home

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 Maintain a work area.
02.0 Solve basic job-related math problems.
03.0 Interpret basic blueprint information.
04.0 Plan machining operations.
05.0 Perform basic measuring operations.
06.0 Maintain machines and tools.
07.0 Perform benchwork skills.
08.0 Set up and operate power saws.
09.0 Set up and operate pedestal grinders.
10.0 Set up and operate drill presses.
11.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
12.0 Apply blueprint specifications to production.
13.0 Perform basic precision-measuring operations.
14.0 Sharpen machining tools.
15.0 Operate lathes.
16.0 Operate milling machines.
17.0 Operate grinding machines.
18.0 Solve problems using critical thinking skills, creativity and innovation.
19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
20.0 Solve advanced job-related math problems.
21.0 Interpret blueprints and machine operations.
22.0 Demonstrate inspection methods.
23.0 Operate a computerized-numerical-control (CNC) machine.
24.0 Operate and set up electrical discharge machine (EDM).
25.0 Use information technology tools.
26.0 Set up and operate a computerized-numerical-control (CNC) machine.
27.0 Use computer-aided design/computer-aided manufacturing (CAD/CAM).
28.0 Perform advanced lathe operations.
29.0 Perform advanced milling operations.
30.0 Perform advanced grinding operations.
31.0 Set up and operate heat-treating furnaces. (optional)
32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
33.0 Explain the importance of employability and entrepreneurship skills.

Florida Department of Education
Student Performance Standards

Program Title: **Machining**
PSAV Number: **I480503**

Course Number: PMT0020
Occupational Completion Point: A
Machinist Helper – 300 Hours – SOC Code 51-4041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Maintain a work area--The student will be able to:	
01.01	Dispose of scrap-metal chips, shavings, trash, and waste.	
01.02	Maintain a shop area in a clean, orderly, and safe condition.	
01.03	Comply with shop-safety rules and practices.	
01.04	Comply with shop-operating guidelines.	
01.05	Follow the guidelines on material-safety data sheets, including proper handling of hazardous waste and chemicals.	
02.0	Solve basic job-related math problems--The student will be able to:	
02.01	Solve job-related problems by adding, subtracting, multiplying, and dividing whole numbers, decimals, and common fractions.	
02.02	Measure a workpiece and compare measurements with blueprint specifications, including tolerances.	
02.03	Calculate the amount of material that should be removed to obtain correct limits for secondary operations.	
02.04	Solve job-related problems using mathematical handbooks, charts, and tables.	
02.05	Calculate machine speed and feed by using appropriate formulas.	
02.06	Calculate chip load per tooth on milling operations.	
03.0	Interpret basic blueprint information--The student will be able to:	
03.01	Interpret view concepts.	
03.02	Interpret lines.	

CTE Standards and Benchmarks	National Standards
03.03 Read and interpret title blocks.	
03.04 Read and interpret change orders on working and assembly prints.	
03.05 Read and interpret abbreviations.	
04.0 Plan machining operations--The student will be able to:	
04.01 Comply with safe and efficient work practices.	
04.02 Perform layout for precision machine work by using layout instruments.	
04.03 Describe the importance of quality assurance.	
05.0 Perform basic measuring operations--The student will be able to:	
05.01 Comply with safe and efficient work practices.	
05.02 Read and measure with rules and calipers.	
05.03 Read and measure with micrometers.	
05.04 Read and measure with vernier tools. (optional)	
05.05 Use surface-plate techniques.	
06.0 Maintain machines and tools--The student will be able to:	
06.01 Comply with safe and efficient work practices.	
06.02 Lubricate equipment parts.	
06.03 Clean and store hand tools, cutters, fixtures, jigs, and attachments.	
06.04 Inspect and repair hand tools.	
06.05 Inspect drive pulleys or belts.	
06.06 Select lubricants for machining operations.	
06.07 Inspect equipment for safe operational conditions.	
06.08 Store grinding wheels.	
06.09 Store precision tools.	
06.10 Inspect and adjust machine guards.	
06.11 Inspect work areas to assure a safe working environment.	
06.12 Inspect and maintain machine cutting fluids.	

CTE Standards and Benchmarks	National Standards
07.0 Perform benchwork skills--The student will be able to:	
07.01 Comply with safe and efficient work practices.	
07.02 Cut materials by using hand hacksaws. (optional)	
07.03 Cut threads by using hand taps.	
07.04 Cut threads by using dies.	
07.05 Deburr workpiece.	
07.06 Demonstrate filing techniques. (optional)	
08.0 Set up and operate power saws--The student will be able to:	
08.01 Comply with safe and efficient work practices.	
08.02 Remove and replace saw blades.	
08.03 Select appropriate blades to perform given sawing operations.	
08.04 Select and set speeds and feeds for given sawing operations.	
08.05 Measure and cut material using a power saw.	
08.06 Saw to scribed lines by using a metal band saw.	
08.07 Cut and weld band-saw blades for contour sawing.	
08.08 Set up and operate saws for angular cutting.	
09.0 Set up and operate pedestal grinders--The student will be able to:	
09.01 Comply with safe and efficient work practices.	
09.02 Identify the parts of the machine and explain their uses.	
09.03 Set up support rests.	
09.04 Dress grinding wheels.	
10.0 Set up and operate drill presses--The student will be able to:	
10.01 Identify the parts of a drill press and explain their uses.	
10.02 Identify and set the machine controls.	
10.03 Comply with safe and efficient work practices.	
10.04 Select the proper tooling.	

CTE Standards and Benchmarks		National Standards
	10.05 Set up and operate drill press for hole work, center drill, drill, ream, countersink, and counterbore.	
	10.06 Set drill presses for proper feed and speed for specified operations.	
11.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:	
	11.01 Locate, organize and reference written information from various sources.	
	11.02 Develop and interpret tables and charts to support written and oral communications.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0021
Occupational Completion Point: B
Machine Operator – 450 Hours – SOC Code 51-4035

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
12.0	Apply blueprint specifications to production--The student will be able to:	
	12.01 Create shop sketches.	
	12.02 Identify the costs involved in product production.	
13.0	Perform basic precision-measuring operations--The student will be able to:	
	13.01 Comply with safe and efficient work practices.	
	13.02 Read and measure with dial indicators.	
	13.03 Read and measure with gage blocks and adjustable gages.	
	13.04 Take readings using optical comparators.	
14.0	Sharpen machining tools--The student will be able to:	
	14.01 Comply with safe and efficient work practices.	
	14.02 Hand sharpens cutting tools by using abrasive stones.	
	14.03 Grind lathe tools to required angles.	
	14.04 Sharpen drills.	
15.0	Operate lathes--The student will be able to:	
	15.01 Identify the parts of a lathe and explain their uses.	
	15.02 Comply with safe and efficient work practices.	
	15.03 Set up an engine lathe.	
	15.04 Secure tools, tool holders, and fixtures or attachments.	
	15.05 Select and set feeds and speeds.	

CTE Standards and Benchmarks	National Standards
15.06 Set up lathes and face workpieces held in chucks.	
15.07 Rough cut and finish cut with lathes.	
15.08 Perform lathe filing to deburr parts.	
15.09 Drill holes with lathes.	
15.10 Countersink holes with lathes.	
15.11 Ream holes with lathes.	
15.12 Tap threads with lathes.	
15.13 Die cut threads with lathes.	
15.14 Counterbore holes with lathes.	
15.15 Align lathe centers using accurate methods.	
15.16 Bore holes with lathes.	
15.17 Knurl parts with lathes.	
15.18 Cut external threads with lathes.	
15.19 Perform contour, angular, or radii cuts with lathes.	
15.20 Set up the faceplate and dog.	
16.0 Operate milling machines--The student will be able to:	
16.01 Identify the parts of a vertical milling machine and explain their uses.	
16.02 Comply with safe and efficient work practices.	
16.03 True up the head and align milling fixtures.	
16.04 Select and set feeds and speeds for milling work.	
16.05 Square up workpieces with a table vise.	
16.06 Perform end milling.	
16.07 Perform fly-cutting operations.	
16.08 Drill holes with milling machines.	
16.09 Perform reaming operations.	
16.10 Perform form milling.	

CTE Standards and Benchmarks	National Standards
16.11 Mill an external radius.	
16.12 Mill an angle.	
16.13 Use an edge finder and wiggler.	
16.14 Identify the parts of vertical and horizontal milling machines and explain their uses.	
16.15 Select the correct set up and operation for different milling machines.	
16.16 Cut external keyways.	
16.17 Bore holes with boring head.	
16.18 Mill cylindrical work.	
16.19 Set up and perform slab mill operations.	
16.20 Use digital readouts.	
16.21 Perform straddle milling operations on the horizontal mill.	
16.22 Set up and operate power tapping head.	
17.0 Operate grinding machines--The student will be able to:	
17.01 Identify the parts of a grinding machine and explain their uses.	
17.02 Comply with safe and efficient work practices.	
17.03 Set up and grind parallel flat surfaces.	
17.04 Select the proper wheel.	
17.05 Inspect, balance, dress, and true grinding wheels.	
17.06 Attach and align workpieces for grinding operations.	
17.07 Set up and grind four sides square.	
17.08 Select and set feeds and speeds of power-feed grinding machines.	
17.09 Cut or part workpieces with grinding machines.	
17.10 Set up and use angle plates.	
17.11 Grind to a shoulder.	
17.12 Grind a taper.	
18.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:	

CTE Standards and Benchmarks		National Standards
	18.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	
	18.02 Employ critical thinking and interpersonal skills to resolve conflicts.	
	18.03 Identify and document workplace performance goals and monitor progress toward those goal.	
	18.04 Conduct technical research to gather information necessary for decision-making.	
19.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The students will be able to:	
	19.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.	
	19.02 Explain emergency procedures to follow in response to workplace accidents.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0023
Occupational Completion Point: C
Machine Setup Operator – 450 Hours – SOC Code 51-4041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
20.0	Solve advanced job-related math problems--The student will be able to:	
20.01	Solve job-related problems using basic formulas, geometry, and trigonometry.	
20.02	Convert measurements from English to metric and from metric to English units.	
21.0	Interpret blueprints and machine operations--The student will be able to: (Depending on training plans this outcome may be completed in OCP A under outcome 03.0)	
21.01	Read and interpret blueprints, including those with geometric tolerancing.	
21.02	Determine and interpret reference information used in performing machine work.	
21.03	Comply with safe and efficient work practices.	
21.04	Lay out radial and bolt hole circles.	
21.05	Inspect, remove, and replace manufactured parts that need repair or machine work.	
21.06	Select the most productive tool and tooling for a given operation.	
22.0	Demonstrate inspection methods--The student will be able to:	
22.01	Comply with safe and efficient work practices.	
22.02	Measure with sine bars.	
22.03	Take readings with hardness testers.	
22.04	Explain the purpose of statistical process control (SPC).	
23.0	Operate a computerized-numerical-control (CNC) machine--The student will be able to:	
23.01	Identify parts of a CNC machine and explain their uses.	
23.02	Follow safe and efficient work practices, including procedures sheets.	

CTE Standards and Benchmarks		National Standards
	23.03 Identify unusual machine noises.	
	23.04 Adjust machine speeds and feeds according to specifications.	
	23.05 Inspect parts for correct dimensions.	
24.0	Operate and set up electrical discharge machine (EDM)--The student will be able to:	
	24.01 Identify parts of the machine and explain their uses.	
	24.02 Comply with safe and efficient work practices.	
	24.03 Follow procedure sheets.	
	24.04 Set up and adjust machine controls according to specifications.	
	24.05 Select and manufacture electrode.	
	24.06 Select flushing techniques.	
	24.07 Create part according to specifications. (optional)	
	24.08 Perform EDM programming.	
25.0	Use information technology tools--The students will be able to:	
	25.01 Use personal information management (PIM) applications to increase workplace efficiency.	
	25.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	
	25.03 Employ computer operations applications to access, create, manage, integrate, and store information.	
	25.04 Employ collaborative/groupware applications to facilitate group work.	

Florida Department of Education
Student Performance Standards

Course Number: PMT0025
Occupational Completion Point: D
Machinist – 300 Hours – SOC Code 51-4041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
26.0	Set up and operate a computerized-numerical-control (CNC) machine--The student will be able to:	
26.01	Comply with safe and efficient work practices.	
26.02	Set up work holding devices.	
26.03	Select proper cutting tools.	
26.04	Write a basic program and apply basic programming skills.	
26.05	Adjust appropriate cutting tools and tool offsets.	
26.06	Machine and create parts to blueprint tolerances.	
27.0	Use computer-aided design/computer-aided manufacturing (CAD/CAM) processes--The student will be able to:	
27.01	Identify parts of the machine and explain their uses.	
27.02	Identify CAD/CAM processes.	
27.03	Comply with safe and efficient work practices.	
27.04	Create a multidimensional geometry of parts.	
27.05	Create a CNC code from parts geometry.	
27.06	Set up and manufacture parts.	
28.0	Perform advanced lathe operations--The student will be able to:	
28.01	Rechase threads with lathes.	
28.02	Cut internal threads with lathes.	
28.03	Set up and perform taper turning with taper attachments.	
28.04	Set up and perform taper turning with the compound rest.	

CTE Standards and Benchmarks		National Standards
	28.05 Cut internal tapered surfaces.	
	28.06 Set up and use follower and steady rests.	
29.0	Perform advanced milling operations--The student will be able to:	
	29.01 Perform indexing operations using a dividing head.	
	29.02 Set up and operate rotary tables.	
30.0	Perform advanced grinding operations--The student will be able to:	
	30.01 Explain up grinders to run workpieces between centers. (optional)	
	30.02 Explain up and use radius dressers. (optional)	
	30.03 Explain cylindrical grinders. (optional)	
	30.04 Explain operate inside diameter (ID) grinders. (optional)	
31.0	Set up and operate heat-treating furnaces--The student will be able to: (optional)	
	31.01 Identify the parts of the machine and explain their uses.	
	31.02 Identify and select proper machine controls.	
	31.03 Comply with safe and efficient work practices.	
	31.04 Select and identify proper heat-treatment processes.	
	31.05 Perform a basic heat-treatment process to blueprint specifications.	
32.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:	
	32.01 Employ leadership skills to accomplish organizational goals and objectives.	
	32.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.	
	32.03 Conduct and participate in meetings to accomplish work tasks.	
	32.04 Employ mentoring skills to inspire and teach others.	
33.0	Explain the importance of employability and entrepreneurship skills--The students will be able to:	
	33.01 Identify and demonstrate positive work behaviors needed to be employable.	
	33.02 Develop personal career plan that includes goals, objectives, and strategies.	
	33.03 Examine licensing, certification, and industry credentialing requirements.	

CTE Standards and Benchmarks	National Standards
33.04 Maintain a career portfolio to document knowledge, skills, and experience.	
33.05 Evaluate and compare employment opportunities that match career goals.	
33.06 Identify and exhibit traits for retaining employment.	
33.07 Identify opportunities and research requirements for career advancement.	
33.08 Research the benefits of ongoing professional development.	
33.09 Examine and describe entrepreneurship opportunities as a career planning option.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 8.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Precision Metal Fabrication**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480504
CIP Number	0648050100
Grade Level	30, 31
Standard Length	1600 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G WELDING @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 precision metal fabrication positions.

The content includes but is not limited to measurement and layout, planning and design, sheet metal work, structural steel, welding, mechanical fasteners, metal properties, heat treating and metalworking tools. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0050	Metal Fabricator Helper	400 hours	47-2211
B	PMT0052	Metal Fabricator	150 hours	47-2211
C	PMT0053 PMT0054	Metal Fabricator Assembler 1 Metal Fabricator Assembler 2	300 hours 400 hours	47-2211
D	PMT0055	Structural Metal Fabricator	350 hours	47-2211

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 basic metal fabrication skills.
02.0 Demonstrate ability to read plans and drawings.
03.0 Describe metals and their properties.
04.0 Perform gas welding and cutting operations.
05.0 Perform measuring and layout operations.
06.0 Operate metalworking machines.
07.0 Perform metal fabrication operations.
08.0 Perform electric metal-bonding operations.
09.0 Perform assembly operation.
10.0 Demonstrate ability to apply geometric form and position control.
11.0 Organize and plan work.

Florida Department of Education
Student Performance Standards

Program Title: **Precision Metal Fabrication**
PSAV Number: **I480504**

Course Number: PMT0050
Occupational Completion Point: A
Metal Fabricator Helper – 400 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Demonstrate basic metal fabrication skills--The student will be able to:
01.01	Comply with safety and operating rules and practices.
01.02	Maintain a clean and orderly shop.
01.03	Make job-related decimal and fraction calculations.
01.04	Solve job-related problems by adding, subtracting, multiplying and dividing numbers.
01.05	Solve job-related problems operating a hand-held calculator.
01.06	Solve job-related problems using mathematical handbooks, charts and tables.
01.07	Compute feet, inches and yards.
01.08	Use the protractor to measure angles to nearest degree.
01.09	Use the protractor and triangles to draw angles.
01.10	Demonstrate proper use of material handling techniques.
01.11	Solve job-related problems using basic formulas.
01.12	Solve job-related problems using basic geometry.
01.13	Solve job-related problems using basic trigonometry.
01.14	Calculate the amount of material that is required to fabricate project.
01.15	Calculate machine feed and speed by using formulas.
01.16	Calculate set back and bend allowance.
02.0	Demonstrate ability to read plans and drawings--The student will be able to:
02.01	Identify dimensions.

CTE Standards and Benchmarks	
02.02	Identify lists of materials and specifications.
02.03	Identify section views/detail views.
02.04	Disassemble and assemble parts using an exploded view drawing.
02.05	Interpret blueprint abbreviations.
02.06	Identify dimensioning of radii, round holes, fillets and chamfers.
02.07	Identify screw threads and bolt types.
02.08	Apply dimensional tolerances.
02.09	Identify metal fabrication symbols used in blueprints.
02.10	Read and interpret title block information.
02.11	Identify and interpret rivet call outs.
02.12	Identify and interpret weld call outs.
02.13	Identify and interpret general and local notes.
02.14	Describe the use of assembly blueprints and detail blueprints.
03.0	Describe metals and their properties--The student will be able to:
03.01	Describe the steelmaking process.
03.02	Describe the differences between ferrous and nonferrous metals.
03.03	Describe casting, alloys and forging.
03.04	Identify metals such as galvanized iron and steel, aluminum stainless steel, sheet metal, copper and brass.
03.05	Identify properties of the most common metals.
03.06	Identify and describe common gages, shapes and dimensions of purchased materials.

Florida Department of Education
Student Performance Standards

Course Number: PMT0052
Occupational Completion Point: B
Metal Fabricator – 150 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
04.0	Perform gas welding and cutting operations--The student will be able to:
04.01	Identify welding cylinders, regulators, hoses, pressure gages and torches.
04.02	Describe welding equipment safety procedures.
04.03	Demonstrate proper flame settings.
04.04	Demonstrate basic gas welding skills.
04.05	Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.
04.06	Demonstrate freehand and guide cutting of various metal thickness'.
04.07	Set up and operate a plasma arc cutting machine.

Florida Department of Education
Student Performance Standards

Course Number: PMT0053
Occupational Completion Point: C (1 of 2)
Metal Fabricator Assembler 1 – 300 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
05.0	Perform measuring and layout operations--The student will be able to:
05.01	Perform basic geometric construction.
05.02	Use marking gages, center punches, scribes, surface gages, squares, dividers, dial indicators, protractors, surfaceplates, depth gates and circumference rules.
05.03	Develop patterns using parallel line, radial line and triangulation.
05.04	Make metal fabrication sketches.
05.05	Read and measure with steel rules.
05.06	Read and measure with micrometers.
05.07	Read and measure with vernier height gages.
05.08	Read and measure with dial calipers.
05.09	Read and measure with universal bevel protractor.
05.10	Measure with sine bars.
05.11	Read and measure with dial indicators.
05.12	Apply parallel bars, angle plates and surface gages to precision measurement operations.
05.13	Apply "V" blocks to precision measurement operations.
05.14	Use gage blocks in establishing measurement.
05.15	Layout work piece using marking gages, center punches, scribes, surface gages, squares, dividers, dial indicators, protractors, surface plates, depth gages and circumference rules.
05.16	Perform flat pattern bracket layouts.
05.17	Perform cone development, construct radial line and use triangulation.
06.0	Operate metalworking machines--The student will be able to:
06.01	Identify the purpose of various types of machine shop equipment.

CTE Standards and Benchmarks	
06.02	Identify types of a drill press.
06.03	Operate a drill press utilizing the correct drilling speed.
06.04	Operate a band saw utilizing the correct cutting speed.
06.05	Demonstrate clamping devices for securing stock for drilling.
06.06	Identify types and sizes of drill bits.
06.07	Use portable power saw equipment.
06.08	Use a cutoff or power hacksaw.
06.09	Use electric and air utility grinders.
06.10	Sharpen drill bits.
06.11	Select proper type of abrasive wheels for grinding machines.
06.12	Operate large belt sander.
06.13	Operate power press brake.
06.14	Operate power metal shear.
06.15	Operate various manual brakes.
06.16	Operate power jitterbug shear.
06.17	Operate bench grinders.
06.18	Operate beverly shear.
06.19	Operate unishear.

Course Number: PMT0054
Occupational Completion Point: C (2 of 2)
Metal Fabricator Assembler 2 – 400 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
07.0	Perform metal fabrication operations--The student will be able to:
07.01	Fabricate metal, edges and seams.

CTE Standards and Benchmarks	
	07.02 Use hand tools to cut, punch and shear metal.
	07.03 Form sheet metal using a brake, a folder, rolls and a turning machine.
	07.04 Join metals using solder, rivets and mechanical fasteners.
	07.05 Make fixtures as required (Micarta and Mild Steel).
	07.06 Arrange proper setup in vise using safety devices.
	07.07 Demonstrate ability to cut various shapes of metal stock.
	07.08 Demonstrate ability to bend various shapes of metal stock.
	07.09 Inspect fabricated parts.
08.0	Perform electric metal-bonding operations--The student will be able to:
	08.01 Describe and demonstrate the spot and arc welding process.
	08.02 Demonstrate basic procedures for safely adjusting and operating an arc welder, selecting a rod, striking and maintaining an arc, welding in various positions and clamping.
	08.03 Setup and operate a spot welder.
	08.04 Explain and demonstrate the MIG welding process.
	08.05 Apply basic procedures for safely adjusting, operating, cleaning and maintaining MIG welding equipment.
	08.06 Apply basic procedures for safely adjusting and operating a TIG welder, welding in various positions, selecting proper tips and choosing filler metal.
09.0	Perform assembly operation--The student will be able to:
	09.01 Identify weld symbols.
	09.02 Perform required weld preparation.
	09.03 Assist welder in weld operation.
	09.04 Identify rivet symbol.
	09.05 Install proper diameter holes and prepare metal surfaces for riveting.
	09.06 Determine whether rivet is to be "shot" or squeezed.
	09.07 Perform proper setup and upset rivets.
	09.08 Set up and install blind rivets.

Florida Department of Education
Student Performance Standards

Course Number: PMT0055
Occupational Completion Point: D
Structural Metal Fabricator – 350 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
10.0	Demonstrate ability to apply geometric form and position control--The student will be able to:
10.01	Identify material condition and perfect form.
10.02	Identify the eleven form characteristics.
10.03	Identify the two position characteristics.
10.04	Identify the seven different tolerance zones.
10.05	Identify datum symbols.
10.06	Identify datum planes.
10.07	Identify datum axis.
10.08	Identify datum centerplane.
10.09	Identify the three plan datum system and multiple datums.
10.10	Identify material condition modifiers.
10.11	Solve bonus tolerance applications.
10.12	Solve datum zone applications.
10.13	Identify tolerance value indicator.
10.14	Identify American National Standards Institute.
10.15	Identify International Standards Institute.
11.0	Organize and plan work--The student will be able to:
11.01	Interpret blueprints and drawings to acquire proper amount of material.
11.02	Requisition proper tools and equipment to fabricate parts.
11.03	Develop and project plan.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Sheet Metal Fabrication Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480506
CIP Number	0648050600
Grade Level	30, 31
Standard Length	1350 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 sheet metal fabrication positions.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, and the layout, fabrication, erection, or installation and maintenance of items made of sheet steel, copper, stainless steel and aluminum using hand tools and machines.

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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0030	Sheet Metal Helper	450 hours	47-2211
B	PMT0032	Sheet Metal Fabricator	225 hours	47-2211
C	PMT0033	Architectural Fabricator	225 hours	47-2211
D	PMT0034	Commercial Kitchen Fabricator	225 hours	47-2211
E	PMT0035	Sheet Metal Welder	225 hours	47-2211

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 understanding of procedures and trade safety practices.
02.0 Read blueprints.
03.0 Lay out sheet metal.
04.0 Describe metals and their properties.
05.0 Describe the operation of metal working machines.
06.0 Perform metal fabrication operations.
07.0 Fabricate mechanical systems.
08.0 Install mechanical systems.
09.0 Fabricate architectural/roofing sheet metal.
10.0 Install architectural/roofing sheet metal.
11.0 Fabricate specialty sheet metal.
12.0 Fabricate food and beverage dispensing equipment.
13.0 Weld sheet metal.
14.0 Perform gas welding and cutting operations.
15.0 Perform electric metal-bonding operations.

Florida Department of Education
Student Performance Standards

Program Title: **Sheet Metal Fabrication Technology**
PSAV Number: **I480506**

Course Number: PMT0030
Occupational Completion Point: A
Sheet Metal Helper – 450 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Demonstrate understanding of procedures and trade safety practices--The student will be able to:
01.01	Apply safety rules and procedures.
01.02	Explain school/class procedures.
01.03	Demonstrate use and care of tools.
02.0	Read blueprints--The student will be able to:
02.01	Interpret detail drawings.
02.02	Read symbols.
02.03	List materials for fabrication from blueprints.
02.04	Develop shop drawings, drafting, sketching, and demonstrate computer usage and CAD operation.
03.0	Lay out sheet metal--The student will be able to:
03.01	Perform basic geometric construction
03.02	Use marking gages, center punches, scribes, surface gages, squares, dividers, protractors, and circumference rules.
03.03	Develop patterns using parallel line, radial line and triangulation.
03.04	Make metal fabrication sketches.
03.05	Read and measure with steel rules.
03.06	Read and measure with micrometers.
03.07	Read and measure with dial calipers.
03.08	Read and measure with universal bevel protractor.
03.09	Layout work place using marking gages, center punches, scribes, surface gages, squares, dividers, protractors, and circumference

CTE Standards and Benchmarks	
	rules.
03.10	Perform flat pattern bracket layouts.
03.11	Perform cone development, construct radial line and use triangulation.
03.12	Lay out rectangular straight duct.
03.13	Lay out rectangular square throat and square heel duct elbow.
03.14	Lay out rectangular duct ogee offset.
03.15	Lay out rectangular taper duct (centerline taper).
03.16	Lay out rectangular duct Y branch.
03.17	Lay out round straight duct.
03.18	Lay out round duct elbow.
03.19	Lay out round duct Y branch.
03.20	Lay out round duct offset.
03.21	Lay out round duct taper (transitional).
03.22	Lay out round duct lateral (round tap).
03.23	Lay out batten seam metal roof panel and cap.
03.24	Lay out square hopper.
03.25	Lay out belt guard.
04.0	Describe metals and their properties--The student will be able to:
04.01	Describe the steelmaking process.
04.02	Describe the difference between ferrous and nonferrous metals.
04.03	Describe casting, alloys and forging.
04.04	Identify metals such as galvanized iron and steel, aluminum stainless steel, sheet metal, copper and brass.
04.05	Identify properties of the most common metals.
04.06	Identify and describe common gages, shapes and dimensions of purchased materials.
05.0	Describe the operation of metalworking machines--The student will be able to:
05.01	Identify the purpose of various types of sheet metal shop equipment.
05.02	Identify types of drill presses.

CTE Standards and Benchmarks	
05.03	Operate a drill press utilizing the correct drilling speed.
05.04	Operate a band saw utilizing the correct cutting speed.
05.05	Demonstrate clamping devices for securing stock for drilling.
05.06	Identify types and sizes of drill bits.
05.07	Use portable power saw equipment.
05.08	Use a cutoff or power hacksaw.
05.09	Use electric and air utility grinders.
05.10	Sharpen drill bits.
05.11	Select proper type of abrasive wheels for grinding machines.
05.12	Describe large belt sanders.
05.13	Describe power press brake.
05.14	Describe power metal shear.
05.15	Describe various manual brakes.
05.16	Describe bench grinders.
05.17	Describe beverly shear.
05.18	Describe unishear.
06.0	Perform metal fabrication operations--The student will be able to:
06.01	Fabricate metal, edges and seams.
06.02	Use hand tools to cut, punch and shear metal.
06.03	Form sheet metal using a brake, a folder, rolls and a turning machine.
06.04	Join metals using solder, rivets and mechanical fasteners.
06.05	Make fixtures as required (Micarta and Mild Steel).
06.06	Arrange proper setup in vise using safety devices.
06.07	Demonstrate ability to cut various shapes of metal stock.
06.08	Demonstrate ability to bend various shapes of metal stock.
06.09	Inspect fabricated parts.

Florida Department of Education
Student Performance Standards

Course Number: PMT0032
Occupational Completion Point: B
Sheet Metal Fabricator – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
07.0	Fabricate mechanical systems--The student will be able to:
07.01	Fabricate rectangular radius throat and radius heel duct elbow.
07.02	Fabricate rectangular square throat and square heel duct elbow.
07.03	Fabricate rectangular duct ogee offset.
07.04	Fabricate rectangular duct transition.
07.05	Fabricate rectangular duct Y branch.
07.06	Fabricate rectangular shoe tap.
07.07	Fabricate round straight duct.
07.08	Fabricate round duct elbow.
07.09	Fabricate round duct Y branch.
07.10	Fabricate round duct offset.
07.11	Fabricate round duct taper (transitional).
07.12	Fabricate round duct lateral (round tap).
07.13	Fabricate round saddle tap.
07.14	Fabricate single wall equipment casing/housing.
07.15	Fabricate flat S.
07.16	Fabricate bar S.
07.17	Fabricate drive cleat.
07.18	Fabricate pocket government lock.
07.19	Fabricate companion angle.

CTE Standards and Benchmarks	
	07.20 Fabricate flanged duct section.
08.0	Install mechanical systems--The student will be able to:
	08.01 Install rectangular duct system.
	08.02 Install round duct system.
	08.03 Install single wall equipment casing/housing

Florida Department of Education
Student Performance Standards

Course Number: MTE0306
Occupational Completion Point: C
Fabrication specialist – 150 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
09.0	Fabricate architectural/roofing sheet metal--The student will be able to:
09.01	Fabricate batten seam metal roof panel and cap.
09.02	Fabricate standing seam metal roof panel.
09.03	Fabricate metal flat-lock roof panel.
09.04	Fabricate ogee gutter.
09.05	Fabricate half-round gutter.
09.06	Fabricate rectangular downspout/conductor.
09.07	Fabricate offset in rectangular downspout/conductor.
09.08	Fabricate conductor head.
09.09	Fabricate flashing.
09.10	Fabricate roof coping.
09.11	Fabricate gravel stop fascia.
09.12	Fabricate metal siding panel.
09.13	Fabricate louver.
09.14	Fabricate metal ceiling panel.
10.0	Install architectural/roofing sheet metal--The student will be able to:
10.01	Install batten seam metal roof panel and cap.
10.02	Install standing seam metal roof panel.
10.03	Install metal flat-lock roof panel.
10.04	Install ogee gutter.

CTE Standards and Benchmarks	
10.05	Install half-round gutter.
10.06	Install rectangular downspout/conductor.
10.07	Install offset in rectangular downspout/conductor.
10.08	Install conductor head.
10.09	Install flashing.
10.10	Install coping.
10.11	Install gravel stop fascia.
10.12	Install metal siding.

Florida Department of Education
Student Performance Standards

Course Number: PMT0034
Occupational Completion Point: D
Commercial Kitchen Fabricator – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
11.0	Fabricate specialty sheet metal--The student will be able to:
11.01	Fabricate rectangular single blade damper in frame.
11.02	Fabricate rectangular tube.
11.03	Fabricate round tube.
11.04	Fabricate hollow metal letter.
11.05	Fabricate round duct support saddle (floor mounted).
11.06	Fabricate belt guard.
11.07	Fabricate blind/drapery pocket (cornice).
12.0	Fabricate food and beverage dispensing equipment--The student will be able to:
12.01	Fabricate counter top.
12.02	Fabricate shelf.
12.03	Fabricate cabinet shell.
12.04	Fabricate cabinet drawer.
12.05	Fabricate cabinet sliding door.
12.06	Fabricate sink and tub.

Florida Department of Education
Student Performance Standards

Course Number: PMT0035
Occupational Completion Point: E
Sheet Metal Welder – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
13.0	Weld sheet metal--The student will be able to:
13.01	Weld aluminum with gas tungsten arc welding (GTAW) equipment.
13.02	Weld aluminum with gas metal arc welding (GMAW) equipment.
13.03	Weld stainless steel with gas metal arc welding (GMAW) equipment.
13.04	Weld stainless steel with shielded metal arc welding (SMAW) equipment.
14.0	Perform gas welding and cutting operations--The student will be able to:
14.01	Identify welding cylinders, regulators, hoses, pressure gages and torches.
14.02	Describe welding equipment safety procedures.
14.03	Demonstrate proper flame settings.
14.04	Demonstrate basic gas welding skills.
14.05	Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.
14.06	Demonstrate freehand and guide cutting of various metal thickness'.
14.07	Set up and operate a plasma arc-cutting machine.
15.0	Perform electric metal-bonding operations--The student will be able to:
15.01	Describe and demonstrate the spot and arc welding process.
15.02	Demonstrate basic procedures for safety adjusting and operating an arc welder, selecting a rod, striking and maintaining an arc, welding in various positions and clamping.
15.03	Set up and operate a spot welder.
15.04	Explain and demonstrate the MIG welding process.
15.05	Apply basic procedures for safety adjusting, operating, cleaning and maintaining MIG welding equipment.
15.06	Apply basic procedures for safely adjusting and operating a TIG welder, welding in various positions, selecting proper tips and choosing filler metal.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Jewelry Making and Repair**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480602
CIP Number	0647040806
Grade Level	30, 31
Standard Length	1650 hours
Teacher Certification	METAL WORK 7G JWLY MFGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9064 – Watch Repairers 51-9071 – Jewelers and Precious Stone and Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 and/or specialized training in jewelry occupations.

The Jewelry Making and Repair program prepares students for employment as Clock, Watch and Jewelry Technician Assistants (SOC 49-9064), Jewelry Designers (SOC 51-9071.01), Wax Modeler/Casters (SOC 51-9071.03), Jewelry Repairers (SOC 51-9071.04), Stone Setters (SOC 51-9071.06) and Certified Jewelers/Gemologists (SOC 51-9071.00).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Clock/Watch and Jewelry Repair industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 six 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0650	Clock, Watch and Jewelry Technician Assistant	450 hours	49-9064
B	PMT0630	Jewelry Designer	450 hours	51-9071
C	PMT0640	Wax Modeler/Casting	150 hours	51-9071
D	PMT0641	Jewelry Repairer	300 hours	51-9071
E	PMT0632	Stone Setter	150 hours	51-9071
F	PMT0645	Certified Jeweler (Jewelry Finishing Technician)	150 hours	51-9071

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 Develop basic trade skills.
02.0 Demonstrate safe use of basic tools and equipment.
03.0 Perform sawing, piercing, filing and cutting skills.
04.0 Solder metals.
05.0 Perform general repairs.
06.0 Perform polishing techniques.
07.0 Perform shop management skills.
08.0 Identify timepieces.
09.0 Demonstrate mathematics knowledge and skills.
10.0 Demonstrate science knowledge and skills.
11.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
12.0 Roll metal and wire.
13.0 Design and fabricate jewelry.
14.0 Cast jewelry.
15.0 Set stones.
16.0 Apply surface treatment.

Florida Department of Education
Student Performance Standards

Program Title: **Jewelry Making and Repair**
PSAV Number: **I480602**

Course Number: PMT0650
Occupational Completion Point: A
Clock, Watch and Jewelry Technician Assistant – 450 Hours – SOC Code 49-9064

CTE Standards and Benchmarks	
01.0	Develop basic trade skills--The student will be able to:
01.01	Organize shop and maintain tools.
01.02	Identify safety skills.
01.03	Develop measuring and weighing skills.
01.04	Test and identify metals.
01.05	Identify problems with quartz watches.
01.06	Select hand tools and equipment.
02.0	Demonstrate safe use of basic tools and equipment--The student will be able to:
02.01	Handle tools and equipment safely.
03.0	Perform sawing, piercing, filing and cutting skills--The student will be able to:
03.01	Identify appropriate sawing, piercing, filing and cutting skills.
04.0	Solder metals--The student will be able to:
04.01	Select soldering equipment and hand tools.
04.02	Select appropriate solder and flux.
04.03	Solder metals.
05.0	Perform general repair--The student will be able to:
05.01	Identify watch batteries, gaskets, band, pins and round watch crystals..
05.02	Remove and replace watch stems.
05.03	Identify jewelry findings and parts.

CTE Standards and Benchmarks	
	05.04 Repair basic chain links.
06.0	Perform polishing techniques--The student will be able to:
	06.01 Buff metals using abrasives.
	06.02 Polish metals.
	06.03 Clean metals.
	06.04 Polish plastic crystals.
07.0	Perform shop management skills--The student will be able to:
	07.01 Apply positive relations with employer or client.
	07.02 Identify and assess repairs.
08.0	Identify timepieces--The student will be able to:
	08.01 Use standard references and computerized database to identify watch movements and replacement parts.
	08.02 Describe timepiece parts and their functions.
09.0	Demonstrate mathematics knowledge and skills--The students will be able to:
	09.01 Demonstrate knowledge of arithmetic operations.
	09.02 Analyze and apply data and measurements to solve problems and interpret documents.
	09.03 Construct charts/tables/graphs using functions and data.
10.0	Demonstrate science knowledge and skills--The students will be able to:
	10.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.
	10.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.
11.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
	11.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	11.02 Locate, organize and reference written information from various sources.
	11.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	11.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	11.05 Apply active listening skills to obtain and clarify information.

CTE Standards and Benchmarks	
11.06	Develop and interpret tables and charts to support written and oral communications.
11.07	Exhibit public relations skills that aid in achieving customer satisfaction.
11.08	Project a professional image.
11.09	Work individually and cooperatively as a member of regular or cultural diverse team.
11.10	Utilize communication skills applicable to the industry.
11.11	Balance personal and professional life.
11.12	Use and conserve resources and energy.
11.13	Locate and select employment opportunities.
11.14	Demonstrate employment seeking skills.
11.15	Use and conserve resources and energy.

Florida Department of Education
Student Performance Standards

Course Number: PMT0630
Occupational Completion Point: B
Jewelry Designer – 450 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
02.0	Demonstrate safe use of basic tools and equipment--The student will be able to:
02.02	Operate polishing machine.
02.03	Operate ultrasonic cleaning machine.
03.0	Perform sawing, piercing, filing and cutting skills--The student will be able to:
03.02	Use sawing techniques.
03.03	Use piercing techniques.
03.04	Use filing techniques.
03.05	Use cutting techniques.
04.0	Solder metals--The student will be able to:
04.04	Solder jewelry.
07.0	Perform shop management skills--The student will be able to:
07.03	Prepare cost estimates and work orders.
07.04	Maintain a shop production schedule.
07.05	Maintain inventory.
07.06	Explain impact of professional trade organizations on the industry.
12.0	Roll metal and wire--The student will be able to:
12.01	Melt precious metals into ingots.
12.02	Roll ingot into sheet metal wire.
12.03	Construct a tubing wire.
13.0	Design and fabricate jewelry--The student will be able to:
13.01	Design and fabricate jewelry using wire.
13.02	Design and fabricate jewelry using sheet metals.

Florida Department of Education
Student Performance Standards

Course Number: PMT0640
Occupational Completion Point: C
Wax Modeler/Casting – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
11.0	Cast jewelry--The student will be able to:
11.01	Identify types of casting methods.
11.02	Design and sculpture wax models and molds.
11.03	Cast jewelry pieces using lost wax process.

Florida Department of Education
Student Performance Standards

Course Number: PMT0641
Occupational Completion Point: D
Jewelry Repairer – 300 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
05.0	Perform general repairs--The student will be able to:
05.05	Analyze and perform advanced chain link repair.
05.06	Size ring.
05.07	Reshank ring.
05.08	Repair prong.
05.09	Repair hinge.
05.10	Replace watch battery
05.11	Replace findings

Florida Department of Education
Student Performance Standards

Course Number: PMT0632
Occupational Completion Point: E
Stone Setter – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
21.0	Set stones--The student will be able to:
21.01	Test and identify stones.
21.02	Set stone in a pronged mounting.
21.03	Set stone in a bezel setting.
21.04	Set stone in a baguette setting.
21.05	Set stone in a pave setting.
21.06	Set stone in a peg setting.
21.07	Set stone in a tube setting.
21.08	Set stone in a channel setting.
21.09	Restring pearls and stone beads

Florida Department of Education
Student Performance Standards

Course Number: PMT0645
Occupational Completion Point: F
Certified Jeweler/Jewelry Finishing Technician – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
22.0	Apply surface treatment--The student will be able to:
22.01	Identify surface techniques.
22.02	Electroplate jewelry.
22.03	Perform diamond cutting.
22.04	Apply enamel to metal.
22.05	Apply repousse' and chasing techniques.
22.06	Apply engraving techniques.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Suggested Equipment/Tool List
For Certified Watchmaker

This list is adopted from the American Watchmakers-Clockmakers Institute (AWCI) as required for the AWCI Certified Watchmaker Exam. Cleaning machines and solutions should be provided by the school. The brand names mentioned below are used to help identify the tools from the most popular tool catalogs; a student is welcome to choose a brand of his/her choice, as long as it is of comparable or better quality. When more than one type of tool is listed below - this indicates that a student may bring the tool of his/her preference.

R1: Required
R2: Recommended
O: Optional

Description	Bergeon	Other Brands	R1	R2	O
1. Arkansas slip (triangular or square) 85mm x 7mm (approx.)				**X**	
2. Barrel Arbor Holder (slide locking jaws) [a.k.a. sliding pin vise]	30610 Diam. 1.50			**X**	
3. Barrel Arbor Holder (slide locking jaws) [a.k.a. sliding pin vise]	30610 Diam. 1.00			**X**	
4. Barrel closing tool (Cas-Ker)				**X**	
5. Baskets small round, 5 or more (i.e. for L&R cleaning machines)					**X**
6. Basket, small round with screw-on cover for small parts e.g. cap jewels			**X**		
7. Benzene glass jar (small) 60mm (or smaller)				**X**	
8. Bench Block (anvil)				**X**	
9. Broaches (pivot-cutting, hand broaches 0.05mm - 0.20mm)	3008-A		**X**		
10. Brush (small & soft)	1300-6			**X**	
11. Brush, 3 rows, No. 4	1103-4			**X**	
12. Carbide gravers (if not available you may purchase blanks as below)				**X**	
13. Carbide graver blank (1/16” thick or 1.58mm) www.mscdirect.com		04120077	**X**		
14. Casing cushion	5394			**X**	
15. Clear Plexiglas round stick 4mm thick, 6” long (from arts and crafts stores)	-				**X**
16. Cloth (lint-free, e.g. microfiber)				**X**	
17. Dial plastic protection	6938				**X**
18. Dust-lower (rubber)		A.F.18666	**X**		
19. Epilame, (oil repellant)					**X**
20. Escapement meter					**X**
21. ETACHRON regulator adjusting tool		015595			**X**

Description	Bergeon	Other Brands	R1	R2	O
22. ETACHRON stud removing tool		015600			**X**
23. File, rectangular, 150mm(L) x 18.5mm(W) x 4.0mm(T)	500-1163-6			**X**	
24. Hammer (Brass or Brass & Fiber)	30416		**X**		
25. Hands fitting tool/pusher	7404			**X**	
26. Hands press e.g. Horotec or Bergeon (with assorted nylon pushers)					**X**
27. Holder for pallet-fork	30433				**X**
28. Jewelling tool		Horia/Seitz			**X**
29. Knife with case opener	6403		**X**		
30. Leather/Chamois buff 6mm wide (x1)	1282-D				**X**
31. Levers for hairspring collets, 1.7mm			**X**		
32. Levers for hands					**X**
33. Loupe (watchmaker's) 10X	4902-1	Bausch & Lomb	**X**		
34. Loupe (watchmaker's) 3X or 4X	4902-2.5	Bausch & Lomb	**X**		
35. Lubricants may be provided by the school or students may bring their own			**-**	**-**	**-**
36. Lubricant, Moebuis Synth-A-Lube #9010		9010			**X**
37. Lubricant, Moebuis Visco-Lube #9020		9020			**X**
38. Lubricant, Moebuis Pallet fork grease #9415		9415			**X**
39. Lubricant, Microglisse D5		D5			**X**
40. Lubricant, Molykote					**X**
41. Lubricant, Moebius HP1300					**X**
42. Lubricant, P125 Chronogrease					**X**
43. Micrometer (accuracy to within 0.005mm)				**X**	
44. Oilers (plastic handle e.g. Bergeon,) assortment black, red			**X**		
45. Oiler (automatic No. 1A)					**X**
46. Opener (for snap back cases) e.g. Seiko S-282 & S-283 or similar					**X**
47. Pegwood, 3mm	6724-30		**X**		
48. Pegwood, 4mm	6724-40				**X**
49. Pith wood			**X**		

Description	Bergeon	Other Brands	R1	R2	O
50. Pin vise, double-ended (0 - 3.2mm capacity)(stem holding capacity)	5860	58.240	**X**		
51. Pivot drill, 0.25mm to cut balance during poising			**X**		
52. Pliers, assortment of 3	2513				**X**
53. Poising Tool					**X**
54. Presto for removing hands, tool #1 (polish the outer jaw surfaces to a mirror sheen)	30636-1			**X**	
55. Presto for chrono fourth wheel tool #3 (polish the jaw surfaces to a mirror sheen)	30636-3		**X**		
56. Rodico or Rub-off				**X**	
57. Roller table remover (polish the jaw surfaces to a smooth mirror sheen)	2810		**X**		
58. Screwdrivers (watchmakers)			**X**		
59. Stem cutter (end-cutting pliers)			**X**		
60. Tray (with Plexiglas bell) (or any similar tray with clear cover)	3508		**X**		
61. Truing calipers (Levin or “lyre” style)	30548			**X**	
62. Truing caliper					**X**
63. Tweezers, brass AM	1064-AM		**X**		
64. Tweezers, antimagnetic, No. 00 (for cap jewels)				**X**	
65. Tweezers, antimagnetic, No. 5	6671-5		**X**		
66. Tweezers, antimagnetic, No. 3	6671-3		**X**		
67. Tweezers for hands, Teflon coated, or Delrin tipped [thinnest tip]		Fontax/Other		**X**	
68. Watch paper				**X**	
69. Vernier caliper (metric & imperial, or digital)	-				**X**
70. Sealing plastic bags 2” x 2” (clear) approx. 10			**X**		

Tool list updated 3/27/2007 by AWCI.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Boatbuilding - Wood and Fabricated**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I480799
CIP Number	0648079901
Grade Level	30, 31
Standard Length	1350 hours
Teacher Certification	CAB WOODWK @7 7G CARPENTRY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2091 – Fiberglass Laminators and Fabricators 51-7099 – Woodworkers, All Other
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 8 Language: 8 Reading: 8

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 boatbuilding positions.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, fiberglass and marine working skills, mechanical systems, piping systems, electrical systems, and frame and form building. A program may be structured to emphasize either wood or fabricated boatbuilding but does not have to cover both areas comprehensively.

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 six 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0304	Fiberglass Plug Specialist	300 hours	51-2091
B	MTE0305	Fiberglass Technician	300 hours	51-2091
C	MTE0306	Fabrication Specialist	150 hours	51-2091
D	MTE0320	Wooden Boat Technician	150 hours	51-7099
E	MTE0321	Wooden Boat Specialist	150 hours	51-7099
F	MTE0410	Boat Systems Specialist	300 hours	51-7099

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 Apply trade-accepted terminology and safety.
02.0 Perform hand lamination operations
03.0 Perform plug construction operations.
04.0 Perform plug finishing operations.
05.0 Construct molds.
06.0 Repair fiberglass.
07.0 Repair gelcoat.
08.0 Perform fiberglass fabrication operations.
09.0 Perform assembly woodworking operations.
10.0 Perform framing operations.
11.0 Perform millwork operations.
12.0 Perform trim operations.
13.0 Repair wooden boats.
14.0 Apply paint.
15.0 Install mechanical systems.
16.0 Install piping systems.
17.0 Install wiring systems.
18.0 Service mechanical systems.
19.0 Service piping and wiring systems.

Florida Department of Education
Student Performance Standards

Program Title: **Boatbuilding - Wood and Fabricated**
PSAV Number: **I480799**

Course Number: MTE0304
Occupational Completion Point: A
Fiberglass Plug Specialist – 300 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
01.0	Apply trade-accepted terminology and safety--The student will be able to:
01.01	Use curriculum modules.
01.02	Clarify career values.
01.03	Use work schedule and progress chart.
01.04	Use marine and technical terminology.
01.05	Apply shop safety rules.
02.0	Perform hand lamination operations--The student will be able to:
02.01	Properly prepare the work area.
02.02	Identify tools, materials and precautions.
02.03	Lay up mat laminates.
02.04	Lay up woven laminates.
02.05	Lay up directional laminates.
02.06	Apply reinforced structural bonds.
02.07	Cut and grind laminates to specifications.
03.0	Perform plug construction operations--The student will be able to:
03.01	Identify components of line drawings.
03.02	Lay down lines from offsets.
03.03	Pick up body plan.
03.04	Construct patterns and frames.

CTE Standards and Benchmarks	
	03.05 Construct, fasten, and fair stringers.
	03.06 Apply planking material.
04.0	Perform plug finishing operations--The student will be able to:
	04.01 Glaze and sheath plug.
	04.02 Fill and prime plug.
	04.03 Fair plug.
	04.04 Prepare and apply finish coat.
	04.05 Polish finish coat.

Florida Department of Education
Student Performance Standards

Course Number: MTE0305
Occupational Completion Point: B
Fiberglass Technician – 300 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
05.0	Construct molds--The student will be able to:
05.01	Prepare plug for mold lamination.
05.02	Gel and skin mold.
05.03	Laminate mold.
05.04	Brace and pull mold.
05.05	Prepare mold for first use.
05.06	Construct molds for vacuum infusion.
06.0	Repair fiberglass--The student will be able to:
06.01	Install point loads and stiffeners.
06.02	Repair laminates.
06.03	Renew bottom paint.
06.04	Perform composite laminate repairs
07.0	Repair gelcoat--The student will be able to:
07.01	Identify tools, materials and precautions.
07.02	Sand and buff gelcoat.
07.03	Repair gelcoat with putty.
07.04	Repair gelcoat with spray equipment.
07.05	Maintain spray equipment.

Florida Department of Education
Student Performance Standards

Course Number: MTE0306
Occupational Completion Point: C
Fabrication specialist – 150 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
08.0	Perform fiberglass fabrication operations--The student will be able to:
08.01	Operate chop gun.
08.02	Prepare and apply bonding putty.
08.03	Identify and apply core materials.
08.04	Fabricate parts by vacuum molding.
08.05	Prepare mold for gelcoat.
08.06	Operate gel gun.
08.07	Pull parts.
08.08	Repair molds.
08.09	Maintain molds.
08.10	Repair and maintain gel and chopper guns as well as safety equipment.

Florida Department of Education
Student Performance Standards

Course Number: MTE0320
Occupational Completion Point: D
Wooden Boat Technician – 150 Hours – SOC Code 51-7099

CTE Standards and Benchmarks	
09.0	Perform assembly woodworking operations--The student will be able to:
09.01	Level hull and set up crossbeams.
09.02	Fabricate and install sub-sole components.
09.03	Fabricate and install sole.
09.04	Construct router, shaper, and tracing patterns.
09.05	Cut bulkheads from patterns.
09.06	Construct straight moldings and posts.
09.07	Construct turned corner moldings and posts.
09.08	Construct solid and laminated curved moldings.
09.09	Construct curved moldings and parts.
10.0	Perform framing operations--The student will be able to:
10.01	Use frame plans and tools.
10.02	Layout dimensions from plans.
10.03	Fit bulkheads.
10.04	Fit faces and tops.
11.0	Perform millwork operations--The student will be able to:
11.01	Operate router and shaper.
11.02	Operate table saw and radial arm saw.
11.03	Fabricate cabinetry from plans.
11.04	Apply plastic laminates to cabinetry.

CTE Standards and Benchmarks	
	11.05 Operate jointer and surface planer.
	11.06 Operate band saw.
12.0	Perform trim operations--The student will be able to:
	12.01 Identify tools and precautions.
	12.02 Identify and apply flat trim moldings.
	12.03 Identify and apply cap and corner moldings.
	12.04 Hang compartment door.
	12.05 Install hull-side paneling.
	12.06 Install cabinet doors and drawers.

Florida Department of Education
Student Performance Standards

Course Number: MTE0321
Occupational Completion Point: E
Wooden Boat Specialist – 150 Hours – SOC Code 51-7099

CTE Standards and Benchmarks	
13.0	Repair wooden boats--The student will be able to:
13.01	Identify wooden boat construction types.
13.02	Repair plank-on-frame construction.
13.03	Use epoxy resin in restoration/repair.
13.04	Maintain wooden boats.
14.0	Apply paint--The student will be able to:
14.01	Identify materials and precautions.
14.02	Repair/prepare surface.
14.03	Apply and prepare primer.
14.04	Apply masking and pull tapes.
14.05	Apply paint with spray equipment.
14.06	Maintain equipment

Florida Department of Education
Student Performance Standards

Course Number: MTE0410
Occupational Completion Point: F
Boat Systems Specialist – 300 Hours – SOC Code 51-7099

CTE Standards and Benchmarks	
15.0	Install mechanical systems--The student will be able to:
15.01	Identify tools and precautions.
15.02	Fabricate and install machinery foundations.
15.03	Install engine and shaft line.
15.04	Install mechanical and hydraulic steering.
15.05	Install deck hardware.
15.06	Understand design blueprints
16.0	Install piping systems--The student will be able to:
16.01	Identify tools, materials, and precautions.
16.02	Install through-hull devices.
16.03	Install bilge pump.
16.04	Install tank supports and tank.
16.05	Install hand pump water system.
16.06	Install pressurized water system.
16.07	Install PVC-slip drain system.
16.08	Install engine cooling and exhaust.
16.09	Install fuel systems.
16.10	Install and understand check valves
17.0	Install wiring systems--The student will be able to:
17.01	Identify tools, materials, and precautions.

CTE Standards and Benchmarks	
	17.02 Install batteries.
	17.03 Select DC conductor size.
	17.04 Install DC service equipment.
	17.05 Install DC lighting and motor circuits.
	17.06 Install starting and charging circuits.
	17.07 Install bonding and cathodic protection.
	17.08 Install AC service equipment.
	17.09 Install AC lighting and receptacle circuits.
	17.10 Install on-board generator.
	17.11 Use Multi-meter to check AC, DC, and bonding circuits
18.0	Service mechanical systems--The student will be able to:
	18.01 Perform routine engine service.
	18.02 Maintain hydraulic steering systems.
	18.03 Repair and maintain mechanical steering.
	18.04 Inspect mast, boom, and rigging.
	18.05 Repair rigging.
19.0	Service piping and wiring systems--The student will be able to:
	19.01 Maintain and repair portable water systems.
	19.02 Maintain and repair fuel systems.
	19.03 Install and maintain sewage systems.
	19.04 Troubleshoot DC systems.
	19.05 Troubleshoot AC systems.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 8.0, Language 8.0, and Reading 8.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Boat and Yacht Repair/Refinishing Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	I490316
CIP Number	0647061601
Grade Level	30, 31
Standard Length	1350 hours
Teacher Certification	SEAMANSHIP 7G CARPENTRY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2091 – Fiberglass Laminators and Fabricators 47-3019 – Helpers, Construction Trades, All Other
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 boat and yacht repair and refinishing positions.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices as marine painter/refinisher, marine carpenter, marine mechanical systems technician or marine welder/fabricator. A program may be structured to emphasize one of the course areas but does not have to cover all areas comprehensively.

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 three 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0360	Helper, Boat Repairer/Refinishing	300 hours	47-3019
B	MTE0361	Boat Refinishing Technician	300 hours	51-2091
C	MTE0376 MTE0377	Boat Repairer 1 Boat Repairer 2	450 hours 300 hours	51-2091

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 Describe different types of marine manufacturing industries.
02.0 Demonstrate basic skills in the different types of marine trades and occupations.
03.0 Demonstrate proficiency in preparing surfaces and applying marine paint finishes.
04.0 Demonstrate proficiency in preparing surfaces and refinishing fiberglass.
05.0 Demonstrate proficiency in marine terminology.
06.0 Demonstrate proficiency in safety practices in marine occupations.
07.0 Demonstrate the ability to properly handle lines and related operations in securing a vessel.
08.0 Demonstrate proficiency in coordinating the manufacturing, repair and refinishing operations in the marine industry.
09.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
10.0 Explain the importance of employability and entrepreneurship skills.
11.0 Demonstrate personal money-management concepts, procedures, and strategies.

Florida Department of Education
Student Performance Standards

Program Title: **Boat and Yacht Repair/Refinishing Technology**
PSAV Number: **I490316**

Course Number: MTE0360
Occupational Completion Point: A
Helper, Boat Repairer/Refinishing – 300 Hours – SOC Code 47-3019

CTE Standards and Benchmarks	
01.0	Describe different types of marine manufacturing industries--The student will be able to:
01.01	Explain the process of manufacturing motor yachts.
01.02	Explain the process of manufacturing sailboats.
01.03	Explain the process of manufacturing small powerboats.
01.04	Explain the process of manufacturing center console boats.
01.05	Explain the process of manufacturing of commercial workboats.
02.0	Demonstrate basic skills in the different types of marine trades and occupations--The student will be able to:
02.01	Describe the occupational requirements of a boat finisher/painter.
02.02	Perform basic occupational requirements of a marine carpenter.
02.03	Perform basic occupational requirements of a marine mechanical installer.
02.04	Perform basic occupational requirements of a marine welder fabricator.
03.0	Demonstrate proficiency in preparing surfaces and applying marine paint finishes--The student will be able to:
03.01	Prepare wood surfaces for painting.
03.02	Prepare aluminum surfaces for painting.
03.03	Prepare steel surfaces for painting.
03.04	Apply paint to surfaces by brush.
03.05	Apply paint to surfaces by spray gun.

Florida Department of Education
Student Performance Standards

Course Number: MTE0361
Occupational Completion Point: B
Boat Refinishing Technician – 450 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
04.0	Demonstrate proficiency in preparing surfaces and refinishing fiberglass--The student will be able to:
04.01	Prepare raw fiberglass surfaces for painting.
04.02	Repair and refinish fiberglass surfaces.
05.0	Demonstrate proficiency in marine terminology--The student will be able to:
05.01	Use correct marine terminology.
05.02	Use correct marine technical terminology.
06.0	Demonstrate proficiency in safety practices in marine occupations--The student will be able to:
06.01	Demonstrate the safe use of hand tools in marine occupations.
06.02	Demonstrate the safe use of power tools in marine occupations.
06.03	Demonstrate the safe use of paints, chemicals, fiberglass and compounds.
06.04	Demonstrate the safe use of electrical connectors, cords and tools.
06.05	Apply shop safety rules.

Florida Department of Education
Student Performance Standards

Course Number: MTE0376
Occupational Completion Point: C (1 of 2)
Boat Repairer – 450 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
07.0	Demonstrate the ability to properly handle lines and related operations in securing a vessel--The student will be able to:
07.01	Demonstrate the use of, a minimum of eight (8), correct nautical knots used in securing a vessel.
07.02	Identify the current terminology of lines.
07.03	Demonstrate slowing a vessel in dock.
07.04	Place fenderboards to protect a vessel
07.05	Connect ancillary services to a moored vessel.
07.06	Demonstrate blocking and supporting a vessel for repair in a work yard.
07.07	Demonstrate two common methods of splicing.

Course Number: MTE0377
Occupational Completion Point: C (2 of 2)
Boat Repairer – 300 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
08.0	Demonstrate proficiency in coordinating the manufacturing, repair and refinishing operations in the marine industry--The student will be able to:
08.01	Perform different basic types of work processes.
08.02	Identify the sequential order of work processes.
08.03	Demonstrate the ability to coordinate the work processes in the boatyard-manufacturing environment.
08.04	Demonstrate the ability to coordinate the work processes in the boatyard-refurbishing environment.
09.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

CTE Standards and Benchmarks	
	09.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
	09.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
	09.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
	09.04 Employ mentoring skills to inspire and teach others. LT5.0
10.0	Explain the importance of employability and entrepreneurship skills--The students will be able to:
	10.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
	10.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
	10.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
	10.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
	10.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
	10.06 Identify and exhibit traits for retaining employment. ECD7.0
	10.07 Identify opportunities and research requirements for career advancement. ECD8.0
	10.08 Research the benefits of ongoing professional development. ECD9.0
	10.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
11.0	Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
	11.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
	11.02 Describe the effect of money management on personal and career goals. FL3.0
	11.03 Develop a personal budget and financial goals. FL3.1
	11.04 Complete financial instruments for making deposits and withdrawals. FL3.2
	11.05 Maintain financial records. FL3.3
	11.06 Read and reconcile financial statements. FL3.4
	11.07 Research, compare and contrast investment opportunities.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Automation and Production Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J100100
CIP Number	0615040603
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	AUTO PROD 7G ENG 7G ELECTRONIC @7 7G TECH ED 1 @ 2
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2022 – Electrical and Electronic Equipment Assemblers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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 Automation and Production positions.

The content includes but is not limited to providing students with a foundation of knowledge and technically oriented experiences in the study of automation technology, its application in manufacturing, engineering and robotics, and its effect upon our lives and the choosing of an occupation. The content and activities will also include the study of enterprise systems, safety, quality, and leadership skills. This program focuses on transferable skills and stresses understanding and demonstration of the technological tools, machines, instruments, materials, processes and systems in business and industry.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0481	Production Worker	150 hours	51-2022
B	ETI0482	Assembler	150 hours	51-2022
C	ETI0484	Process Assistant	150 hours	51-2022
D	ETI0485	Automation and Production Technician	150 hours	51-2022

National Standards

Programs identified as having Industry or National Standards have been crosswalked with the corresponding standards and/or benchmarks. Industry or National Standards for the Automation and Production Technology program can be found using the following link:

http://www.msscusa.org/production-certification-cpt/

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 an understanding of the core concepts of technology.
02.0 Demonstrate an understanding of the influence of technology on history as well as its cultural, social, economic, and political effects.
03.0 Demonstrate an understanding of the attributes of engineering design.
04.0 Demonstrate an understanding of employability skills and career opportunities in the fields of advanced manufacturing and engineering technologies.
05.0 Demonstrate an understanding of workplace safety and workplace organization.
06.0 Demonstrate an understanding of mechanisms.
07.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
08.0 Demonstrate an understanding of thermal technology.
09.0 Demonstrate an understanding of communication and workplace computer skills.
10.0 Demonstrate the ability to read and interpret blueprints and schematics.
11.0 Demonstrate proficiently in the use of quality assurance methods and quality control concepts.
12.0 Demonstrate an understanding of modern business practices and enterprise systems.
13.0 Demonstrate an understanding of graphic design by generating and interpreting computer-aided drawings.
14.0 Demonstrate proficiency in using measurement tools, instruments and testing devices related to proper quality assurance methods.
15.0 Demonstrate a fundamental understanding of AC/DC electrical and electrical control.
16.0 Demonstrate an understanding of fluid power.
17.0 Demonstrate the abilities to use and maintain technological products and systems.
18.0 Demonstrate an understanding of and be able to select production processes.
19.0 Demonstrate an understanding of industrial tools and processes inclusive of: Basic Machine Tools, CNC machines, and Welding technology.
20.0 Demonstrate an understanding of computer aided manufacturing and flexible manufacturing planning and control.
21.0 Demonstrate proficiency in computer control and robotics.
22.0 Demonstrate the ability to properly identify, organize, plan, allocate resources, document and produce a mass-produced product via a master project.

Florida Department of Education
Student Performance Standards

Program Title: **Automation and Production Technology**
PSAV Number: **J100100**

Course Number: ETI0481
Occupational Completion Point: A
Production Worker – 150 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Demonstrate an understanding of the core concepts of technology--The student will be able to:	
01.01	Illustrate the nature and development of technological knowledge and processes.	
01.02	Discuss and evaluate current technological developments that are/were driven by profit motive and the market.	
01.03	Identify new technologies that create new processes.	
01.04	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	
01.05	Identify and compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste.	
01.06	Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems	
01.07	Define a management system as the process of planning, organizing, and controlling work.	
01.08	Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems.	
01.09	Outline complex systems that have many layers of controls and feedback loops to provide information.	
01.10	Explain technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields	
02.0	Demonstrate an understanding of the influence of technology on history as well as its cultural, social, economic, and political effects--The student will be able to:	
02.01	Discuss the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	
02.02	Define the following "Ages" to show the progression and their impact on society: Iron Age, Middle Ages, Renaissance, Industrial Revolution, and the Information Age.	

CTE Standards and Benchmarks		National Standards
02.03	Assess how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	
02.04	List trade-offs of developing technologies to reduce the use of resources.	
02.05	Identify and discuss ethical considerations important in the development, selection, and use of technologies.	
02.06	Select technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling.	
02.07	Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment.	
02.08	Identify and assess technologies devised to reduce the negative consequences of other technologies.	
02.09	Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	
03.0	Demonstrate an understanding of the attributes of engineering design--The student will be able to:	
03.01	Describe the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	
03.02	Restate design problems that are seldom presented in a clearly defined form.	
03.03	Check and critique a design, and improve and revise the idea of the design as needed.	
03.04	Analyze competing requirements of a design, such as criteria, constraints, and efficiency.	
03.05	Identify design principles to include, but not limited to, Design for Manufacturing (DFM) used to evaluate existing designs, to collect data, and to guide the design process.	
03.06	Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	
03.07	Describe the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process.	
03.08	Apply the design process to construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments.	
04.0	Demonstrate an understanding of employability skills and career opportunities in the fields of advanced manufacturing and engineering technologies--The student will be able to:	
04.01	Demonstrate knowledge of good workplace behavior and how to address improper workplace behavior.	
04.02	Discuss motivation and human behavior.	
04.03	Develop a personal stress management plan.	

CTE Standards and Benchmarks		National Standards
04.04	Demonstrate knowledge of ways to improve reading, listening and writing skills.	
04.05	Demonstrate knowledge of techniques for making effective presentations to internal and external customers.	
04.06	Use different forms of communication, such as e-mail, fax and phones.	
04.07	Provide effective feedback and make suggestions.	
04.08	Demonstrate appropriate customer service skills and techniques.	
04.09	Explain the characteristics of a high-performance team and how to assess team member personality types.	
04.10	Engage in team activities such as a team icebreaker exercise, developing a team constitution, brainstorming session, and reaching a decision by consensus.	
04.11	Demonstrate knowledge of roles and responsibilities of production team members.	
04.12	Align team goals (that are specific, documented, measurable and achievable) to customer and business production needs.	
04.13	Communicate production and process information to team members.	
04.14	Organize a team to: construct and analyze a flow chart, construct a fishbone diagram, use a criteria screen to make a decision, use an impact/effort grid to make a decision, use multi-voting to make a decision, manually construct a Pareto chart.	
05.0	Demonstrate an understanding of workplace safety and workplace organization--The student will be able to:	
05.01	Locate and use Material Safety Data Sheets (MSDS).	
05.02	Demonstrate knowledge of first aid or first response procedures.	
05.03	Identify safety procedures in case of smoke or chemical inhalation.	
05.04	Demonstrate knowledge of material handling techniques to safely move materials.	
05.05	Demonstrate the proper techniques for lifting loads.	
05.06	Demonstrate knowledge of safety requirements for material handling equipment such as forklifts, cranes, rigging, and pry trucks.	
05.07	Demonstrate knowledge of safety requirements for platforms, manlifts, and ladders.	
05.08	Proactively respond to a safety concern and then document occurrences.	
05.09	Demonstrate knowledge of emergency exits and signage.	
05.10	Demonstrate knowledge of various emergency alarms and procedures.	
05.11	Perform emergency drills and participate in emergency teams.	

CTE Standards and Benchmarks	National Standards
05.12 Demonstrate knowledge of clean-up procedures for spills.	
05.13 Explain Lock Out/Tag Out requirements and procedures.	
05.14 Demonstrate knowledge of machinery and equipment safety functions to determine if all safeguards are operational.	
05.15 Identify procedures for handling hazardous material.	
05.16 Develop safety checklists.	
05.17 Identify and report unsafe conditions.	
05.18 Determine the appropriate corrective action after an unsafe condition is identified.	
05.19 Demonstrate knowledge of safety requirements for manual, electrical-powered, and pneumatic tools.	
05.20 Demonstrate knowledge of safety requirements for operation of automated machines.	
05.21 Perform safety and environmental inspections.	
05.22 Skill in performing leak checks to determine if toxic or hazardous material is escaping from a piece of equipment.	
05.23 Demonstrate knowledge of proper and safe installation techniques as described in manuals, checklists, and regulations.	
05.24 Demonstrate knowledge of equipment shutdown procedures.	
05.25 Identify-safety related maintenance procedures.	
05.26 Selecting and use personal protective equipment (PPE).	
05.27 Explain the safety benefits of 6S work environment.	
05.28 Demonstrate knowledge of ergonomic impact of work techniques.	
05.29 Train other personnel to use equipment safely.	
06.0 Demonstrate an understanding of mechanisms--The student will be able to:	
Levers and Linkages	
06.01 For the relation (m, w) calculate the weights (range) of objects given mass (domain) of objects.	
06.02 Calculate the compression rate of a spring using Hooke’s Law.	
06.03 Use a spring scale to measure the weight of an object and the force on an object.	
06.04 Calculate torque given an application.	
06.05 Calculate the moment caused by a force.	

CTE Standards and Benchmarks	National Standards
06.06 Calculate and measure the mechanical advantage of a first-class, second-class, and third-class lever.	
06.07 Calculate the coefficient of friction given application data.	
06.08 Measure the force required to overcome friction in different applications.	
06.09 Calculate and measure the mechanical advantage of an inclined plane	
06.10 Connect and operate a slider crank linkage.	
06.11 Connect and operate a double rocker linkage.	
06.12 Connect and operate a crank rocker linkage.	
06.13 Connect and operate a cam and cam follower.	
06.14 Measure the velocity and dwell of a cam.	
06.15 Connect and operate a turnbuckle.	
Power Transmission Systems	
06.16 Use a spirit level to determine orientation of a surface.	
06.17 Select a fastener size and type for a motor mount and correct for a soft foot condition.	
06.18 Level an electric motor.	
06.19 Select a key size for a given application.	
06.20 Measure the actual size of a key and keyseat given a sample.	
06.21 Assemble a hub to a shaft using a key fastener.	
06.22 Use a digital tachometer to measure motor speed.	
06.23 Use a prony brake to measure shaft torque.	
06.24 Calculate rotary mechanical power.	
06.25 Identify shaft size given a sample.	
06.26 Install and adjust a pillow block antifriction bearing and shaft.	
06.27 Install a flexible jaw coupling.	
06.28 Align two shafts using a straight edge and feeler gage.	
Pulley Systems and Gear Drives	
06.29 Measure the mechanical advantage of a fixed pulley.	

CTE Standards and Benchmarks	National Standards
06.30 Measure the mechanical advantage of a movable pulley.	
06.31 Calculate and measure the mechanical advantage of a pulley combination.	
06.32 Connect and operate a gear drive system.	
06.33 Calculate and measure the mechanical advantage of a gear drive.	
V-belt Drives	
06.34 Calculate pulley ratio.	
06.35 Calculate the shaft speed and torque of a belt drive system.	
06.36 Install and align a fractional HP V-belt drive with a finished bore.	
06.37 Determine the belt deflection force for a given application.	
06.38 Adjust belt tension using an adjustable mounting base.	
06.39 Use a belt tension tester to measure belt tension.	
Chain Drives	
06.40 Calculate sprocket ratio.	
06.41 Calculate the shaft speed and torque of a chain drive system.	
06.42 Install and align a roller chain drive system with adjustable centers.	
06.43 Determine allowable chain sag for a given application.	
06.44 Use a rule and a straight edge to measure chain sag.	
06.45 Adjust chain sag to a specified amount using adjustable centers.	
06.46 Install and remove a chain with a master link.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0482
Occupational Completion Point: B
Assembler – 150 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
07.0	Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving--The student will be able to:	
07.01	Define research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	
07.02	Conduct research and development to prepare a prototype devices, product or systems for the marketplace.	
07.03	Identify and conduct research needed to solve technological problems.	
07.04	Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.	
07.05	Utilize a multidisciplinary approach to solving technological problems.	
08.0	Demonstrate an understanding of thermal technology--The student will be able to:	
08.01	Measure temperature and convert between temperature scales.	
08.02	Calculate the change in length of a material given a change in temperature using the slope intercept and standard form of the equation expression this relationship.	
08.03	Calculate the change in volume of a material given a temperature change.	
08.04	Convert between Energy units.	
08.05	Calculate the change in internal energy of a substance given its temperature change.	
08.06	Calculate gas properties using the Ideal Gas Law.	
08.07	Determine the effectiveness of an insulation system.	
08.08	Analyze a system using the first law of thermodynamics.	
08.09	Measure the relative humidity and calculate the dew point of the air.	
09.0	Demonstrate an understanding of communication and workplace computer skills--The student will be able to:	
09.01	Write logical and understandable statements, or phrases, to accurately complete forms commonly used in business and industry.	

CTE Standards and Benchmarks		National Standards
09.02	Read and understand graphs, charts, diagrams, and common table formats.	
09.03	Read and follow written instructions.	
09.04	Demonstrate knowledge of technical language and technical acronyms.	
09.05	Use a spreadsheet application to open, view, enter, and format data.	
09.06	Create formulas in a spreadsheet application to manipulate data.	
09.07	Create a chart in a spreadsheet application to represent linear and quadratic equations.	
09.08	Use a sword processing application to open, view, create and save a new document.	
09.09	Create a writing sample such as a business letter, memo, or technical report.	
09.10	Create a presentation outline.	
09.11	Create and deliver a short presentation using a presentation application.	
09.12	Use a browser to go to and navigate a Web site.	
09.13	Download a file from a Web site.	
09.14	Use E-mail to send and receive a message with attachments.	
09.15	Use an internet search engine to research a topic.	
10.0	Demonstrate the ability to read and accurately interpret blueprints and schematics–The student will be able to:	
10.01	Define basic blueprint terminology such as title block, border, views, notes, revision blocks, etc. In addition, the individual will recognize the intent of the drawing and its use in manufacturing.	
10.02	Differentiate between dimensions of location and size. These dimensions may be represented as ordinate, base line, tabular, etc.	
10.03	Interpret Linear, Circular, and Angular dimension features on a print.	
10.04	Identify general note symbols and their applications within a manufacturing environment. Examples of symbols include finishing requirements, material specifications, machining/manufacturing specifications, assembly symbols, ANSI symbols, ISO symbols, etc.	
10.05	Locate notes on a print using industry standards, using three drawings with two minutes per note and 100% accuracy.	
10.06	Interpret commonly used abbreviations and terminology used on prints in the manufacturing environment.	
10.07	Determine tolerances associated with dimensions on a drawing.	
10.08	Determine if a part dimension is within tolerance using conventional tolerancing.	
10.09	Calculate the limits of a dimension given its tolerance.	

CTE Standards and Benchmarks		National Standards
10.10	Determine a dimension of an object given an undimensioned scaled drawing.	
10.11	Identify types of lines within a drawing. Examples include hidden lines, object lines, extension lines, and section lines. Individuals should read various drawings and identify lines with 100% accuracy.	
10.12	Interpret the following information from a blueprint title block: company name, part name and number, material, name of designer and checker, revision history, and other important information regarding the part.	
10.13	Recognize the changes through which the design has progressed from the original design. Interpret the meaning of the revision block symbols and notations. Match the revision block components with the actual drawing features.	
10.14	Check for revisions. Given a series of drawings, some of which contain revisions and proper notation, properly identify which ones are the most current revisions, and identify which drawings do not contain revisions.	
10.15	Identify orthographic views. Recognize the three basic views which may be represented on the drawing; front, top, right side. Identify if the print is drawn in first or third angle projection. Detect features represented in one view and find those same features in another view.	
10.16	Identify isometric views. On a drawing containing orthographic and isometric, properly identify the isometric view.	
10.17	Identify positions of views: top, front, side, auxiliary, and section. Given an orthographic drawing, identify all appropriate views according to their position or placement on print. Or, given an actual part, the individual will be able to match the views to the appropriate surfaces.	
10.18	Determine the scale of the view or section. Based on the title block information, physical scaling of view, and standard drawing scale, determine appropriate scale of view or section.	
10.19	Identify the size and type of fasteners used in an assembly drawing.	
11.0	Demonstrate proficiency in the use of quality assurance methods and quality control concepts–The student will be able to:	
11.01	Demonstrate knowledge of quality systems such as Statistical Process Control (SPC), Six Sigma, Total Quality Management (TQM), and International Standards Organization (ISO) 9000.	
11.02	Selecting and use quality systems to identify problems and record quality issues.	
11.03	Demonstrate knowledge of statistics for making accurate decisions about quality data.	
11.04	Demonstrate knowledge of various statistical quality tools such as histograms, Cpk, X bar and R charts, and range.	
11.05	Create control charts (e.g., variables and attributes) using linear relationships and properties of parallel lines.	
11.06	Record and analyze quality issues in the production process, using tools such as Root Cause Failure Analyses (RCFA).	
11.07	Use Pareto analysis to identify priorities for solving multiple sub–standard product problems.	

CTE Standards and Benchmarks		National Standards
11.08	Determining accuracy and precision when using measuring equipment.	
11.09	Demonstrate knowledge of performance indicators that can be readily understood by operators.	
11.10	Demonstrate knowledge of how to use inspection tools, equipment and procedures.	
11.11	Use and convert both U.S. measurement and standard international metric systems using precision measurement tools such as: a machinist's rule, tape measure, caliper, micrometer, digital gage, pH meter, and thermometer.	
11.12	Demonstrate knowledge of inspection equipment calibration standards and requirements.	
11.13	Verify calibration of inspection equipment.	
11.14	Demonstrate knowledge of appropriate automated inspection system.	
11.15	Demonstrate knowledge of maintaining and storing inspection tools.	
11.16	Develop records on quality process which are maintained to appropriate standards.	
11.17	Chart outcomes of quality processes according to appropriate methods and standards.	
11.18	Demonstrate knowledge of the importance of accurate and precise data for quality process performance.	
11.19	Analyze quality process performance data to identify trends.	
11.20	Report quality process performance data to appropriate parties in a timely manner.	
11.21	Identify/report performance and training issues affecting quality.	
11.22	Examine previous documentation on similar process issues to identify possible solutions.	
11.23	Recommend actions that are clear, concise and supported by data.	
11.24	Identify follow-up activities that indicate that corrective action was taken.	
11.25	Document product quality following corrective action and identify documentation and records transmittal required for customers.	
11.26	Identify the circumstances for prompt corrective actions related to product quality or the health or safety of workers.	
11.27	Determine disposition of sub-standard product.	
11.28	Implement closed-loop corrective action follow-up: spot checks, quality documentation, and an audit to optimize the outcomes of the corrective steps.	
11.29	Describe and explain the concepts of Lean Manufacturing.	
11.30	Identify and apply value stream mapping, just-in-time procedures, and techniques of continual improvement.	
11.31	Describe the changes necessary in implementing waste-free manufacturing (WFM) in a lean environment.	

CTE Standards and Benchmarks		National Standards
11.32	Describe and explain supply chain management.	
11.33	Describe and explain the use of the 6S's, (sort, set in order, shine, standardize, sustain, safety).	
12.0	Demonstrate an understanding of modern business practices and enterprise systems--The student will be able to:	
12.01	Use the Internet to find economic statistics.	
12.02	Use the Internet to find commodity price data.	
12.03	Use a spreadsheet application to analyze economic data.	
12.04	Select materials and process for a product using cost as a factor.	
12.05	Interpret a Bill of Materials.	
12.06	Create a Bill of Materials for a product given a sample.	
12.07	Use a spreadsheet to create a bill of materials for a product.	
12.08	Demonstrate knowledge of the alignment of a company's business objectives with production goals.	
12.09	Describe the importance of entrepreneurship to the American economy.	
12.10	Identify the necessary personal characteristics of a successful entrepreneur.	
12.11	Identify the business skills needed to operate a small business efficiently and effectively.	
12.12	Identify the key elements of a business plan and apply them in the creation of a business plan.	
12.13	Evaluate and justify decisions based on ethical reasoning.	
12.14	Identify and explain personal and organizational consequences of unethical or illegal behaviors in the workplace.	
12.15	Interpret and explain written organizational policies and procedures.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0484
Occupational Completion Point: C
Process Assistant – 150 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
13.0	Demonstrate an understanding of graphic design by generating and interpreting computer-aided drawings--The student will be able to:	
13.01	Create a sketch of an object.	
13.02	Sketch a multiview drawing with dimensions given an isometric drawing.	
13.03	Select the front view of an object.	
13.04	Use a CAD System to open and change the views of CAD drawings.	
13.05	Use a CAD system to identify points in Absolute, Relative, and Polar coordinates.	
13.06	Use standard CAD commands (such as: Grid, Snap, Array, Erase, Trim Break, Hatch) in the editing of a drawing.	
13.07	Create a drawing with a title block using CAD drawing commands.	
13.08	Plot (Print) a CAD System drawing to a specific scale.	
13.09	Use CAD software to create a single view drawing.	
13.10	Use CAD software to create a multiview drawing.	
13.11	Use CAD software to dimension a drawing.	
13.12	Print a CAD drawing to a specific scale.	
13.13	Use a CAD system to create an electrical schematic of a process.	
13.14	Use a CAD system to create a piping schematic of a process.	
13.15	Use a CAD system to create a schematic symbol library.	
13.16	Use CAD to create a full sectional view for an object.	
13.17	Use CAD to create a bent sectional view for an object.	
13.18	Use CAD to create an offset sectional view for an object.	

CTE Standards and Benchmarks		National Standards
13.19	Sketch an internal thread using the simplified method of thread representation.	
13.20	Sketch an external thread using the simplified method of thread representation.	
13.21	Use a CAD system to draw a thread representation.	
13.22	Use the UCS command to create a custom 3D coordinate system orientation.	
13.23	Create a 3D object using 3D drawing commands.	
13.24	Open and change the view of a solid model.	
13.25	Add features (such as: extruded cut, fillet, chamfer, revolved boss/base, revolved cut) to a solid model.	
14.0	Demonstrate proficiency in using measurement tools, instruments and testing devices related to proper quality assurance methods--The student will be able to:	
14.01	Use appropriate measurement tools such as: machinist's rule, tape measure, caliper, digital caliper, outside micrometer, and dial indicator.	
14.02	Convert between common fraction inches and decimal inches.	
14.03	Calibrate a dial caliper.	
14.04	Master a dial indicator.	
14.05	Implement appropriate testing regimes.	
14.06	Use appropriate safety monitoring and testing equipment.	
14.07	Use multi-gauging to inspect, verify, and document whether product dimensions meet customer requirements.	
14.08	Research measurement tools for non-mechanical systems and products. (i.e. pH, °Brix)	
15.0	Demonstrate a fundamental understanding of AC/DC electrical and electrical control--The student will be able to:	
15.01	Demonstrate knowledge of AC/DC theory.	
15.02	Check electrical components for UL and CSA approval.	
15.03	Use an AC tester to check a wall outlet for electricity.	
15.04	Use appropriate grounding techniques.	
15.05	Connect and operate a power supply.	
15.06	Connect and operate a circuit using some combination of the following elements: three types of manual switches, a resistor, a buzzer, a solenoid, a motor.	
15.07	Use a Digital Multi-Meter (DMM) to measure the voltage of a point referenced to ground, voltage drops in series and parallel circuits, electrical current, current in series and parallel circuits, resistance of a component, resistance in series and parallel circuits, and test the continuity of wires.	

CTE Standards and Benchmarks	National Standards
15.08 Calculate series resistance given each load's resistance.	
15.09 Use Ohm's Law to calculate voltage, current, and resistance in a series circuit.	
15.10 Calculate the total power used by a series circuit.	
15.11 Calculate the main line current in a parallel circuit.	
15.12 Calculate the total parallel resistance.	
15.13 Calculate the total power used in a parallel circuit.	
15.14 Operate a circuit using a fuse, test and replace a fuse.	
15.15 Operate a circuit using a circuit breaker, test and reset a circuit breaker.	
15.16 Connect and operate a relay in a circuit.	
15.17 Calculate the total load on an AC circuit with inductors.	
15.18 Discharge a capacitor.	
15.19 Test a capacitor with a DMM.	
15.20 Measure the voltage across a charged capacitor.	
15.21 Calculate the total load on an AC circuit with capacitors.	
15.22 Calculate the time to charge and discharge a capacitor.	
15.23 Trace the current path in a combination circuit.	
15.24 Solve a combination circuit.	
15.25 Connect and operate a basic lighting circuit, a ceiling fan circuit, and a rheostat as a light dimmer.	
15.26 Design, connect, and operate a voltage divider network.	
15.27 Locate a short circuit and an open circuit.	
15.28 Size, connect, and operate a transformer.	
15.29 Calculate the secondary coil voltage of a transformer.	
15.30 Troubleshoot a transformer by measuring continuity.	
15.31 Calculate the current load on a transformer.	
15.32 Design a control transformer circuit to provide a given output voltage.	
15.33 Read and interpret the operation of a circuit given a ladder diagram.	

CTE Standards and Benchmarks	National Standards
15.34 Connect and operate a logic circuit given a ladder diagram.	
15.35 Design a ladder diagram using one or more logic elements.	
15.36 Design, connect, and operate a control circuit to operate a solenoid valve.	
15.37 Read and interpret a basic ladder diagram with detached symbology.	
15.38 Design, connect, and operate a relay to energize a fluid power solenoid.	
15.39 Connect and operate a relay to perform a seal-in function.	
15.40 Connect and operate an event sequencing circuit given a ladder diagram.	
15.41 Design a logic circuit that uses a limit switch to sequence an event.	
15.42 Connect and operate a single-cycle cylinder reciprocation circuit.	
15.43 Connect and operate a continuous-cycle cylinder reciprocation circuit.	
15.44 Design a continuous-cycle cylinder reciprocation circuit with a safety interlock.	
15.45 Connect and operate a control circuit with a timer relay.	
15.46 Connect and operate a control circuit to perform an unloaded start of a motor.	
15.47 Design a control circuit to perform time-driven sequencing.	
15.48 Connect and operate a dual-cylinder control circuit using two limit switches.	
15.49 Design a continuous-cycle multiple-cylinder circuit.	
15.50 Connect and operate a circuit having both automatic and manual modes of operation.	
15.51 Connect and operate a control circuit to simulate a two-pushbutton jog circuit.	
16.0 Demonstrate an understanding of fluid power--The student will be able to:	
Pneumatic Circuits and Power Systems	
16.01 Identify pneumatic symbols.	
16.02 Read a pneumatic pressure gage and flow meter.	
16.03 Calculate the extension force of a cylinder given its size and pressure.	
16.04 Determine the pressure needed to create a known output force on an extending cylinder.	
16.05 Measure the force output of an extending cylinder.	
16.06 Calculate the retraction force of a cylinder given its size and pressure.	

CTE Standards and Benchmarks	National Standards
16.07 Convert between gage and absolute pressures.	
16.08 Use Boyle's Law to calculate changes in pressure and volume.	
16.09 Convert air volumes at pressures to free air volumes.	
16.10 Measure pressure drop (Delta P) across pneumatic components.	
16.11 Connect equipment and perform basic pneumatic operations such as: adjust a pressure regulator, drain a pneumatic filter, uses quick-connect fittings, use a tee to connect two circuit branches together, use a cross to connect three circuit branches together, operate a check valve.	
16.12 Connect a pneumatic circuit given a schematic.	
16.13 Draw a pneumatic schematic from the actual circuit connections on the machine.	
16.14 Design a multiple actuator pneumatic circuit.	
16.15 Connect pneumatic speed control circuits to: operate a needle valve to control actuator speed, operate a flow control valve to control actuator speed, operate a meter-in flow control circuit, operate a meter-out flow control circuit, operate an exhaust port speed control circuit, and operate a pressure port speed control circuit.	
16.16 Design speed control circuits.	
16.17 Connect and utilize Pneumatic DCV applications such as: a pneumatic cam-operated 4/2 DCV, a pneumatic cam-operated 3/2 DCV, a single-acting pneumatic cylinder using a 3-way manually-operated DCV, a double-acting pneumatic cylinder using a 3-way manually-operated DCV, a unidirectional pneumatic motor using a 3-way manually-operated DCV, a two-way valve, a cylinder deceleration circuit using power braking, and an externally air-piloted DCV using the manual override.	
16.18 Design a rapid traverse-slow feed pneumatic circuit.	
16.19 Design a pneumatic circuit to sequence two cylinders.	
16.20 Design a pneumatic circuit that uses an externally air-piloted DCV.	
Vacuum Systems	
16.21 Convert between units of mercury and units of air pressure.	
16.22 Connect and read a vacuum gage and manometer.	
16.23 Convert between units of water column and units of water pressure.	
16.24 Connect and operate a vacuum generator.	
16.25 Calculate vacuum cup lift force.	
16.26 Connect and operate a vacuum cup.	

CTE Standards and Benchmarks	National Standards
16.27 Design the vacuum cup portion of a handling rack.	
Hydraulic Circuits and Power Systems	
16.28 Read a hydraulic pressure gage, flow meter and the liquid level and temperature in the reservoir.	
16.29 Calculate the extension force of a cylinder given its size and pressure.	
16.30 Measure the force output of an extending cylinder.	
16.31 Calculate the retraction force of a cylinder given its size and pressure.	
16.32 Measure the force output of a retracting cylinder.	
16.33 Measure the pressure drop (Delta P) across a hydraulic component.	
16.34 Convert between absolute pressure and gage hydraulic pressure.	
16.35 Calculate the extend speed, retract speed, and cylinder stroke time of a hydraulic cylinder given its size and a flow rate.	
16.36 Draw a hydraulic schematic from the actual circuit connections on a pictorial.	
16.37 Draw a hydraulic circuit given a schematic.	
16.38 Operate a hydraulic power unit.	
16.39 Connect equipment and perform basic hydraulic operations such as: connect and disconnect a hydraulic hose that uses quick-connect fittings, use a tee to connect two circuit branches together, connect a flow meter, operate a needle valve to control the speed of an actuator, control the speed of an actuator using a manually-operated DCV, operate a bi-directional hydraulic motor using a 3-position manually-operated DCV, operate a double-acting hydraulic cylinder using a 3-position manually-operated DCV.	
16.40 Design and connect hydraulic speed control circuits to: limit pressure in the system with a relief valve, provide bypass flow, control speed of an actuator by adjusting a flow control valve, operate a meter-in flow control circuit, and operate a meter-out flow control circuit.	
16.41 Design a multiple actuator hydraulic circuit, an independent speed control circuit, and a two-speed actuator circuit.	
17.0 Demonstrate the abilities to use and maintain technological products and systems–The student will be able to:	
Overall Maintenance Process	
17.01 Discuss preventive and predictive maintenance methods for manufacturing environments.	
17.02 Demonstrate knowledge of principles of Total Productive Maintenance (TPM).	
17.03 Recognize potential maintenance issues with basic production systems and determine when to inform maintenance personnel about issues.	
17.04 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	

CTE Standards and Benchmarks	National Standards
17.05 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	
17.06 Operate systems so that they function in the way they were designed.	
17.07 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	
17.08 Develop and follow maintenance schedules.	
17.09 Identify the most common causes of failure of equipment in order to diagnosis problem quickly.	
17.10 Demonstrate knowledge of what different equipment alarms indicate.	
17.11 Make on-process adjustments during production.	
17.12 Examine the concept of troubleshooting within basic manufacturing maintenance areas.	
17.13 Identify equipment failures in manufacturing maintenance areas.	
17.14 Describe root cause analysis methods.	
17.15 Use materials management to know what is recyclable and what is not.	
17.16 Use monitoring or diagnostic devices to find out when equipment is operating correctly.	
17.17 Use appropriate maintenance tools to maintain machines.	
Documentation of Maintenance	
17.18 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	
17.19 Demonstrate knowledge of the procedures for logging repairs and work order requests.	
17.20 Demonstrate knowledge of statistical method charts to ensure that equipment is producing a quality product.	
17.21 Demonstrate knowledge of forms and procedures for correctly documenting processes (e.g., preventative maintenance forms).	
17.22 Read diagrams, schematics, manuals and specifications to understand how to repair equipment.	
17.23 Document repairs, replacement parts, problems and corrective actions to maintain log to determine patterns of operation.	
17.24 Review maintenance log/checklist to ensure that recommended preventative procedures are followed.	
Specific Maintenance Operations	
17.25 Demonstrate knowledge of proper and safe functioning of mechanical power transmission equipment. Specifically, the basic functions of bearings, shafts and couplings and how to recognize a malfunction.	
17.26 Demonstrate knowledge of lubrication procedures and requirements. Specifically, explain API Service	

CTE Standards and Benchmarks		National Standards
	Categories for lubricants; take and analyze oil samples; determine proper lubricants for various types of equipment; use grease guns for various types of lubrication, and demonstrate skill in safe storage and disposal of lubricants.	
17.27	Demonstrate knowledge of the selection, design, and safe functioning of belt, chain, and roller chain drive equipment.	
17.28	Demonstrate knowledge of fluid transport. Specifically, identify standard types of industrial pumps and determine the causes and maintenance procedures for: shaft seal failure, shaft misalignment, and pump cavitations.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0485
Occupational Completion Point: D
Automation and Production Technician – 150 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
18.0 Demonstrate an understanding of and be able to select production processes--The student will be able to:	
18.01 Identify the production characteristics of manufacturing's subindustries: Chemical, Computers and Electronics Products, Electrical and Appliances, Food and Beverage, Furniture, Machinery, Nonmetallic Minerals, Petroleum and Coal, Plastics and Rubber, Primary and Fabricated Metals, Printing, Textile and Apparel, Transportation, and Wood and Paper.	
18.02 Identify customer needs.	
18.03 Determine resources available for the production process.	
18.04 Make job assignments and coordinate workflow.	
18.05 Communicate production and material requirements to meet product specifications.	
18.06 Establish set-up and operation procedures are available and up-to-date.	
18.07 Read and interpret a production schedule and manufacturing work order.	
18.08 Demonstrate knowledge of production process, including flow and bottlenecks.	
18.09 Document product and process compliance with customer requirements.	
19.0 Demonstrate an understanding of industrial tools and processes inclusive of: Basic Machine Tools, CNC machines, and Welding technology--The student will be able to:	
Introduction to Manufacturing Hand Tools	
19.01 Use a bench vise to hold material for a benchwork operation.	
19.02 Change a blade on a hacksaw.	
19.03 Cut a piece of stock to length using a hacksaw.	
19.04 Stamp letters in a part using a letter/number stamp set.	
19.05 Deburr a part using a file.	

CTE Standards and Benchmarks	National Standards
19.06 Clean and store a file.	
19.07 Chamfer a part using a file.	
19.08 Square the ends of a part using a file.	
19.09 Create layout lines on round stock.	
19.10 Drill holes in round stock.	
Milling Processes	
19.11 Operate manual controls on a milling machine.	
19.12 Use a milling machine micrometer collar to measure table movement.	
19.13 Face a piece of stock to length.	
19.14 Mill a step using the micrometer collars on the milling machine.	
19.15 Mill a step on a part using layout lines.	
19.16 Mill a slot to a specific depth.	
19.17 Mill a pocket in a part.	
Band Saw Operation	
19.18 Determine the size of three common metal stock shapes: sheet, flat, round.	
19.19 Select stock size and type given a part drawing.	
19.20 Use a horizontal band saw to cut stock to a specified length.	
19.21 Use a vertical band saw to cut stock to a specified length.	
Drill Press Operations	
19.22 Use the prick punch, center punch, and ball-peen hammer to prepare holes for drilling.	
19.23 Determine the size of a drill.	
19.24 Select and change the spindle speeds of the floor drill press.	
19.25 Install a twist drill into a drill chuck.	
19.26 Mount a workpiece in a drill press vise.	
19.27 Drill holes using cutting fluid.	
19.28 Select a drill and drill a hole for reaming.	

CTE Standards and Benchmarks	National Standards
19.29 Select a reamer and ream a hole.	
19.30 Drill a pilot hole to prepare a hole for countersinking.	
19.31 Select a countersink and countersink a hole.	
19.32 Drill the pilot hole for the counterboring operation.	
19.33 Select a counterbore and counterbore a hole.	
19.34 Select drill size and drill the holes for the tapping operation.	
19.35 Use a countersink to chamfer a hole.	
19.36 Select a tap and thread a hole using a tap and a tap wrench.	
CNC Mill Programming and Operation	
19.37 Enter and edit a CNC mill program using a text editor.	
19.38 Simulate and edit a CNC mill program.	
19.39 Determine the size and cutting direction of an end mill.	
19.40 Mount a tool in a CNC mill.	
19.41 Operate a CNC Mill.	
19.42 Determine CNC program coordinates based on a dimensioned part drawing.	
19.43 Select tooling for a CNC operation.	
19.44 Determine the spindle speed for various machining operations.	
19.45 Determine the feed rate for a machining operation.	
19.46 Locate the PRZ of a part in a CNC mill using an edgefinder.	
19.47 Determine the tool offsets in a CNC mill.	
19.48 Create a precision part using PRZ and tool offset measurements.	
19.49 Convert coordinates between absolute and incremental positioning methods.	
19.50 Interpret a CNC mill program that uses basic G- and M-Codes (G00-G03).	
19.51 Design a CNC programs that use: program stop command, linear interpolation, absolute and incremental positioning, circular interpolation, spot boring cycle, counterboring cycle, pecking cycle, boring cycle, cutter compensation, mirroring and subprograms.	
Welding	

CTE Standards and Benchmarks		National Standards
19.52	Identify a specified weld using a welding symbol.	
19.53	Draw a welding symbol using given variables.	
19.54	Demonstrate an understanding of the steps necessary to create a project from a welding drawing.	
19.55	Prepare metal for welding.	
19.56	Demonstrate an understanding of weld quality analysis using various testing procedures. i.e., dye penetrant, guided bend.	
19.57	Design a welded project.	
20.0	Demonstrate an understanding of computer aided manufacturing and flexible manufacturing planning and control--The student will be able to demonstrate:	
20.01	Skill in making job assignments and coordinating workflow.	
20.02	Skill in knowing that the appropriate resources are available to meet customer specifications and the roll of Enterprise Resource Planning (ERP) and Material Resource Planning (MRP) to accomplish this.	
20.03	Skill in ensuring that set-up and operation procedures are available and up-to-date.	
20.04	Skill in correctly reading and interpreting a production schedule and manufacturing work order.	
20.05	Knowledge of production process, including flow and bottlenecks.	
20.06	Knowledge of lead-time required for a production plan.	
20.07	Skill in correctly reading and interpreting bills of materials and routing sheets.	
20.08	Knowledge of methods of productivity measurement and improvement.	
20.09	Knowledge of principles and practice of Just-in-time (JIT) inventory control skill in performing a physical inventory.	
20.10	Ability to identify manufacturing process variables that must be controlled for quality and reliability. This will include controlling quality of incoming materials, amounts of materials, operator skills, and adjustable parameters: time, temperature, pressure, speed, voltage, etc.	
21.0	Demonstrate proficiency in computer control and robotics--The student will be able to:	
Programmable Logic Controllers (PLC)		
21.01	Demonstrate proficiently an understanding of Binary concepts.	
21.02	Wire input and output devices to a PLC.	
21.03	Open, download, monitor, run and stop a PLC processor file using PLC programming software.	
21.04	View the status of Input and Output Data Tables.	

CTE Standards and Benchmarks	National Standards
21.05 Create, enter, save, and edit a PLC program using PLC programming software.	
21.06 Generate and print out a ladder logic report using PLC software.	
21.07 Design a PLC program to jog two motors.	
21.08 Design a PLC program to control the start/stop of two motors.	
21.09 Design a PLC program to interlock two motors.	
21.10 Design a PLC program that uses a safety interlock to control the operation of a machine.	
21.11 Design a reciprocating actuator sequence PLC program.	
21.12 Design a continuous cycle clamp and drill sequence PLC program.	
Basic Robot Operation	
21.13 Power up and shut down servo robot.	
21.14 Jog a servo robot and adjust the fast and slow jog speed settings.	
21.15 Move parts using the manual jog function.	
21.16 Home a servo robot.	
21.17 Manually operate the gripper using the teach pendant.	
21.18 Use a teach pendant to: teach robot position points, test teach points, and edit teach points.	
21.19 Use a teach pendant to delete a program file.	
21.20 Use a teach pendant to enter a servo robot program that uses standard commands such as: PMOVE, LABEL, BRANCH, GRASP, RELEASE, SPEED, and DELAY.	
21.21 Run a servo robot program using a teach pendant.	
21.22 Stop a servo robot program using any one of four different functions on a teach pendant.	
21.23 Design a program to perform a basic material handling task.	
21.24 Store and retrieve multiple programs in a robot controller.	
21.25 Use PC software to enter and edit a robot program offline and online.	
21.26 Use PC software to delete a program.	
21.27 Use PC software to power up, jog, home, and power down a servo robot	
21.28 Use PC software to run a servo robot program.	
21.29 Connect digital input and output devices to a robot controller.	

CTE Standards and Benchmarks	National Standards
21.30 Use PC software to enter a program that has WAITI and WRITEO commands, uses a manual operator station, and will unload an automatic machine.	
21.31 Design a robot program that performs a basic assembly task using linear motion and the commands LMOVE and LINEAR.	
21.32 Enter a robot program that uses the World Coordinate motion commands.	
21.33 Design and enter a robot program that uses Tool Coordinate motion commands.	
Application Development and Flexible Manufacturing Cells	
21.34 Construct a flow chart given a general sequence of operations.	
21.35 Connect a solenoid-operated pneumatic valve to the output of a robot and operate.	
21.36 Design a robot program that will load and unload an automatic machine.	
21.37 Teach points with a double-jointed robot arm using the full range of its work envelope.	
21.38 Design a robot program that uses a robot's double-jointed design.	
21.39 Design a robot program given a general description of the application.	
21.40 Connect and configure a servo conveyor to a servo robot.	
21.41 Enter a robot program that has MON and MOFF commands.	
21.42 Design a robot program that uses a conveyor.	
21.43 Enter a robot program that has conditional commands: IFIN, ELSE, ENDIF, IF-THEN, and INP.	
21.44 Design a robot program that sorts parts.	
21.45 Enter a robot program that has subroutine commands: CALL, RETURN, and SUB.	
21.46 Design a robot application using a subroutine.	
21.47 Enter a robot program that has a DDMOVE command.	
21.48 Design a robot program that uses a servo conveyor.	
21.49 Jog a robot using four joint modes.	
21.50 Program a robot that uses a servo traverse axis.	
21.51 Enter a robot program which uses the GRWIDTH command.	
21.52 Design a robot program that uses a servo gripper.	
21.53 Develop a robot-to-solid state I/O interface wiring diagram.	
21.54 Interface a robot discrete I/O using a relay.	

CTE Standards and Benchmarks	National Standards
21.55 Design a robot program to control an FMS workstation via discrete I/O.	
21.56 Design a robot program that will unload two or more automatic machines.	
21.57 Design a robot program that encompasses the skills, techniques, and components in a flexible manufacturing system.	
Production Control	
21.58 Enter a robot program that uses an input command.	
21.59 Enter a robot program that uses arithmetic and relational operators.	
21.60 Enter a robot program that has loop commands.	
21.61 Design a robot application using FOR-NEXT commands.	
21.62 Design and enter a robot program that uses counter commands.	
21.63 Design a robot program that stops a production process if a quality standard is not met.	
Quality Control	
21.64 View the current location of a robot in Cartesian coordinates.	
21.65 Use the MOV function with Cartesian coordinates to move a robot to a position.	
21.66 Use PC software to enter a robot program that uses points stored in Cartesian coordinates.	
21.67 Enter a robot program that has TESTI, FLAG, SET, RESET and IF FLAG commands.	
21.68 Design a robot program to perform a go no-go inspection.	
21.69 Enter a robot program that uses a variable name.	
21.70 Enter a robot program that uses the PRINT and PRINTLN commands.	
21.71 Design a program that provides an operator interface on a computer screen.	
21.72 Enter a robot program that has a MEASURE command.	
21.73 Design a robot program to inspect parts by measuring them in its gripper.	
22.0 Demonstrate the ability to properly identify, organize, plan, allocate resources, document and produce a mass-produced product via a master project--The student will be able to:	
22.01 Work in a team and use a seven step design process to design and build a prototype.	
22.02 Create a Design Portfolio documenting research and student development materials including:	
a. Operation and design description	
b. History research paper	

CTE Standards and Benchmarks		National Standards
	c. Current events article	
	d. Individual contributor research paper	
	e. Global industry analysis	
	f. Local industry interview	
22.03	Create a Technology Sector Research Report containing four topics:	
	a. Operation and application	
	b. History and current events	
	c. Impacts	
	d. Individual and organization contribution	
22.04	Create an Industry Market Report that includes:	
	a. Global market analysis	
	b. Industry case study	
22.05	Create a Bill of Material (BOM) for your solution.	
22.06	Create a prototype using specified design constraints (time, expenses, materials, safety considerations, etc.) and automated production processes.	
22.07	Create and deliver a presentation to communicate project results to other teams.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Electrical and Instrumentation Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J110100
CIP Number	0615040401
Grade Level	30, 31
Standard Length	1000 hours
Teacher Certification	TEC ELEC @7 7G ELECTRONIC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2111 – Electricians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
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 three 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0650	Electrician (Construction)	350 hours	47-2111
B	EEV0652	Instrument Mechanic	350 hours	49-2094
C	EEV0654	Electrician Maintenance	300 hours	47-2111

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 knowledge of National Electrical Codes (NEC).
02.0 Install and troubleshoot facility electrical circuits from service entrance to convenience outlets.
03.0 Demonstrate knowledge of using basic electrical drawings.
04.0 Demonstrate basic electrical construction skills.
05.0 Demonstrate understanding of DC power sources.
06.0 Demonstrate understanding of AC power sources.
07.0 Demonstrate knowledge of DC motors.
08.0 Demonstrate knowledge of AC motors.
09.0 Demonstrate knowledge of motor controls.
10.0 Demonstrate knowledge of transformers.
11.0 Demonstrate knowledge of over current protection and grounding.
12.0 Demonstrate knowledge of an industrial power distribution system.
13.0 Perform preventive and corrective maintenance on basic electrical power and control components.
14.0 Demonstrate knowledge of electrical test equipment.
15.0 Demonstrate knowledge of hydraulic and pneumatic systems.
16.0 Identify the basic principles and terminology of process control.
17.0 Identify the primary components of a process control system.
18.0 Demonstrate knowledge of using instrumentation drawings.
19.0 Demonstrate knowledge of using instrumentation test instruments.
20.0 Demonstrate knowledge of instrumentation installation techniques.
21.0 Demonstrate knowledge of programmable logic controllers (PLC).

Florida Department of Education
Student Performance Standards

Program Title: **Electrical and Instrumentation Technology 1**
PSAV Number: **J110100**

Course Number: EEV0650
Occupational Completion Point: A
Electrician (Construction) – 350 Hours – SOC Code 47-2111

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Demonstrate knowledge of the National Electrical Code (NEC)--The student will be able to:	
01.01	Relate the NEC to general wiring practices.	
01.02	Relate the NEC to wire, conduit and box sizing.	
01.03	Relate the NEC to outlets, lighting, appliances and building services.	
01.04	Relate the NEC to services and service calculations.	
01.05	Relate the NEC to grounding and bonding requirements.	
01.06	Relate the NEC to over current protection.	
01.07	Relate the NEC to motor circuit wiring.	
01.08	Relate the NEC to transformers.	
01.09	Relate the NEC to hazardous location wiring.	
01.10	Relate the NEC to emergency and alternate power systems.	
01.11	Relate the NEC to industrial electrical.	
02.0	Install and troubleshoot facility wiring circuits from service entrance to convenience outlets--The student will be able to:	
02.01	Demonstrate the knowledge power requirements, distribution, and construction considerations to meet the needs for a safe and functional electrical system for residential, commercial, or industrial facilities.	
02.02	Determine the size of service entrance equipment, components and conductors.	
02.03	Demonstrate proper methods to install service entrance, lighting circuits and equipment branch circuits.	
02.04	Demonstrate knowledge of NEC local codes, utility regulations, special ordinances and installation instructions.	

CTE Standards and Benchmarks		National Standards
02.05	Demonstrate knowledge of optional electrical safety devices, special fixtures (explosion proof, waterproof), communications and alarm systems, timers and controllers.	
02.06	Demonstrate knowledge of the needs for, and the proper methods of facility grounding systems.	
02.07	Demonstrate the ability to troubleshoot faults in control and power circuits.	
02.08	Choose the correct test equipment to service electrical systems.	
03.0	Demonstrate knowledge of using basic electrical drawings--The student will be able to:	
03.01	Demonstrate the knowledge to describe, identify and use electrical symbols and abbreviations.	
03.02	Demonstrate the knowledge to use floor plans, lighting layouts and building service drawings.	
03.03	Demonstrate the knowledge to use single line power distribution drawings.	
03.04	Demonstrate the knowledge to use elementary drawings.	
03.05	Demonstrate the knowledge to use process logic drawings.	
03.06	Demonstrate the knowledge to convert English system and metric system measurements.	
03.07	Demonstrate the knowledge to use measuring scales to take accurate system measurements.	
03.08	Demonstrate the knowledge to produce accurate electrical drawings.	
03.09	Demonstrate the knowledge to prepare an equipment and material list.	
03.10	Demonstrate the knowledge to troubleshoot using the different electrical diagrams and drawings.	
04.0	Demonstrate basic electrical construction skills--The student will be able to:	
04.01	Use blueprints and associated documents to identify materials and equipment which will be needed to perform construction or maintenance task.	
04.02	Use the proper equipment to make correct and accurate bends in various types of electrical conduits.	
04.03	Use the proper equipment to thread electrical conduit.	
04.04	Make appropriate electrical terminations.	
04.05	Apply correct wiring methods to motors and motor control circuits.	
04.06	Apply correct wiring methods to transformers.	
04.07	Install non-metallic sheathed cable.	
04.08	Correctly install lighting fixtures and perform preventive and corrective maintenance.	
04.09	Correctly install switching and outlet devices.	

CTE Standards and Benchmarks		National Standards
	04.10 Correctly use power tools.	
05.0	Demonstrate an understanding of DC power sources--The student will be able to:	
	05.01 Describe safe procedures for handling, storing, charging and installing storage batteries.	
	05.02 Describe electrical characteristics of lead-acid storage batteries, dry cells and NiCads.	
	05.03 Demonstrate knowledge of low voltage electronic power supplies.	
	05.04 Demonstrate knowledge of DC generator theory and construction for DC generators.	
	05.05 Perform troubleshooting and preventive maintenance on DC power sources.	
06.0	Demonstrate and understanding of AC power sources--The student will be able to:	
	06.01 Calculate and explain power factor.	
	06.02 Calculate and explain power factor corrections.	
	06.03 Demonstrate knowledge of the theory and physical and electrical characteristics of three phase alternators.	
	06.04 Demonstrate knowledge of the theory and application for engine driven generating sets, including types of prime movers and transfer switches.	
	06.05 Demonstrate knowledge of paralleling, synchronizing, testing three phase alternators.	
	06.06 Demonstrate knowledge of selecting, troubleshooting, connecting and maintaining 3-phase alternators.	
	06.07 Demonstrate knowledge of un-iterruptable power supplies (UPS).	
07.0	Demonstrate knowledge of DC motors--The student will be able to:	
	07.01 Demonstrate knowledge of DC motor theory and construction including series, shunt and compound motors.	
	07.02 Demonstrate knowledge of DC motor torque effectively speed regulation, loading and starting.	
	07.03 Demonstrate knowledge of performing maintenance procedures for and installation of DC motors.	
	07.04 Demonstrate knowledge of correctly apply testing and monitoring equipment to DC motors and machines.	
	07.05 Select and apply DC motor controls.	
08.0	Demonstrate knowledge of AC motors--The student will be able to:	
	08.01 Demonstrate knowledge of single-phase AC motors.	
	08.02 Demonstrate the ability to select connect and troubleshoot single phase AC motors.	
	08.03 Demonstrate knowledge of 3-phase AC motors.	

CTE Standards and Benchmarks		National Standards
08.04	Demonstrate the ability to select, connect, troubleshoot and maintain 3-phase AC motors.	
08.05	Demonstrate the ability to correctly apply testing and monitoring equipment to AC 3-phase motors.	
08.06	Select and apply AC motor controls.	
08.07	Disassemble and assemble a single-phase motor.	
08.08	Disassemble and assemble a 3-phase motor.	
08.09	Perform preventative maintenance for AC motors.	
09.0	Demonstrate knowledge of motor controls--The student will be able to:	
09.01	Use schematics and drawings to troubleshoot electrical failures.	
09.02	Demonstrate knowledge of motor starters.	
09.03	Design, install, operate, and troubleshoot 2-wire control.	
09.04	Design, install, operate, and troubleshoot 3-wire control.	
09.05	Design, install, operate, and troubleshoot motor control circuits that use timers.	
09.06	Design, install, operate, and troubleshoot motor control circuits that use relays.	
09.07	Design, install, operate, and troubleshoot motor control circuits that use sequences.	
09.08	Demonstrate the ability to install and troubleshoot limit switches, proximity switches and other sensors in control circuits.	
09.09	Demonstrate knowledge of variable frequency drives (VFC's).	
09.10	Demonstrate knowledge of DC motor circuits.	
10.0	Demonstrate knowledge of transformers--The student will be able to:	
10.01	Demonstrate knowledge of transformer theory and application.	
10.02	Demonstrate knowledge of single-phase transformer theory and application.	
10.03	Demonstrate knowledge of theory and application of a single-phase 3-wire secondary system.	
10.04	Demonstrate knowledge of theory and application for single-phase transformers connected in 3-phase systems.	
10.05	Apply testing and monitoring equipment to transformers and their associated circuits.	
10.06	Install transformers to primary service and main switch metering equipment and secondary switching.	
10.07	Install transformer over current protection.	

CTE Standards and Benchmarks		National Standards
11.0	Demonstrate knowledge of over current protection and grounding--The student will be able to:	
11.01	List and identify types, classes and ratings of fuses and circuit breakers.	
11.02	Describe operation of fuses and breakers.	
11.03	Install fuses and breakers.	
11.04	Select and apply branch-circuit protection for appliances.	
11.05	Select and apply branch-circuit and overload protection for motors.	
11.06	Relate the NEC to the selection and installation of over current protection devices.	
11.07	Explain the purpose of equipment grounding.	
11.08	Relate the NEC to the sizing and installation of grounding systems and conductors.	
11.09	Perform preventative maintenance on grounding systems.	
12.0	Demonstrate knowledge of an industrial power distribution system--The student will be able to:	
12.01	Demonstrate knowledge of a utility generation and distribution system.	
12.02	Demonstrate knowledge of a typical industrial generation and distribution system.	
12.03	Demonstrate knowledge of co-generation applications.	
12.04	Demonstrate knowledge of protective relay applications.	
12.05	Demonstrate knowledge of amperage, voltage control and power factor control techniques.	
12.06	Demonstrate knowledge of breaker controls and computer load shed considerations.	
12.07	Demonstrate knowledge of high voltage, distribution equipment, ground fault protection methods.	
12.08	Demonstrate knowledge of safety procedures including identification of equipment used for testing high voltage.	
12.09	Demonstrate knowledge of pole line isolation switches.	
12.10	Demonstrate knowledge of current transformers (CT's) and potential transformers (PT's).	
13.0	Perform preventative and corrective maintenance on basic electrical power and control components--The student will be able to:	
13.01	Use technical data and manuals to perform preventative maintenance.	
13.02	Demonstrate ability to select and apply appropriate tools and testing equipment.	
13.03	Perform corrective preventative maintenance and certify completion.	
13.04	Determine the need for corrective maintenance by applying trouble-shooting and analysis techniques.	

CTE Standards and Benchmarks		National Standards
13.05	Replace parts and calibrate or adjust as necessary to bring equipment, systems, components or machines to specifications.	
13.06	Prepare forms and reports of preventive and corrective maintenance.	
14.0	Demonstrate knowledge of electrical test equipment--The student will be able to:	
14.01	Demonstrate the ability to use an analog multimeter.	
14.02	Demonstrate the ability to use a digital multimeter.	
14.03	Demonstrate the ability to use a “wiggy” voltmeter.	
14.04	Demonstrate the ability to use a clamp-on ammeter.	
14.05	Demonstrate the ability to use a megohmmeter.	
14.06	Demonstrate the ability to use an oscilloscope.	
14.07	Demonstrate the ability to use a high voltage tester.	
14.08	Use test equipment to systematically troubleshoot a defective system.	
15.0	Demonstrate knowledge of hydraulic and pneumatic systems--The student will be able to:	
15.01	Identify principles and practical applications of hydraulic and pneumatic power.	
15.02	Identify control valves in a hydraulic and pneumatic system.	
15.03	Identify pressure and safety relief valves and vacuum breakers.	
15.04	Identify cylinders and motors.	
15.05	Remove and replace hydraulic and pneumatic systems and components.	
15.06	Identify strainers and filters in hydraulic and pneumatic systems.	
15.07	Identify reservoirs and accumulators in hydraulic and pneumatic systems.	
15.08	Identify hydraulic and pneumatic pimps on a system.	
15.09	Identify piping, tubing, and fittings on a hydraulic pneumatic system.	
15.10	Identify system interfaces.	
15.11	Identify the procedures for pneumatic and hydraulic system maintenance.	
15.12	Locate control valve failures.	
15.13	Demonstrate knowledge of regulators, volume boosters, relays and repeaters.	
15.14	Identify the components to produce instrument air.	
15.15	Demonstrate knowledge of current-to-pressure and pressure-to-current transducers.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0652
Occupational Completion Point: B
Instrument Mechanics – 350 Hours – SOC Code 49-2094

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Identify the basic principles and terminology of process control--The student will be able to:	
16.01	Identify the purpose of automatic control systems.	
16.02	Identify the elements of process control.	
16.03	Identify measured and manipulated variables in a control loop.	
16.04	Demonstrate knowledge of proportional control.	
16.05	Demonstrate knowledge of on/off control.	
16.06	Determine the effects of gain, reset and derivative in a proportional control scheme.	
16.07	Demonstrate knowledge of the basic laws of physics pertaining to instrumentation.	
16.08	Demonstrate knowledge of the terminology associated with instrumentation and process control.	
17.0	Identify the primary components of a process control system--The student will be able to:	
17.01	Identify primary control elements in process loops.	
17.02	Identify final control elements in process loops.	
17.03	Identify electronic, pneumatic, and digital transmitters in process loops.	
17.04	Identify controllers in process loops.	
17.05	Identify control loop applications (level, flow, temp, pressure, or analytical).	
17.06	Define the static and dynamic characteristics of instruments.	
17.07	Demonstrate knowledge necessary to interface individual process loops into microprocessor based control schemes.	
18.0	Demonstrate knowledge of using instrumentation drawings--The student will be able to:	
18.01	Demonstrate ability to use loop sheets.	
18.02	Demonstrate ability to use flow sheets/P&IDs.	

CTE Standards and Benchmarks	National Standards
18.03 Demonstrate ability to use process logic diagrams.	
18.04 Demonstrate ability to use installation drawings.	
18.05 Demonstrate ability to use building layout or location drawings.	
18.06 Troubleshoot using drawings.	
18.07 Identify process safety devices and explain their purpose.	
19.0 Demonstrate knowledge of using instrumentation test instruments--The student will be able to:	
19.01 Operate basic hydraulic measuring instruments.	
19.02 Operate dead weight testers.	
19.03 Operate manometers.	
19.04 Operate basic pneumatic measuring instruments.	
19.05 Operate vacuum pumps.	
19.06 Operate pressure and vacuum gauges.	
19.07 Operate basic thermal measuring instruments.	
19.08 Operate temperature baths.	
19.09 Operate electronic calibration instruments.	
19.10 Operate thermometers.	
19.11 Calibrate instruments using test instruments.	
19.12 Operate instrument standards.	
20.0 Demonstrate knowledge of instrumentation installation techniques--The student will be able to:	
20.01 Apply proper OSHA safety standards.	
20.02 Make electrical connections for instrument equipment.	
20.03 Identify and use hand tools properly.	
20.04 Identify and use power tools properly.	
20.05 Demonstrate acceptable tubing bending and installation techniques.	
20.06 Identify the proper method for instrument wire installation in a cable tray.	
20.07 Demonstrate the ability to properly install various instrumentation devices.	
20.08 Demonstrate knowledge of “clean design” for instrument installations.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0654
Occupational Completion Point: C
Electrician Maintenance – 300 Hours – SOC Code 47-2111

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
21.0 Demonstrate knowledge of programmable logic controllers (PLC)--The student will be able to:	
21.01 Demonstrate knowledge of the terminology and operating components of PLC systems.	
21.02 Demonstrate knowledge of the addressing schemes used in various PLC systems.	
21.03 Understand and use ladder logic for various PLC systems.	
21.04 Program basic relay logic in ladder logic.	
21.05 Program timers and counters in ladder logic.	
21.06 Program shift registers and other data manipulation routines.	
21.07 Program for message displays and other output devices.	
21.08 Interface PLS's to perform communications.	
21.09 Load and save files on storage media.	
21.10 Prepare and update documentation.	
21.11 Perform local/remote interfacing.	
21.12 Troubleshoot defective PLC systems.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	J110200
CIP Number	0615040402
Grade Level	30, 31
Standard Length	800 hours
Teacher Certification	TEC ELEC @7 7G ELECTRONICS @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3023 – Electrical and Electronic Engineering Technicians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
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.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0656	Instrument Technician	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:

01.0 Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS).
02.0 Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control devices.
03.0 Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices.
04.0 Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices.
05.0 Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices.
06.0 Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices.
07.0 Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices.
08.0 Demonstrate process operation skills.
09.0 Demonstrate knowledge of technical reporting.

Florida Department of Education
Student Performance Standards

Program Title: **Electrical and Instrumentation Technology 2**
PSAV Number: **J110200**

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

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Demonstrate knowledge of operating, troubleshooting and maintaining distributed control systems (DCS)--The student will be able to:	
01.01	Describe the principles and purpose of a DCS system.	
01.02	Describe the architecture and components of a DCS system.	
01.03	Configure control points on a DCS system.	
01.04	Perform data storage routines on a DCS system.	
01.05	Print graphs of control point responses from a DCS system.	
01.06	Perform data communications through PLC or discrete input/output interface units.	
01.07	Perform preventive maintenance and calibrate on DCS system devices.	
01.08	Troubleshoot and repair faults in DCS systems.	
02.0	Demonstrate knowledge of operating, troubleshooting and maintaining level measurement and control device--The student will be able to:	
02.01	Demonstrate knowledge of the terminology, physics, methods and principles of level measurement and control.	
02.02	Identify level measurement purpose and requirements.	
02.03	Identify level measurement instruments.	
02.04	Identify solid level measuring systems.	
02.05	Identify instrument calibration standards.	
02.06	Identify safe standards, installation techniques and maintenance practices as applicable to level measurement.	

CTE Standards and Benchmarks		National Standards
02.07	Identify common causes of level measurement instrument and sensor failures.	
02.08	Troubleshoot and repair level measurement and control system failures.	
02.09	Identify ultrasonic level devices.	
02.10	Identify principles of operation for radiation type, level control devices.	
02.11	Determine correct applications for direct level measurement devices: floats, displacers, conductivity probes, etc.)	
02.12	Determine correct applications for indirect level measurement devices: (hydraulic pressure, bubble tubes, radioactive emitters and detectors, etc.)	
02.13	Design and operate a level control loop.	
02.14	Calibrate level elements, transmitters and controllers.	
02.15	Demonstrate knowledge of final control elements and applications for level loops.	
03.0	Demonstrate knowledge of operating, troubleshooting and maintaining pressure measurement and control devices--The student will be able to:	
03.01	Demonstrate knowledge of the terminology, physics, methods and principles of pressure measurement and control.	
03.02	Identify pressure measurement instruments.	
03.03	Identify pressure measurement purpose and requirements.	
03.04	Identify applications of vacuum/pressure measuring methods.	
03.05	Identify the elements of vacuum/pressure measurement systems.	
03.06	Identify safety standards, installation techniques and maintenance practices as applicable to vacuum/pressure measurement.	
03.07	Identify instrument calibration standards.	
03.08	Identify common vacuum/pressure, measuring instrument and sensor failures.	
03.09	Troubleshoot and repair vacuum/pressure measurement and control system failures.	
03.10	Demonstrate knowledge of elastic deformation elements.	
03.11	Design and operate pressure loop.	
03.12	Calibrate pressure elements, transmitters and controllers.	
03.13	Demonstrate knowledge of differential pressure elements, principles, and applications.	
03.14	Demonstrate knowledge of applications and requirements of vacuum breakers and pressure relief devices.	

CTE Standards and Benchmarks		National Standards
	03.15 Demonstrate knowledge of final control elements and applications for vacuum/pressure loops.	
04.0	Demonstrate knowledge of operating, troubleshooting and maintaining temperature measurement and control devices--The student will be able to:	
	04.01 Demonstrate knowledge of the terminology, physics, methods and principles of temperature measurement and control.	
	04.02 Identify temperature measurement purpose and requirements.	
	04.03 Identify temperature measurement instruments.	
	04.04 Identify bimetallic and fluid-filled temperature measuring instruments.	
	04.05 Identify thermocouple and RTD temperature measuring instruments.	
	04.06 Identify and operate pyrometers and thermometers.	
	04.07 Identify safety standards, installation techniques and maintenance practices as applicable to temperature measurement.	
	04.08 Identify instrument calibration standards.	
	04.09 Identify common temperature measuring instrument and sensor failures.	
	04.10 Troubleshoot and repair temperature measurement and control system failure.	
	04.11 Design and operate a temperature control loop.	
	04.12 Calibrate temperature elements, transmitters and controllers.	
	04.13 Demonstrate knowledge of final control elements and applications for temperature loops.	
05.0	Demonstrate knowledge of operating, troubleshooting and maintaining flow measurement and control devices--The student will be able to:	
	05.01 Demonstrate knowledge of the terminology, physics, methods and principles of fluid flow measurement and control.	
	05.02 Identify flow measurement purpose and requirement.	
	05.03 Identify secondary measurement devices for fluid flow.	
	05.04 Identify applications for variable area instruments.	
	05.05 Identify open channel flow devices.	
	05.06 Identify applications for positive displacement metering.	
	05.07 Identify flow displacement measurement methods.	
	05.08 Identify applications for magnetic flow meters.	

CTE Standards and Benchmarks		National Standards
	05.09 Identify applications for ultrasonic flow metering methods.	
	05.10 Identify safety standards, installation techniques and maintenance practices as applicable to flow measurement.	
	05.11 Troubleshoot and repair flow measurement and control system failure.	
	05.12 Demonstrate knowledge of Venturi tubes, flow nozzles, orifice plates and pilot tubes to measure flow.	
	05.13 Demonstrate knowledge of mass flow measurement techniques.	
	05.14 Demonstrate knowledge of final control elements and applications for flow loops.	
	05.15 Calibrate flow elements, transmitters and controllers.	
	05.16 Design and operate a flow control loop.	
06.0	Demonstrate knowledge of operating, troubleshooting and maintaining physical property measurement and control devices--The student will be able to:	
	06.01 Identify weight and mass measuring units.	
	06.02 Identify methods for weighing materials in motion.	
	06.03 Identify weight displacement measurement methods.	
	06.04 Troubleshoot and repair weight instruments.	
	06.05 Perform operating systems checks, preventative maintenance and make adjustments to weight measurement loops.	
	06.06 Calibrate weight elements, transmitters and controllers.	
	06.07 Understand the principles of operation for consistency measuring instruments.	
07.0	Demonstrate knowledge of operating, troubleshooting and maintaining chemical property measurement and control devices--The student will be able to:	
	07.01 Troubleshoot and repair pH measuring instruments.	
	07.02 Perform operating systems checks and make minor adjustments to pH measuring instruments.	
	07.03 Troubleshoot and repair liquid conductivity measuring instruments.	
	07.04 Understand basic principles of operation and the application for gas analyzer measuring instruments.	
	07.05 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

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
08.0	Demonstrate process operation skills--The student will be able to:	
08.01	Use PLC's to troubleshoot process systems.	
08.02	Identify safety isolation procedures for removing a device from a process.	
08.03	Perform operating system checks, preventive maintenance and make minor adjustments to level control loops.	
08.04	Perform operating system checks, preventive maintenance and make minor adjustments to vacuum/pressure control loops.	
08.05	Perform operating system checks, preventive maintenance and make minor adjustments to temperature control loops.	
08.06	Perform operating system checks, preventive maintenance and make minor adjustments to flow measuring instruments.	
08.07	Perform operating system checks, preventive maintenance and make minor adjustments to consistency measuring instruments.	
08.08	Perform operating system checks, preventive maintenance and make minor adjustments to liquid conductivity measuring instruments.	
08.09	Perform operating system checks to pneumatic and hydraulic systems.	
08.10	Operate control points on a DCS system.	
09.0	Demonstrate knowledge of technical reporting--The student will be able to:	
09.01	Draw and interpret schematics.	
09.02	Record data and prepare charts and graphs.	
09.03	Write reports and make oral presentations.	
09.04	Make equipment - failure reports.	
09.05	Specify and requisition simple components.	

CTE Standards and Benchmarks	National Standards
09.06 Compose technical letters and memoranda.	
09.07 Draw preventive maintenance and calibration procedures.	
09.08 Write and use maintenance work orders.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Precision Metal Fabrication 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J310100
CIP Number	0648050101
Grade Level	30, 31
Standard Length	850 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G WELDING @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to measurement and layout, planning and design, sheet metal work, structural steel, welding, mechanical fasteners, metal properties, heat treating and metalworking tools. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

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 three 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0050	Metal Fabricator Helper	400 hours	47-2211
B	PMT0052	Metal Fabricator	150 hours	47-2211
C	PMT0053	Metal Fabricator Assembler 1	300 hours	47-2211

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 basic metal fabrication skills.
02.0 Demonstrate ability to read plans and drawings.
03.0 Describe metals and their properties.
04.0 Perform gas welding and cutting operations.
05.0 Perform measuring and layout operations.
06.0 Operate metalworking machines.

Florida Department of Education
Student Performance Standards

Program Title: **Precision Metal Fabrication 1**
PSAV Number: **J310100**

Course Number: PMT0050
Occupational Completion Point: A
Metal Fabricator Helper – 400 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Demonstrate basic metal fabrication skills--The student will be able to:
01.01	Comply with safety and operating rules and practices.
01.02	Maintain a clean and orderly shop.
01.03	Make job-related decimal and fraction calculations.
01.04	Solve job-related problems by adding, subtracting, multiplying and dividing numbers.
01.05	Solve job-related problems operating a hand-held calculator.
01.06	Solve job-related problems using mathematical handbooks, charts and tables.
01.07	Compute feet, inches and yards.
01.08	Use the protractor to measure angles to nearest degree.
01.09	Use the protractor and triangles to draw angles.
01.10	Demonstrate proper use of material handling techniques.
01.11	Solve job-related problems using basic formulas.
01.12	Solve job-related problems using basic geometry.
01.13	Solve job-related problems using basic trigonometry.
01.14	Calculate the amount of material that is required to fabricate project.
01.15	Calculate machine feed and speed by using formulas.
01.16	Calculate set back and bend allowance.
02.0	Demonstrate ability to read plans and drawings--The student will be able to:
02.01	Identify dimensions.

CTE Standards and Benchmarks	
02.02	Identify lists of materials and specifications.
02.03	Identify section views/detail views.
02.04	Disassemble and assemble parts using an exploded view drawing.
02.05	Interpret blueprint abbreviations.
02.06	Identify dimensioning of radii, round holes, fillets and chamfers.
02.07	Identify screw threads and bolt types.
02.08	Apply dimensional tolerances.
02.09	Identify metal fabrication symbols used in blueprints.
02.10	Read and interpret title block information.
02.11	Identify and interpret rivet call outs.
02.12	Identify and interpret weld call outs.
02.13	Identify and interpret general and local notes.
02.14	Describe the use of assembly blueprints and detail blueprints.
03.0	Describe metals and their properties--The student will be able to:
03.01	Describe the steelmaking process.
03.02	Describe the differences between ferrous and nonferrous metals.
03.03	Describe casting, alloys and forging.
03.04	Identify metals such as galvanized iron and steel, aluminum stainless steel, sheetmetal, copper and brass.
03.05	Identify properties of the most common metals.
03.06	Identify and describe common gages, shapes and dimensions of purchased materials.

Florida Department of Education
Student Performance Standards

Course Number: PMT0052
Occupational Completion Point: B
Metal Fabricator – 150 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
04.0	Perform gas welding and cutting operations--The student will be able to:
04.01	Identify welding cylinders, regulators, hoses, pressure gages and torches.
04.02	Describe welding equipment safety procedures.
04.03	Demonstrate proper flame settings.
04.04	Demonstrate basic gas welding skills.
04.05	Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.
04.06	Demonstrate freehand and guide cutting of various metal thickness.
04.07	Set up and operate a plasma arc cutting machine.

Florida Department of Education
Student Performance Standards

Course Number: PMT0053
Occupational Completion Point: C
Metal Fabricator Assembler 1 – 300 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
05.0	Perform measuring and layout operations--The student will be able to:
05.01	Perform basic geometric construction.
05.02	Use marking gages, center punches, scribes, surface gages, squares, dividers, dial indicators, protractors, surfaceplates, depth gates and circumference rules.
05.03	Develop patterns using parallel line, radial line and triangulation.
05.04	Make metal fabrication sketches.
05.05	Read and measure with steel rules.
05.06	Read and measure with micrometers.
05.07	Read and measure with vernier height gages.
05.08	Read and measure with dial calipers.
05.09	Read and measure with universal bevel protractor.
05.10	Measure with sine bars.
05.11	Read and measure with dial indicators.
05.12	Apply parallel bars, angle plates and surface gages to precision measurement operations.
05.13	Apply "V" blocks to precision measurement operations.
05.14	Use gage blocks in establishing measurement.
05.15	Layout work piece using marking gages, center punches, scribes, surface gages, squares, dividers, dial indicators, protractors, surface plates, depth gages and circumference rules.
05.16	Perform flat pattern bracket layouts.
05.17	Perform cone development, construct radial line and use triangulation.
06.0	Operate metalworking machines--The student will be able to:
06.01	Identify the purpose of various types of machine shop equipment.
06.02	Identify types of a drill press.

CTE Standards and Benchmarks	
06.03	Operate a drill press utilizing the correct drilling speed.
06.04	Operate a band saw utilizing the correct cutting speed.
06.05	Demonstrate clamping devices for securing stock for drilling.
06.06	Identify types and sizes of drill bits.
06.07	Use portable power saw equipment.
06.08	Use a cutoff or power hacksaw.
06.09	Use electric and air utility grinders.
06.10	Sharpen drill bits.
06.11	Select proper type of abrasive wheels for grinding machines.
06.12	Operate large belt sander.
06.13	Operate power press brake.
06.14	Operate power metal shear.
06.15	Operate various manual brakes.
06.16	Operate power jitterbug shear.
06.17	Operate bench grinders.
06.18	Operate Beverly shear.
06.19	Operate unishear.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Precision Metal Fabrication 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J310200
CIP Number	0648050102
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G WELDING @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to measurement and layout, planning and design, sheet metal work, structural steel, welding, mechanical fasteners, metal properties, heat treating and metalworking tools. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

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 750 hours. **Precision Metal Fabrication 1** is a core program. It is recommended students complete **Precision Metal Fabrication 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Precision Metal Fabrication 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0054	Metal Fabricator Assembler 2	400 hours	47-2211
B	PMT0055	Structural Metal Fabricator	350 hours	47-2211

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 Perform metal fabrication operations.
02.0 Perform electric metal-bonding operations.
03.0 Perform assembly operation.
04.0 Demonstrate ability to apply geometric form and position control.
05.0 Organize and plan work.

Florida Department of Education
Student Performance Standards

Program Title: **Precision Metal Fabrication 2**
PSAV Number: **J310200**

Course Number: PMT0054
Occupational Completion Point: A
Metal Fabricator Assembler 2 – 400 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Perform metal fabrication operations--The student will be able to:
01.01	Fabricate metal, edges and seams.
01.02	Use hand tools to cut, punch and shear metal.
01.03	Form sheet metal using a brake, a folder, rolls and a turning machine.
01.04	Join metals using solder, rivets and mechanical fasteners.
01.05	Make fixtures as required (Micarta and Mild Steel).
01.06	Arrange proper setup in vise using safety devices.
01.07	Demonstrate ability to cut various shapes of metal stock.
01.08	Demonstrate ability to bend various shapes of metal stock.
01.09	Inspect fabricated parts.
02.0	Perform electric metal-bonding operations--The student will be able to:
02.01	Describe and demonstrate the spot and arc welding process.
02.02	Demonstrate basic procedures for safely adjusting and operating an arc welder, selecting a rod, striking and maintaining an arc, welding in various positions and clamping.
02.03	Setup and operate a spot welder.
02.04	Explain and demonstrate the MIG welding process.
02.05	Apply basic procedures for safely adjusting, operating, cleaning and maintaining MIG welding equipment.
02.06	Apply basic procedures for safely adjusting and operating a TIG welder, welding in various positions, selecting proper tips and choosing filler metal.
03.0	Perform assembly operation--The student will be able to:

CTE Standards and Benchmarks	
03.01	Identify weld symbols.
03.02	Perform required weld preparation.
03.03	Assist welder in weld operation.
03.04	Identify rivet symbol.
03.05	Install proper diameter holes and prepare metal surfaces for riveting.
03.06	Determine whether rivet is to be "shot" or squeezed.
03.07	Perform proper setup and upset rivets.
03.08	Set up and install blind rivets.

Florida Department of Education
Student Performance Standards

Course Number: PMT0055
Occupational Completion Point: B
Structural Metal Fabricator – 350 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
04.0	Demonstrate ability to apply geometric form and position control--The student will be able to:
04.01	Identify material condition and perfect form.
04.02	Identify the eleven form characteristics.
04.03	Identify the two position characteristics.
04.04	Identify the seven different tolerance zones.
04.05	Identify datum symbols.
04.06	Identify datum planes.
04.07	Identify datum axis.
04.08	Identify datum centerplane.
04.09	Identify the three plan datum system and multiple datums.
04.10	Identify material condition modifiers.
04.11	Solve bonus tolerance applications.
04.12	Solve datum zone applications.
04.13	Identify tolerance value indicator.
04.14	Identify American National Standards Institute.
04.15	Identify International Standards Institute.
05.0	Organize and plan work--The student will be able to:
05.01	Interpret blueprints and drawings to acquire proper amount of material.
05.02	Requisition proper tools and equipment to fabricate parts.
05.03	Develop and project plan.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Sheet Metal Fabrication Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J360100
CIP Number	0648050601
Grade Level	30, 31
Standard Length	675 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, and the layout, fabrication, erection, or installation and maintenance of items made of sheet steel, copper, stainless steel and aluminum using hand tools and machines.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0030	Sheet Metal Helper	450 hours	47-2211
B	PMT0032	Sheet Metal Fabricator	225 hours	47-2211

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 understanding of procedures and trade safety practices.
02.0 Read blueprints.
03.0 Lay out sheet metal.
04.0 Describe metals and their properties.
05.0 Describe the operation of metal working machines.
06.0 Perform metal fabrication operations.
07.0 Fabricate mechanical systems.
08.0 Install mechanical systems.

Florida Department of Education
Student Performance Standards

Program Title: **Sheet Metal Fabrication Technology 1**
PSAV Number: **J360100**

Course Number: PMT0030
Occupational Completion Point: A
Sheet Metal Helper – 450 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Demonstrate understanding of procedures and trade safety practices--The student will be able to:
01.01	Apply safety rules and procedures.
01.02	Explain school/class procedures.
01.03	Demonstrate use and care of tools.
02.0	Read blueprints--The student will be able to:
02.01	Interpret detail drawings.
02.02	Read symbols.
02.03	List materials for fabrication from blueprints.
02.04	Develop shop drawings, drafting, sketching, and demonstrate computer usage and CAD operation.
03.0	Lay out sheet metal--The student will be able to:
03.01	Perform basic geometric construction
03.02	Use marking gages, center punches, scribes, surface gages, squares, dividers, protractors, and circumference rules.
03.03	Develop patterns using parallel line, radial line and triangulation.
03.04	Make metal fabrication sketches.
03.05	Read and measure with steel rules.
03.06	Read and measure with micrometers.
03.07	Read and measure with dial calipers.
03.08	Read and measure with universal bevel protractor.
03.09	Layout work place using marking gages, center punches, scribes, surface gages, squares, dividers, protractors, and circumference rules.

CTE Standards and Benchmarks	
03.10	Perform flat pattern bracket layouts.
03.11	Perform cone development, construct radial line and use triangulation.
03.12	Lay out rectangular straight duct.
03.13	Lay out rectangular square throat and square heel duct elbow.
03.14	Lay out rectangular duct ogee offset.
03.15	Lay out rectangular taper duct (centerline taper).
03.16	Lay out rectangular duct Y branch.
03.17	Lay out round straight duct.
03.18	Lay out round duct elbow.
03.19	Lay out round duct Y branch.
03.20	Lay out round duct offset.
03.21	Lay out round duct taper (transitional).
03.22	Lay out round duct lateral (round tap).
03.23	Lay out batten seam metal roof panel and cap.
03.24	Lay out square hopper.
03.25	Lay out belt guard.
04.0	Describe metals and their properties--The student will be able to:
04.01	Describe the steelmaking process.
04.02	Describe the difference between ferrous and nonferrous metals.
04.03	Describe casting, alloys and forging.
04.04	Identify metals such as galvanized iron and steel, aluminum stainless steel, sheet metal, copper and brass.
04.05	Identify properties of the most common metals.
04.06	Identify and describe common gages, shapes and dimensions of purchased materials.
05.0	Describe the operation of metalworking machines--The student will be able to:
05.01	Identify the purpose of various types of sheet metal shop equipment.
05.02	Identify types of drill presses.

CTE Standards and Benchmarks	
05.03	Operate a drill press utilizing the correct drilling speed.
05.04	Operate a band saw utilizing the correct cutting speed.
05.05	Demonstrate clamping devices for securing stock for drilling.
05.06	Identify types and sizes of drill bits.
05.07	Use portable power saw equipment.
05.08	Use a cutoff or power hacksaw.
05.09	Use electric and air utility grinders.
05.10	Sharpen drill bits.
05.11	Select proper type of abrasive wheels for grinding machines.
05.12	Describe large belt sanders.
05.13	Describe power press brake.
05.14	Describe power metal shear.
05.15	Describe various manual brakes.
05.16	Describe bench grinders.
05.17	Describe Beverly shear.
05.18	Describe unishear.
06.0	Perform metal fabrication operations--The student will be able to:
06.01	Fabricate metal, edges and seams.
06.02	Use hand tools to cut, punch and shear metal.
06.03	Form sheet metal using a brake, a folder, rolls and a turning machine.
06.04	Join metals using solder, rivets and mechanical fasteners.
06.05	Make fixtures as required (Micarta and Mild Steel).
06.06	Arrange proper setup in vise using safety devices.
06.07	Demonstrate ability to cut various shapes of metal stock.
06.08	Demonstrate ability to bend various shapes of metal stock.
06.09	Inspect fabricated parts.

Florida Department of Education
Student Performance Standards

Course Number: PMT0032
Occupational Completion Point: B
Sheet Metal Fabricator – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
07.0	Fabricate mechanical systems--The student will be able to:
07.01	Fabricate rectangular radius throat and radius heel duct elbow.
07.02	Fabricate rectangular square throat and square heel duct elbow.
07.03	Fabricate rectangular duct ogee offset.
07.04	Fabricate rectangular duct transition.
07.05	Fabricate rectangular duct Y branch.
07.06	Fabricate rectangular shoe tap.
07.07	Fabricate round straight duct.
07.08	Fabricate round duct elbow.
07.09	Fabricate round duct Y branch.
07.10	Fabricate round duct offset.
07.11	Fabricate round duct taper (transitional).
07.12	Fabricate round duct lateral (round tap).
07.13	Fabricate round saddle tap.
07.14	Fabricate single wall equipment casing/housing.
07.15	Fabricate flat S.
07.16	Fabricate bar S.
07.17	Fabricate drive cleat.
07.18	Fabricate pocket government lock.
07.19	Fabricate companion angle.
07.20	Fabricate flanged duct section.

CTE Standards and Benchmarks	
08.0	Install mechanical systems--The student will be able to:
	08.01 Install rectangular duct system.
	08.02 Install round duct system.
	08.03 Install single wall equipment casing/housing.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Sheet Metal Fabrication Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J360200
CIP Number	0648050602
Grade Level	30, 31
Standard Length	675 hours
Teacher Certification	SHEETMETAL @7 7G METAL WORK 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2211 – Sheet Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, and the layout, fabrication, erection, or installation and maintenance of items made of sheet steel, copper, stainless steel and aluminum using hand tools and machines.

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 three 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 675 hours. **Sheet Metal Fabrication Technology 1** is a core program. It is recommended students complete **Sheet Metal Fabrication Technology 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Sheet Metal Fabrication Technology 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0033	Architectural Fabricator	225 hours	47-2211
B	PMT0034	Commercial Kitchen Fabricator	225 hours	47-2211
C	PMT0035	Sheet Metal Welder	225 hours	47-2211

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 Fabricate architectural/roofing sheet metal.
02.0 Install architectural/roofing sheet metal.
03.0 Fabricate specialty sheet metal.
04.0 Fabricate food and beverage dispensing equipment.
05.0 Weld sheet metal.
06.0 Perform gas welding and cutting operations.
07.0 Perform electric metal-bonding operations.

Florida Department of Education
Student Performance Standards

Program Title: **Sheet Metal Fabrication Technology 2**
PSAV Number: **J360200**

Course Number: PMT0033
Occupational Completion Point: A
Architectural Fabricator – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
01.0	Fabricate architectural/roofing sheet metal--The student will be able to:
01.01	Fabricate batten seam metal roof panel and cap.
01.02	Fabricate standing seam metal roof panel.
01.03	Fabricate metal flat-lock roof panel.
01.04	Fabricate ogee gutter.
01.05	Fabricate half-round gutter.
01.06	Fabricate rectangular downspout/conductor.
01.07	Fabricate offset in rectangular downspout/conductor.
01.08	Fabricate conductor head.
01.09	Fabricate flashing.
01.10	Fabricate roof coping.
01.11	Fabricate gravel stop fascia.
01.12	Fabricate metal siding panel.
01.13	Fabricate louver.
01.14	Fabricate metal ceiling panel.
02.0	Install architectural/roofing sheet metal--The student will be able to:
02.01	Install batten seam metal roof panel and cap.
02.02	Install standing seam metal roof panel.
02.03	Install metal flat-lock roof panel.

CTE Standards and Benchmarks
02.04 Install ogee gutter.
02.05 Install half-round gutter.
02.06 Install rectangular downspout/conductor.
02.07 Install offset in rectangular downspout/conductor.
02.08 Install conductor head.
02.09 Install flashing.
02.10 Install coping.
02.11 Install gravel stop fascia.
02.12 Install metal siding.

Florida Department of Education
Student Performance Standards

Course Number: PMT0034
Occupational Completion Point: B
Commercial Kitchen Fabricator – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
03.0	Fabricate specialty sheet metal--The student will be able to:
03.01	Fabricate rectangular single blade damper in frame.
03.02	Fabricate rectangular tube.
03.03	Fabricate round tube.
03.04	Fabricate hollow metal letter.
03.05	Fabricate round duct support saddle (floor mounted).
03.06	Fabricate belt guard.
03.07	Fabricate blind/drapery pocket (cornice).
04.0	Fabricate food and beverage dispensing equipment--The student will be able to:
04.01	Fabricate counter top.
04.02	Fabricate shelf.
04.03	Fabricate cabinet shell.
04.04	Fabricate cabinet drawer.
04.05	Fabricate cabinet sliding door.
04.06	Fabricate sink and tub.

Florida Department of Education
Student Performance Standards

Course Number: PMT0035
Occupational Completion Point: C
Sheet Metal Welder – 225 Hours – SOC Code 47-2211

CTE Standards and Benchmarks	
05.0	Weld sheet metal--The student will be able to:
05.01	Weld aluminum with gas tungsten arc welding (GTAW) equipment.
05.02	Weld aluminum with gas metal arc welding (GMAW) equipment.
05.03	Weld stainless steel with gas metal arc welding (GMAW) equipment.
05.04	Weld stainless steel with shielded metal arc welding (SMAW) equipment.
06.0	Perform gas welding and cutting operations--The student will be able to:
06.01	Identify welding cylinders, regulators, hoses, pressure gages and torches.
06.02	Describe welding equipment safety procedures.
06.03	Demonstrate proper flame settings.
06.04	Demonstrate basic gas welding skills.
06.05	Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.
06.06	Demonstrate freehand and guide cutting of various metal thicknesses.
06.07	Set up and operate a plasma arc-cutting machine.
07.0	Perform electric metal-bonding operations--The student will be able to:
07.01	Describe and demonstrate the spot and arc welding process.
07.02	Demonstrate basic procedures for safety adjusting and operating an arc welder, selecting a rod, striking and maintaining an arc, welding in various positions and clamping.
07.03	Set up and operate a spot welder.
07.04	Explain and demonstrate the MIG welding process.
07.05	Apply basic procedures for safety adjusting, operating, cleaning and maintaining MIG welding equipment.
07.06	Apply basic procedures for safely adjusting and operating a TIG welder, welding in various positions, selecting proper tips and choosing filler metal.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Biomedical Equipment Repair Technology**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J400100
CIP Number	0615040106
Grade Level	30, 31
Standard Length	1140 hours
Teacher Certification	ELECTRONIC @7 7G MED EQUIP TECH 7G BIOMED EQ 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9062 – Medical Equipment Repairer 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial 49-9071 – Maintenance and Repair Workers, General
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

The purpose of this program is to prepare students for employment as biomedical equipment repair technicians. 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 course content includes, but is not limited to, hydraulics, pneumatics, optics and mechanics to troubleshoot, service and repair equipment commonly used for treatment, diagnosis and monitoring of patients in a medical environment.

The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Equipment Repair industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 four 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AVS0095	Basic Electronics Troubleshooter	150 hours	49-2094
B	EER0006	Electronics Equipment Repairer	150 hours	49-9071
C	EER0090 EER0091	Biomedical Electronics Troubleshooter 1 Biomedical Electronics Repair Technician	150 hours 150 hours	49-9062 49-9062
D	EER0092 EER0093	Biomedical Imaging Equipment 1 Biomedical Imaging Equipment Technician	270 hours 270 hours	49-9062 49-9062

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 soldering and basic laboratory practices.
02.0 Demonstrate proficiency in basic DC 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 DC circuits.
07.0 Demonstrate proficiency in AC circuits.
08.0 Demonstrate proficiency in analog circuits.
09.0 Demonstrate proficiency in solid state devices.
10.0 Demonstrate proficiency in digital circuits.
11.0 Demonstrate proficiency in fundamental micro-processors.
12.0 Demonstrate appropriate understanding of basic math skills.
13.0 Demonstrate an understanding of basic science skills.
14.0 Demonstrate skills in technical recording.
15.0 Demonstrate appropriate communication skills.
16.0 Demonstrate proficiency with Transistor Pulse Amplifiers.
17.0 Demonstrate proficiency with Trigger Device Circuits.
18.0 Demonstrate proficiency with Operational Amplifiers.
19.0 Demonstrate proficiency in knowledge of Electromagnetics.
20.0 Demonstrate proficiency with Fiber Optic Applications.
21.0 Demonstrate proficiency in DC Motor Systems.
22.0 Demonstrate proficiency with Motor Control Systems.
23.0 Demonstrate an understanding of safety concepts and best practices.
24.0 Demonstrate appropriate understanding of “The Human Machine”.
25.0 Demonstrate an understanding of Monitoring Systems.
26.0 Demonstrate proficiency with Basic Monitoring Equipment.
27.0 Demonstrate proficiency with Medical Support Equipment.
28.0 Demonstrate proficiency with Motors.
29.0 Demonstrate proficiency with Power Systems.
30.0 Demonstrate proficiency with Laboratory Equipment.
31.0 Demonstrate proficiency with Sterilization Equipment.
32.0 Demonstrate an understanding of Biomedical Imaging Systems.
33.0 Demonstrate proficiency with Radiographic Imaging Systems.
34.0 Demonstrate proficiency with Magnetic Resonance Imaging Systems.
35.0 Demonstrate proficiency with Impedance Tomography Systems.
36.0 Demonstrate proficiency with Life Support Systems.

37.0 Demonstrate proficiency with Respiratory Systems.
38.0 Demonstrate proficiency with Cardio Systems.
39.0 Demonstrate proficiency with Renal Systems.
40.0 Demonstrate proficiency with Incubators.
41.0 Demonstrate proficiency with Biomedical Optic Systems.
42.0 Demonstrate proficiency with Surgical Support Tools.
43.0 Demonstrate proficiency using Biomedical Information Systems.
44.0 Graphically illustrate an understanding of anatomy.
45.0 Reinforce knowledge of Medical Terminology.
46.0 Demonstrate proficiency in Computer Communication.
47.0 Demonstrate understanding and knowledge of Electro/Mechanical Safety.
48.0 Demonstrate understanding of Picture Archive Communication Systems.
49.0 Demonstrate understanding and knowledge of Diagnostic Ultrasound Equipment.
50.0 Demonstrate proficiency in Building Wiring.
51.0 Demonstrate proficiency in Basic Radiographic Equipment.
52.0 Demonstrate proficiency in Film Processing.
53.0 Demonstrate proficiency in Test Equipment.
54.0 Demonstrate an understanding of Magnetic Resonance Imaging.
55.0 Demonstrate understanding and knowledge of Computed Tomography.
56.0 Demonstrate an understanding of Nuclear Medicine.
57.0 Demonstrate an understanding of Codes and Regulations Applications.
58.0 Demonstrate proficiency in Troubleshooting.
59.0 Demonstrate proper application of Radiation Safety.
60.0 Demonstrate an understanding and knowledge of Radiation Physics.
61.0 Demonstrate proficiency in Linear Accelerators**.**

Florida Department of Education
Student Performance Standards

Program Title: **Biomedical Equipment Repair Technology**
PSAV Number: **J400100**

Course Number: AVS0095
Occupational Completion Point: A
Basic Electronics Troubleshooter – 150 Hours – SOC 49-4099

Course Description:
This course teaches basic DC an AC electricity and electronics fundamentals. It emphasizes troubleshooting techniques and it brings elements that help to develop fine motor skills. This course defines techniques, requirements and expectations for those seeking to enter the job market as employees or small business owners.

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
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 de-soldering 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 DC circuits.	
02.02 Solve problems in electronic units utilizing metric prefixes.	

CTE Standards and Benchmarks		National Standards
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	Analyze and troubleshoot series circuits.	
02.11	Apply Ohm's law to parallel circuits.	
02.12	Analyze and troubleshoot parallel circuits.	
03.0	Demonstrate employability skills—The Student will be able to:	
03.01	Discuss elements of a job search.	
03.02	Develop sources of 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).	
03.11	Resume writing.	
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.	

CTE Standards and Benchmarks		National Standards
	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.	
	04.07 Corporate structure “S”,”C”, Sole Proprietor, “LLC”	
05.0	Demonstrate proficiency in knowledge of basic computer usage—The Student will be able to:	
	05.01 Demonstrate proficiency in the knowledge of basic computer use.	
	05.02 Demonstrate the use of computer application programs (i.e., word processing, data base, Excel).	
06.0	Demonstrate proficiency in advanced DC circuits—The Student will be able to:	
	06.01 Solve algebraic problems to include exponentials to DC.	
	06.02 Relate electricity to the nature of matter.	
	06.03 Apply Ohm’s law to series-parallel and parallel-series circuits.	
	06.04 Construct and verify the operation of series-parallel and parallel-series and bridge circuits.	
	06.05 Troubleshoot series-parallel and parallel-series and bridge circuits.	
	06.06 Identify and define voltage divider circuits (loaded and unloaded).	
	06.07 Construct and verify the operation of voltage divider circuits (loaded and unloaded).	
	06.08 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).	
	06.09 Describe magnetic properties of circuits and devices.	
	06.10 Determine the physical and electrical characteristics of capacitors and inductors.	
	06.11 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants.	
	06.12 Set up and operate power supplies for DC circuits.	
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 Define the characteristics of AC capacitive circuits.	
	07.03 Analyze and troubleshoot AC capacitive circuits.	
	07.04 Define the characteristics of AC inductive circuits.	
	07.05 Analyze and troubleshoot AC inductive circuits.	

CTE Standards and Benchmarks	National Standards
07.06 Define and apply the principles of transformers to AC circuits.	
07.07 Analyze and troubleshoot AC circuits utilizing transformers.	
07.08 Analyze and troubleshoot differentiator and integrator circuits.	
07.09 Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).	
07.10 Define the characteristics of series and parallel resonant circuits.	
07.11 Analyze and troubleshoot R-C, R-L, and RLC circuits.	
07.12 Define the characteristics of frequency selective filter circuits.	
07.13 Analyze and troubleshoot frequency selective filter circuits.	
07.14 Define the characteristics of polyphase circuits.	
07.15 Define basic motor theory and operation.	
07.16 Define basic generator theory and operation.	
07.17 Set up and operate power supplies for AC circuits.	
07.18 Analyze and measure power in AC circuits.	

Florida Department of Education
Student Performance Standards

Course Number: EER0006
Occupational Completion Point: B
Electronics Equipment Repairer – 150 Hours – SOC 49-9071

Course Description:
This course develops skills and understanding of basic electronics, Analog, Digital, and Microprocessor functions. Students will learn or refresh practical and applied math and science skills.

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
08.0	Demonstrate proficiency in analog circuits—The Student will be able to:	
08.01	Identify and define operational characteristics and applications of multistage amplifiers.	
08.02	Analyze and troubleshoot multistage amplifiers.	
08.03	Identify and define operating characteristics and applications of linear integrated circuits.	
08.04	Identify and define operating characteristics and applications of basic power supplies and filters.	
08.05	Identify and define operating characteristics and applications of differential and operational amplifiers.	
08.06	Analyze and troubleshoot differential and operational amplifier circuits.	
08.07	Identify and define operating characteristics of audio power amplifiers.	
08.08	Analyze and troubleshoot audio power amplifiers.	
08.09	Identify and define operating characteristics and applications of power supply regulator circuits.	
08.10	Analyze and troubleshoot power supply regulator circuits.	
08.11	Identify and define operating characteristics and applications of active filters.	
08.12	Analyze and troubleshoot active filter circuits.	
08.13	Identify and define operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits.	
08.14	Analyze and troubleshoot oscillator circuits.	

CTE Standards and Benchmarks		National Standards
08.15	Identify and define operating characteristics and applications of cathode ray tubes and optoelectronic devices.	
08.16	Set up and operate measuring instruments for analog circuits.	
09.0	Demonstrate proficiency in solid state devices—The Student will be able to:	
09.01	Identify and define properties of semiconductor materials.	
09.02	Identify and define operating characteristics and applications of junction and special diodes.	
09.03	Analyze and troubleshoot diode circuits.	
09.04	Identify and define operating characteristics and applications of bipolar and field effect transistors,	
09.05	Identify and define operating characteristics and applications of single-stage amplifiers.	
09.06	Analyze and troubleshoot single-stage amplifiers.	
09.07	Analyze and troubleshoot thyristor circuitry.	
09.08	Set up and operate; DVM, power supplies, oscilloscopes, and function generators for solid-state devices.	
09.09	Demonstrate transistor testing techniques.	
10.0	Demonstrate proficiency in digital circuits—The Student will be able to:	
10.01	Define and apply numbering systems to codes and arithmetic operations.	
10.02	Analyze and minimize logic circuits using Boolean operations.	
10.03	Set up and operate; logic probes, pulsers, oscilloscopes, logic analyzers, and pulse generators for digital circuits.	
10.04	Set up and operate power supplies for digital circuits and solve power distribution and noise problems.	
10.05	Identify types of logic gates and their truth tables.	
10.06	Construct combinational logic circuits using integrated circuits.	
10.07	Troubleshoot logic circuits.	
10.08	Analyze types of flip-flops and their truth tables.	
10.09	Troubleshoot flip-flops.	
10.10	Identify, define and measure characteristics of integrated circuit (IC) logic families.	
10.11	Identify types of registers and counters.	
10.12	Troubleshoot registers and counters.	

CTE Standards and Benchmarks		National Standards
10.13	Analyze clock and timing circuits.	
10.14	Troubleshoot clock and timing circuits.	
10.15	Identify types of arithmetic-logic circuits.	
10.16	Troubleshoot arithmetic-logic circuits.	
10.17	Identify types of encoding and decoding devices.	
10.18	Troubleshoot encoders and decoders.	
10.19	Identify types of multiplexer and demultiplexer circuits.	
10.20	Troubleshoot multiplexer and demultiplexer circuits.	
10.21	Identify types of memory circuits.	
10.22	Relate the uses of digital-to-analog and analog-to-digital conversions.	
10.23	Troubleshoot digital-to-analog and analog-to-digital circuits.	
10.24	Identify types of digital displays.	
10.25	Troubleshoot digital display circuits.	
11.0	Demonstrate proficiency in fundamental micro-processors—The Student will be able to:	
11.01	Identify central processing unit (CPU) building blocks and their uses (architecture).	
11.02	Analyze bus concepts.	
11.03	Analyze various memory schemes.	
11.04	Use memory devices in circuits.	
11.05	Set up and operate oscilloscopes for microprocessor systems.	
11.06	Identify types of input and output devices and peripherals.	
11.07	Interface input and output ports to peripherals.	
11.08	Analyze and troubleshoot input and output ports.	
12.0	Demonstrate appropriate understanding of basic math skills—The Student will be able to:	
12.01	Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.	
12.02	Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.	
12.03	Add, subtract, multiply and divide using fractions, decimals, and whole numbers.	

CTE Standards and Benchmarks		National Standards
12.04	Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.	
12.05	Demonstrate and understanding of federal, state, and local taxes and their computation.	
13.0	Demonstrate an understanding of basic science skills—The Student will be able to:	
13.01	Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
13.02	Draw conclusions or make interferences from data.	
13.03	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.	
13.04	Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.	
14.0	Demonstrate skills in technical recording—The Student will be able to:	
14.01	Draw and interpret electronic schematics.	
14.02	Write reports and make oral presentations.	
14.03	Maintain test logs.	
14.04	Make equipment failure reports.	
14.05	Specify and requisition simple electronic components.	
14.06	Compose technical letters and memoranda.	
14.07	Write formal reports of laboratory experiences.	
14.08	Draft preventive maintenance procedures.	
15.0	Demonstrate appropriate communication skills—The Student will be able to:	
15.01	Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.	
15.02	Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.	
15.03	Read and follow written instructions.	
15.04	Answer and ask questions coherently and concisely.	
15.05	Read critically by recognizing assumptions and implications and by evaluating ideas.	
15.06	Demonstrate appropriate telephone/communication skills.	

Florida Department of Education
Student Performance Standards

Course Number: EER0090
Occupational Completion Point: C (1 of 2)
Biomedical Electronics Troubleshooter 1 – 150 Hours – SOC 49-9062

Course Description:
This course develops skills and understanding of advanced electronics circuits; semiconductor devices, fiber optics, and basic motor applications.

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Demonstrate proficiency with Transistor Pulse Amplifiers—The Student will be able to:	
16.01	Observe and study Schmitt Trigger operation.	
16.02	Troubleshoot Schmitt Trigger circuits.	
17.0	Demonstrate proficiency with Trigger Device Circuits—The Student will be able to:	
17.01	Understand trigger devices.	
17.02	Explain uni-junction transistor oscillator operation.	
17.03	Validate SCR trigger circuit operation.	
17.04	Explain SCR power control operation.	
17.05	Troubleshoot SCR circuit circuits.	
17.06	Differentiate between DIAC, TRIAC, and 4-layer diodes.	
17.07	Classify programmable uni-junction transistors.	
18.0	Demonstrate proficiency with Operational Amplifiers—The Student will be able to:	
18.01	Examine operational amplifiers functionality.	
18.02	Troubleshoot operational amplifiers.	
19.0	Demonstrate proficiency in knowledge of Electromagnetics—The Student will be able to:	
19.01	State magnetism and electromagnetic principles.	
19.02	Extrapolate magnetic calculations.	

CTE Standards and Benchmarks		National Standards
20.0	Demonstrate proficiency with Fiber Optic Applications—The Student will be able to:	
20.01	Understand fiber optics.	
20.02	Apply fiber optics concepts to communications protocols.	
20.03	Understand lasers.	
20.04	Construct fiber optic cable connections.	
20.05	Troubleshoot fiber optic system devices.	
21.0	Demonstrate proficiency in DC Motor Systems—The Student will be able to:	
21.01	Explain the concepts and principles of DC series field motors.	
21.02	Label brushless DC motor components.	
21.03	Troubleshoot AC motor systems.	
21.04	Describe pulse width modulation and amplification functionality.	
21.05	Troubleshoot open loop motor system.	
22.0	Demonstrate proficiency with Motor Control Systems—The Student will be able to:	
22.01	Investigate the functionality of motion detection.	
22.02	Recognize error detection and feedback protocols.	
22.03	Troubleshoot closed loop system.	
22.04	Investigate the functionality of position detection.	
22.05	Extrapolate Proportional-Integral-Derivative (PID) control system output functions.	
22.06	Troubleshoot Proportional-Integral-Derivative (PID) control systems.	
22.07	Distinguish the differences between motion detection and position detection.	
23.0	Demonstrate an understanding of safety concepts and best practices—The Student will be able to:	
23.01	Evaluate personal and workplace safety concerns.	
23.02	Justify medical ethics.	
23.03	Create an Electrical Shock and Safety Public Service Announcement (PSA).	
23.04	Design a “Best Practices” plan for tool safety.	
23.05	Apply National Electric Code (NEC) Standards to medical facilities.	

CTE Standards and Benchmarks		National Standards
	23.06 Compare and contrast Biomedical Equipment specifications and installation requirements.	
	23.07 Diagram a Systems Thinking model.	
24.0	Demonstrate appropriate understanding of “The Human Machine” —The Student will be able to:	
	24.01 Define medical terminology words and terms.	
	24.02 Communicate an understanding of cells and body fluid.	
	24.03 Reconstruct the skeletal and muscle system as they apply to biomechanics.	
	24.04 Recognize and document the gastrointestinal system.	
	24.05 Explain the functionality of the nervous and endocrine systems.	
	24.06 List the functions of the circulatory and pulmonary systems.	
	24.07 Outline the proper procedures for handling bio-hazardous materials.	
25.0	Demonstrate an understanding of Monitoring Systems—The Student will be able to:	
	25.01 Collect and confirm biomedical measurements.	
	25.02 Align the proper electrodes, sensors, and transducer to a biomedical measurement.	
	25.03 Provide examples of signal processing techniques.	
	25.04 Identify data recording systems.	
26.0	Compile and Compare Data through the Usage of Basic Monitoring Equipment—The Student will be able to:	
	26.01 Recognize vital signs.	
	26.02 Compare blood pressure measurements from various sources.	
	26.03 Chart blood oxygen level measurements over multiple time periods.	
	26.04 Plot temperature measurements and explain how temperature sensors react to various skin conditions.	
	26.05 Apply electro-cardio measurement devices and determine normal outcomes.	
	26.06 Estimate pulse and respiratory measurements and compare to actual scales.	
27.0	Demonstrate proficiency with Medical Support Equipment—The Student will be able to:	
	27.01 Understand the fundamental concepts and principles of biomedical pumps.	
	27.02 Explain displacement pumps functionality.	
	27.03 List the applications of centrifugal and gravity pumps.	

CTE Standards and Benchmarks	National Standards
27.04 Detail the effects of electromagnetic and impedance on pumps	
27.05 Observe the operation of vacuum and pneumatic pumps.	
28.0 Demonstrate proficiency with Motors—The Student will be able to:	
28.01 Understand motion control as it applies to biomedical motors.	
28.02 Analyze and troubleshoot stepper, linear, PCB, and pneumatic motors.	
29.0 Demonstrate proficiency with Power Systems—The Student will be able to:	
29.01 Formulate a plan for managing AC power in a medical environment.	
29.02 Differentiate between batteries and their application to medical equipment.	
29.03 Evaluate battery backup systems for rated capacity and life expectancy.	
29.04 Summarize the characteristics of various dental compressor systems.	
30.0 Demonstrate proficiency with Laboratory Equipment—The Student will be able to:	
30.01 Compare and contrast biological and chemical testing systems	
30.02 Categorize manipulation, prep, and storage systems to their laboratory application.	
31.0 Demonstrate proficiency with Sterilization Equipment—The Student will be able to:	
31.01 Understand the need and describe the process of sterilization.	
31.02 List the types of sterilization equipment.	
31.03 Analyze and troubleshoot ultrasonic and ultraviolet sterilization systems.	

Course Number: EER0091
Occupational Completion Point: C (2 of 2)
Biomedical Electronics Repair Technician – 150 Hours – SOC 49-9062

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
32.0 Demonstrate an understanding of Sound Imaging Systems—The Student will be able to:	
32.01 Explain the characteristics of sound waves.	

CTE Standards and Benchmarks		National Standards
32.02	Describe the Doppler Effect and list the medical uses of Doppler.	
32.03	Determine how sonography and ultrasonography equipment capture images of the body's internal functions.	
32.04	Explain how echocardiography creates an image of the heart muscle and identify information that is captured and displayed by echocardiograph equipment.	
32.05	Develop a preventative maintenance plan for a given sound imaging system (ultrasound, echocardiograph).	
33.0	Demonstrate proficiency with Radiographic Imaging Systems—The Student will be able to:	
33.01	Prepare a 20 minute presentation on the types, operation, and safety precautions of a given Radiographic Imaging System (x-ray, fluoroscopic).	
33.02	Differentiate between an x-ray and a fluoroscopic imaging system and define the limitations of each.	
33.03	Analyze and troubleshoot faulted radiographic imaging systems.	
34.0	Demonstrate proficiency with Nuclear Imaging Systems—The Student will be able to:	
34.01	Identify the main components of MRI, CT, and PET imaging systems and describe the information provided by these systems.	
34.02	Develop an operational procedures step-action table from the observation of the operation of MRI, CT, and PET imaging systems.	
34.03	Evaluate a faulted Magnetic Resonance Imaging System and create a troubleshooting procedure for determining the cause of the fault.	
35.0	Demonstrate proficiency with Impedance Tomography Systems—The Student will be able to:	
35.01	Diagram the process of nerve impulses across synapses and at neuromuscular junctions.	
35.02	Draw a block diagram of the key elements of an EMG, EEG, and ECG system.	
35.03	Recognize the operational differences between EMG, EEG, and ECG systems.	
35.04	List the common failures associated with EMG, EEG, and ECG systems and recommend interventions for returning the equipment to an operational condition.	
36.0	Demonstrate proficiency with Life Support Systems—The Student will be able to:	
36.01	Categorize biomedical needs as basic, advance, or long term life support.	
36.02	Explain the purpose and operation of various life support systems and link their use with the appropriate level of life support.	
36.03	Choose the best infusion device (intravenous, subcutaneous, respiratory) to provide life support to a given medical condition.	
36.04	Write a troubleshooting plan to correct malfunctions on specific life support systems.	
37.0	Demonstrate proficiency with Respiratory Systems—The Student will be able to:	

CTE Standards and Benchmarks		National Standards
	37.01 Identify the types and explain the operation of different types of Resuscitator Systems.	
	37.02 List the critical elements to verify when maintaining respiratory equipment, ventilators, and nebulizers.	
38.0	Demonstrate proficiency with Cardio Systems—The Student will be able to:	
	38.01 Describe the purpose and operation of various types of Cardio Systems.	
	38.02 Explain the safety precautions when using and working with Defibrillators.	
	38.03 Report on the history, purpose, and technical requirements of pacemakers.	
39.0	Demonstrate proficiency with Renal Systems—The Student will be able to:	
	39.01 Recognize the types of renal dysfunctions.	
	39.02 Draw a flow diagram of Renal System Equipment with their interfaces to the human renal system.	
	39.03 Determine the corrective action for common Dialysis Equipment failures.	
40.0	Demonstrate proficiency with Incubators—The Student will be able to:	
	40.01 Correlate the fetal biomedical functions to the elements an incubator provides (ambient temperature, skin temperature, humidity, oxygen, sound and lighting) and explain the purpose and operation of each element.	
	40.02 Explain the purpose and components of an MR-Compatible Neonatal Incubator.	
	40.03 Describe the process of monitoring fetal heart, temperature, and respiratory parameters and determine the life-sustaining ranges of each.	
	40.04 Create a preventative maintenance plan for Incubators.	
41.0	Demonstrate proficiency with Biomedical Optic Systems—The Student will be able to:	
	41.01 Practice the protocols associated with working in the operating room environment (dress code, sterilization, equipment handling).	
	41.02 Define the characteristics of fiber optics and calculate reflective and refraction errors in a fiber optic cable.	
	41.03 Select a type of operating room optic system (laser, optical microscope, endoscopy, etc) and prepare a 15 minute lesson that describes the purpose, use, operation, and precautions associated with the system.	
42.0	Demonstrate proficiency with Surgical Support Systems—The Student will be able to:	
	42.01 Explain the use and operation of the different types of Surgical Support Systems (electrosurgical generators, cauterization, lighting, suction, robotics, adjustable patient platforms, and cooling).	
	42.02 Analyze malfunctions in surgical support systems and develop a troubleshooting process plan.	
43.0	Demonstrate Proficiency using Biomedical Information Systems—The Student will be able to:	
	43.01 Research the meaning and provide examples of health-care informatics.	

CTE Standards and Benchmarks		National Standards
43.02	Conduct a survey of local medical facilities and determine the types of Facility Information Systems used in the biomedical industry.	
43.03	Draw a block diagram of a typical health-care facility Central Monitoring System.	

Florida Department of Education
Student Performance Standards

Course Number: EER0092
Occupational Completion Point: D (1 of 2)
Medical Imaging Equipment 1 – 270 Hours – SOC 49-9062

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
44.0	Graphically illustrate an understanding of anatomy—The Student will be able to:	
44.01	State the Purposes of the Skeletal System.	
44.02	Describe Appendicular Skeletal System.	
44.03	Describe Axial Skeletal System	
44.04	Identify Bone vs. Cartilage and list the differences between them	
44.05	Identify Ligament vs. Tendon and Explain the Difference	
44.06	Identify Major Nerves	
44.07	Identify Major Veins	
44.08	Identify Major Bones	
45.0	Reinforce knowledge of Medical Terminology—The Student will be able to:	
45.01	Describe the anatomical position.	
45.02	State positional terms.	
45.03	State directional terms	
45.04	Identify anatomical planes	
45.05	Describe supine and compare the term with prone	
45.06	Identify major suffixes, roots and prefixes used in medical terminology	
45.07	State radiographic positional terms.	
46.0	Demonstrate proficiency in Computer Communication—The Student will be able to:	

CTE Standards and Benchmarks		National Standards
	46.01 Demonstrate the ability to install RJ45/48 connectors and fittings	
	46.02 Explain the difference between single twisted pair and CAT-5 wiring	
	46.03 Define network control points	
	46.04 Define and construct a database	
	46.05 Demonstrate ability to “ping” hardware along the network.	
47.0	Demonstrate understanding and knowledge of Electro/Mechanical Safety—The Student will be able to:	
	47.01 Define electrical safety	
	47.02 Relate how preventive maintenance reduces electrical hazards	
	47.03 Define corrective maintenance	
	47.04 Define scheduled maintenance	
	47.05 Explain lock out/tag out procedures	
	47.06 Define leakage current	
	47.07 Define required grounding for imaging equipment (portable and fixed)	
	47.08 Administer electrical safety tests on equipment	
	47.09 Explain universal precautions	
	47.10 State the ground resistances for existing portable medical equipment in patient-care areas	
	47.11 State the ground resistances for new portable medical equipment in patient-care areas	
	47.12 State the chassis leakage current for portable medical equipment in patient-care areas	
	47.13 State the lead leakage current for portable medical equipment in patient-care areas	
	47.14 State the lead leakage current for x-ray equipment in patient-care areas	
48.0	Demonstrate understanding of Picture Archive Communication Systems—The Student will be able to:	
	48.01 Explain electrical surge potentials	
	48.02 List ways of preventing damage from electrical surges	
	48.03 Describe the internet and its application to imaging modalities	
	48.04 Explain TCP/IP duties and protocols	
	48.05 Describe security problems with the internet	

CTE Standards and Benchmarks		National Standards
	48.06 Describe tele-radiology	
	48.07 Describe picture archive communication system	
	48.08 List major components of picture archive communication system	
	48.09 Explain basic computer/network maintenance procedures	
49.0	Demonstrate understanding and knowledge of Diagnostic Ultrasound Equipment—The Student will be able to:	
	49.01 List the functions of the five basic components of a diagnostic medical ultrasound machine	
	49.02 Identify the unique characteristics for each of the types of transducer scan heads used in real-time ultrasound	
	49.03 Describe current ultrasound image display formats (pie-shaped, rectangular, trapezoidal, circular)	
	49.04 Describe the different ultrasound image recording formats (polaroid film, single emulsion film, thermal paper, magnetic tape, magnetic disks, optical disks)	
	49.05 Describe A-mode, B-mode, and M-mode	
50.0	Demonstrate proficiency in Building Wiring—The Student will be able to:	
	50.01 List standards used in the electrical wiring of medical buildings	
	50.02 Explain methods of pre-wiring and ways to wire existing buildings	
	50.03 Explain NEC or other safety rules pertaining to building wiring and grounding	
51.0	Demonstrate proficiency in Basic Radiographic Equipment—The Student will be able to:	
	51.01 List the main function of an X-ray machine	
	51.02 State the different types of X-ray machines (fluoroscope, cine, chest, dental)	
	51.03 Sketch a circuit diagram of an X-ray machine and X-ray tube	
	51.04 Describe the “heel effect”	
	51.05 Describe the focal spot	
	51.06 Explain the purpose of grids	
	51.07 Explain the purpose of the “bucky”	
	51.08 Identify dental and portable X-ray machine components	
	51.09 Identify general “rad-room” components	
	51.10 Identify “cath-lab” components	

CTE Standards and Benchmarks	National Standards
52.0 Demonstrate proficiency in Film Processing—The Student will be able to:	
52.01 Describe wet processing	
52.02 Identify chemicals and functions	
52.03 Describe dry processing	
52.04 Identify and describe laser imaging process	
52.05 Describe function and makeup of X-ray cassettes	
52.06 Describe and identify X-ray film types	
52.07 State dark-room procedures	
52.08 Describe film duplication process	
52.09 Demonstrate proper cassette loading techniques	

Course Number: EER0093
Occupational Completion Point: D (2 of 2)
Biomedical Imaging Equipment Technician – 270 Hours – SOC-17-2031

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
53.0 Demonstrate proficiency in Test Equipment—The Student will be able to:	
53.01 Explain the purpose of a dosimeter	
53.02 Demonstrate proper operation of a DVM and an Oscilloscope	
53.03 Demonstrate proper operation of a milliamp-meter	
53.04 Explain the application of an ion chamber	
53.05 Explain the application of the half-value layer	
54.0 Demonstrate an understanding of Magnetic Resonance Imaging—The Student will be able to:	
54.01 Identify magnet types	
54.02 Describe the Fourier process	

CTE Standards and Benchmarks		National Standards
	54.03 Identify cryogens	
	54.04 Describe T1 and T2	
	54.05 State purpose of gradients	
	54.06 Identify coils	
	54.07 State purpose of auxiliary coils	
	54.08 Identify RF leakage	
	54.09 Identify image produced with metal in bore	
55.0	Demonstrate understanding and knowledge of Computed Tomography—The Student will be able to:	
	55.01 Define computed tomography	
	55.02 Identify the components of computed tomography (gantry – tube/detectors – generator – couch – computers – applications – reconstruction – display)	
	55.03 Describe the formation of the image	
	55.04 Describe computed tomography dose index (CTDI)	
	55.05 Describe multiple scan average dose (MSDA)	
	55.06 Describe beam geometry	
	55.07 Describe measuring dose	
	55.08 Describe protocol selection options (kvp, mAs, slice thickness, feed, matrix, algorithm)	
56.0	Demonstrate an understanding of Nuclear Medicine—The Student will be able to:	
	56.01 Identify the major components of a scintillation camera	
	56.02 List the function of scintillation camera collimators	
	56.03 Identify the material of which scintillation camera collimators are made	
	56.04 Identify the chemical composition of a scintillation crystal and its physical characteristics	
	56.05 List the environmental factors that can adversely affect a scintillation crystal	
	56.06 Identify the purpose of a photo multiplier tube in a scintillation detector system	
	56.07 Describe the function of a pulse height analyzer in a scintillation detector system	
	56.08 Differentiate between planar, SPECT, and PET	

CTE Standards and Benchmarks	National Standards
57.0 Demonstrate an understanding of Codes and Regulations Applications—The Student will be able to:	
57.01 State pertinent NFPA 99 chapters	
57.02 Explain ACR regulations	
57.03 List the labeling criteria per 21CFR	
57.04 List the safety indicators required per 21CFR	
57.05 Enumerate fluoroscopic time limits	
57.06 State required accuracy of mA and kVp measurements	
57.07 State required accuracy of timer and light field	
57.08 State the three major organizations involved in setting the safe limits of radiation dosage	
58.0 Demonstrate proficiency in Troubleshooting—The Student will be able to:	
58.01 Demonstrate proper usage of test equipment	
58.02 Describe “last good, first bad” method of troubleshooting	
58.03 Describe “divide and conquer” method of troubleshooting	
58.04 Demonstrate how to use static-arresting test procedures	
58.05 Demonstrate diagnosis and repair of defective electronic imaging equipment	
59.0 Demonstrate proper application of Radiation Safety—The Student will be able to:	
59.01 State the importance of exposure time, shielding, and distance from source in regard to safety.	
59.02 Describe the safe handling of isotopes and cryogens	
59.03 Describe the reasons for non-ferrous tools in the MRI suite	
59.04 Describe the “Thomson Effect”	
59.05 Describe the purpose of a film badge	
59.06 State the inverse square law	
59.07 State the potential lethal dose of x-radiation for humans	
60.0 Demonstrate an understanding and knowledge of Radiation Physics—The Student will be able to:	
60.01 Define ionizing radiation	
60.02 State the diagnostic (measurement) function of an X-ray machine	

CTE Standards and Benchmarks		National Standards
60.03	Explain how X-Rays are produced	
60.04	Explain decay rate	
60.05	Describe hard and soft radiation	
61.0	Demonstrate proficiency in Linear Accelerators—The Student will be able to:	
61.01	Describe a cyclotron.	
61.02	Explain how a cyclotron may be utilized for treatment.	
61.03	Discuss how a neutron beam is generated.	
61.04	Describe the betatron.	
61.05	Discuss the major differences between a cyclotron and betatron.	
61.06	Name the types of isotope treatment units.	
61.07	State the function of a linear accelerator treatment unit.	
61.08	Name the types of beams produced by a linear accelerator and state their uses.	
61.09	List types of linear accelerator designs utilized to accelerate electrons.	
61.10	List the functions of the major block diagram components and auxiliary systems of a medical linear accelerator.	
61.11	Name the common types of external beams utilized in radiotherapy.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 10.0, 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Boat and Yacht Repair/Refinishing Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J430100
CIP Number	0647061603
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	SEAMANSHIP 7G CARPENTRY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2091 – Fiberglass Laminators and Fabricators 47-3019 – Helpers, Construction Trades, All Other
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices as marine painter/refinisher, marine carpenter, marine mechanical systems technician or marine welder/fabricator. A program may be structured to emphasize one of the course areas but does not have to cover all areas comprehensively.
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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0360	Helper, Boat Repairer/Refinishing	300 hours	47-3019
B	MTE0361	Boat Refinishing Technician	300 hours	51-2091

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 Describe different types of marine manufacturing industries.
02.0 Demonstrate basic skills in the different types of marine trades and occupations.
03.0 Demonstrate proficiency in preparing surfaces and applying marine paint finishes.
04.0 Demonstrate proficiency in preparing surfaces and refinishing fiberglass.
05.0 Demonstrate proficiency in marine terminology.
06.0 Demonstrate proficiency in safety practices in marine occupations.

2014 – 2015

Florida Department of Education
Student Performance Standards

Program Title: **Boat and Yacht Repair/Refinishing Technology 1**
PSAV Number: **J430100**

Course Number: MTE0360
Occupational Completion Point: A
Helper, Boat Repairer/Refinishing – 300 Hours – SOC Code 47-3019

CTE Standards and Benchmarks	
01.0	Describe different types of marine manufacturing industries--The student will be able to:
01.01	Explain the process of manufacturing motor yachts.
01.02	Explain the process of manufacturing sailboats.
01.03	Explain the process of manufacturing small powerboats.
01.04	Explain the process of manufacturing center console boats.
01.05	Explain the process of manufacturing of commercial workboats.
02.0	Demonstrate basic skills in the different types of marine trades and occupations--The student will be able to:
02.01	Describe the occupational requirements of a boat finisher/painter.
02.02	Perform basic occupational requirements of a marine carpenter.
02.03	Perform basic occupational requirements of a marine mechanical installer.
02.04	Perform basic occupational requirements of a marine welder fabricator.
03.0	Demonstrate proficiency in preparing surfaces and applying marine paint finishes--The student will be able to:
03.01	Prepare wood surfaces for painting.
03.02	Prepare aluminum surfaces for painting.
03.03	Prepare steel surfaces for painting.
03.04	Apply paint to surfaces by brush.
03.05	Apply paint to surfaces by spray gun.

Florida Department of Education
Student Performance Standards

Course Number: MTE0361
Occupational Completion Point: B
Boat Refinishing Technician – 300 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
04.0	Demonstrate proficiency in preparing surfaces and refinishing fiberglass--The student will be able to:
04.01	Prepare raw fiberglass surfaces for painting.
04.02	Repair and refinish fiberglass surfaces.
05.0	Demonstrate proficiency in marine terminology--The student will be able to:
05.01	Use correct marine terminology.
05.02	Use correct marine technical terminology.
06.0	Demonstrate proficiency in safety practices in marine occupations--The student will be able to:
06.01	Demonstrate the safe use of hand tools in marine occupations.
06.02	Demonstrate the safe use of power tools in marine occupations.
06.03	Demonstrate the safe use of paints, chemicals, fiberglass and compounds.
06.04	Demonstrate the safe use of electrical connectors, cords and tools.
06.05	Apply shop safety rules.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Boat and Yacht Repair/Refinishing Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J430200
CIP Number	0647061604
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	SEAMANSHIP 7G CARPENTRY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2091 – Fiberglass Laminators and Fabricators
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices as marine painter/refinisher, marine carpenter, marine mechanical systems technician or marine welder/fabricator. A program may be structured to emphasize one of the course areas but does not have to cover all areas comprehensively.
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 750 hours. **Boat and Yacht Repair/Refinishing Technology 1** is a core program. It is recommended students complete **Boat and Yacht Repair/Refinishing Technology 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Boat and Yacht Repair/Refinishing Technology 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
	MTE0376	Boat Repairer 1	450 hours	
A	MTE0377	Boat Repairer 2	300 hours	51-2091

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 the ability to properly handle lines and related operations in securing a vessel.
02.0 Demonstrate proficiency in coordinating the manufacturing, repair and refinishing operations in the marine industry.

Florida Department of Education
Student Performance Standards

Program Title: **Boat and Yacht Repair/Refinishing Technology 2**
PSAV Number: **J430200**

Course Number: MTE0376
Occupational Completion Point: A (1 of 2)
Boat Repairer – 450 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
01.0	Demonstrate the ability to properly handle lines and related operations in securing a vessel--The student will be able to:
01.01	Demonstrate the use of, a minimum of eight (8), correct nautical knots used in securing a vessel.
01.02	Identify the current terminology of lines.
01.03	Demonstrate slowing a vessel in dock.
01.04	Place fenderboards to protect a vessel
01.05	Connect ancillary services to a moored vessel.
01.06	Demonstrate blocking and supporting a vessel for repair in a work yard.
01.07	Demonstrate two common methods of splicing.

Course Number: MTE0377
Occupational Completion Point: A (2 of 2)
Boat Repairer – 300 Hours – SOC Code 51-2091

CTE Standards and Benchmarks	
02.0	Demonstrate proficiency in coordinating the manufacturing, repair and refinishing operations in the marine industry--The student will be able to:
02.01	Perform different basic types of work processes.
02.02	Identify the sequential order of work processes.
02.03	Demonstrate the ability to coordinate the work processes in the boatyard-manufacturing environment.
02.04	Demonstrate the ability to coordinate the work processes in the boatyard-refurbishing environment.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Jewelry Making and Repair 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J450400
CIP Number	0647040804
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	METAL WORK 7G JWLY MFGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9064 – Watch Repairers 51-9071 – Jewelers and Precious Stone and Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0650	Clock, Watch and Jewelry Technician Assistant	450 hours	49-9064
B	PMT0630	Jewelry Designer	450 hours	51-9071

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 Develop basic trade skills.
02.0 Demonstrate safe use of basic tools and equipment.
03.0 Perform sawing, piercing, filing and cutting skills.
04.0 Solder metals.
05.0 Perform general repairs.
06.0 Perform polishing techniques.
07.0 Perform shop management skills.
08.0 Identify timepieces.
09.0 Roll metal and wire.
10.0 Design and fabricate jewelry.

Florida Department of Education
Student Performance Standards

Program Title: **Jewelry Making and Repair 1**
PSAV Number: **J450400**

Course Number: PMT0650
Occupational Completion Point: A
Clock, Watch and Jewelry Technician Assistant – 450 Hours – SOC Code 49-9064

CTE Standards and Benchmarks	
01.0	Develop basic trade skills--The student will be able to:
01.01	Organize shop and maintain tools.
01.02	Identify safety skills.
01.03	Develop measuring and weighing skills.
01.04	Test and identify metals.
01.05	Identify problems with quartz watches.
01.06	Select hand tools and equipment.
02.0	Demonstrate safe use of basic tools and equipment--The student will be able to:
02.01	Handle tools and equipment safely.
03.0	Perform sawing, piercing, filing and cutting skills--The student will be able to:
03.01	Identify appropriate sawing, piercing, filing and cutting skills.
04.0	Solder metals--The student will be able to:
04.01	Select soldering equipment and hand tools.
04.02	Select appropriate solder and flux.
04.03	Solder metals.
05.0	Perform general repair--The student will be able to:
05.01	Identify watch batteries, gaskets, band, pins and round watch crystals .
05.02	Remove and replace watch stems.
05.03	Identify jewelry findings and parts.

CTE Standards and Benchmarks	
	05.04 Repair basic chain links.
06.0	Perform polishing techniques--The student will be able to:
	06.01 Buff metals using abrasives.
	06.02 Polish metals.
	06.03 Clean metals.
	06.04 Polish plastic crystals.
07.0	Perform shop management skills--The student will be able to:
	07.01 Apply positive relations with employer or client.
	07.02 Identify and assess repairs.
08.0	Identify timepieces--The student will be able to:
	08.01 Use standard references and computerized database to identify watch movements and replacement parts.
	08.02 Describe timepiece parts and their functions.

Florida Department of Education
Student Performance Standards

Course Number: PMT0630
Occupational Completion Point: B
Jewelry Designer – 450 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
02.0	Demonstrate safe use of basic tools and equipment--The student will be able to:
02.02	Operate polishing machine.
02.03	Operate ultrasonic cleaning machine.
03.0	Perform sawing, piercing, filing and cutting skills--The student will be able to:
03.02	Use sawing techniques.
03.03	Use piercing techniques.
03.04	Use filing techniques.
03.05	Use cutting techniques.
04.0	Solder metals--The student will be able to:
04.04	Solder jewelry.
07.0	Perform shop management skills--The student will be able to:
07.03	Prepare cost estimates and work orders.
07.04	Maintain a shop production schedule.
07.05	Maintain inventory.
07.06	Explain impact of professional trade organizations on the industry.
09.0	Roll metal and wire--The student will be able to:
09.01	Melt precious metals into ingots.
09.02	Roll ingot into sheet metal wire.
09.03	Construct a tubing wire.
10.0	Design and fabricate jewelry--The student will be able to:
10.01	Design and fabricate jewelry using wire.
10.02	Design and fabricate jewelry using sheet metals.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Jewelry Making and Repair 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J450500
CIP Number	0647040805
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	METAL WORK 7G JWLY MFGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-9071 – Jewelers and Precious Stone and Metal Workers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 four 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 750 hours. **Jewelry Making and Repair 1** is a core program. It is recommended students complete **Jewelry Making and Repair 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Jewelry Making and Repair 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0640	Wax Modeler/Casting	150 hours	51-9071
B	PMT0641	Jewelry Repairer	300 hours	51-9071
C	PMT0632	Stone Setter	150 hours	51-9071
D	PMT0645	Certified Jeweler (Jewelry Finishing Technician)	150 hours	51-9071

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 Cast jewelry.
02.0 Perform general repairs.
03.0 Set stones.
04.0 Apply surface treatment.

Florida Department of Education
Student Performance Standards

Program Title: **Jewelry Making and Repair 2**
PSAV Number: **J450500**

Course Number: PMT0640
Occupational Completion Point: A
Wax Modeler/Casting – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
01.0	Cast jewelry--The student will be able to:
01.01	Identify types of casting methods.
01.02	Design and sculpture wax models and molds.
01.03	Cast jewelry pieces using lost wax process.

Florida Department of Education
Student Performance Standards

Course Number: PMT0641
Occupational Completion Point: B
Jewelry Repairer – 300 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
02.0	Perform general repairs--The student will be able to:
02.01	Analyze and perform advanced chain link repair.
02.02	Size ring.
02.03	Reshank ring.
02.04	Repair prong.
02.05	Repair hinge.
02.06	Replace watch battery.
02.07	Replace findings.

Florida Department of Education
Student Performance Standards

Course Number: PMT0632
Occupational Completion Point: C
Stone Setter – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
03.0	Set stones--The student will be able to:
03.01	Test and identify stones.
03.02	Set stone in a pronged mounting.
03.03	Set stone in a bezel setting.
03.04	Set stone in a baguette setting.
03.05	Set stone in a pave setting.
03.06	Set stone in a peg setting.
03.07	Set stone in a tube setting.
03.08	Set stone in a channel setting.
03.09	Restring pearls and stone beads.

Florida Department of Education
Student Performance Standards

Course Number: PMT0645
Occupational Completion Point: D
Certified Jeweler (Jewelry Finishing Technician) – 150 Hours – SOC Code 51-9071

CTE Standards and Benchmarks	
04.0	Apply surface treatment--The student will be able to:
04.01	Identify surface techniques.
04.02	Electroplate jewelry.
04.03	Perform diamond cutting.
04.04	Apply enamel to metal.
04.05	Apply repousse' and chasing techniques.
04.06	Apply engraving techniques.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Florida Department of Education
Curriculum Framework

Program Title: **Electronic Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J540100
CIP Number	0615030315
Grade Level	30, 31
Standard Length	650 hours
Teacher Certification	ELECTRONIC @7 7G TEC ELEC @7 7G AVIONICS @7 7G RADIO TV 7G TV PROD TEC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-2022 – Electrical and Electronic Equipment Assemblers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 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.

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 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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0010	Electronics Assembler	250 hours	51-2022
B	EEV0100	Electronics Tester	400 hours	51-2022

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 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 AC circuits.
05.0 Demonstrate proficiency in solid state devices.

Florida Department of Education
Student Performance Standards

Program Title: **Electronic Technology 1**
PSAV Number: **J540100**

Course Number: EEV0010
Occupational Completion Point: A
Electronics Assembler – 250 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
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	Apply recognized industry accepted standard soldering techniques.	
01.06	Apply recognized industry accepted standard desoldering techniques.	
01.07	Apply recognized industry accepted standard electrostatic discharge (ESD) safety procedures.	
01.08	Design and/or construct printed circuit boards (PCB's) to industry accepted standards.	
01.09	Explain the theoretical concepts of industry accepted soldering techniques.	
01.10	Apply recognized industry accepted standard techniques for rework and repair.	
02.0	Demonstrate proficiency in basic DC circuits--The student will be able to:	
02.01	Demonstrate proficiency in basic DC 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.	

CTE Standards and Benchmarks	National Standards
02.06 Read and interpret color codes and symbols to identify electrical components and values.	
02.07 Measure properties of a circuit using a digital multi-meter (DMM).	
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.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0100
Occupational Completion Point: B
Electronics Tester – 400 Hours – SOC Code 51-2022

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
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	Describe the relationship of DC electricity to the nature of matter.	
03.03	Apply Ohm's law to series-parallel and parallel-series circuits.	
03.04	Construct and verify the operation of series-parallel and parallel-series and bridge circuits.	
03.05	Troubleshoot series-parallel and parallel-series and bridge circuits.	
03.06	Identify and define voltage divider circuits (loaded and unloaded).	
03.07	Construct and verify the operation of voltage divider circuits (loaded and unloaded).	
03.08	Analyze and troubleshoot voltage divider circuits (loaded and unloaded).	
03.09	Apply maximum power transfer theorem.	
03.10	Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.	
03.11	Describe magnetic properties of circuits and devices.	
03.12	Determine the physical and electrical characteristics of capacitors and inductors.	
03.13	Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.	
03.14	Set up and operate power supplies for DC circuits.	
03.15	Explain the theory of DC motor operation.	
03.16	Identify the practical applications for the use of a DC motor.	
04.0	Demonstrate proficiency in AC circuits--The student will be able to:	
04.01	Solve basic trigonometric problem as applicable to electronics.	

CTE Standards and Benchmarks	National Standards
04.02 Define the characteristics of AC capacitive circuits.	
04.03 Construct and verify the operation of AC capacitive circuits.	
04.04 Analyze and troubleshoot AC capacitive circuits.	
04.05 Define the characteristics of AC inductive circuits.	
04.06 Construct and verify the operation of AC inductive circuits.	
04.07 Analyze and troubleshoot AC inductive circuits.	
04.08 Define and apply the principles of transformers to AC circuits.	
04.09 Construct and verify the operation of AC circuits utilizing transformers.	
04.10 Analyze and troubleshoot AC circuits utilizing transformers.	
04.11 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.	
04.12 Analyze and troubleshoot differentiator and integrator circuits.	
04.13 Define the characteristics of Resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).	
04.14 Construct and verify the operation of series and parallel resonant circuits.	
04.15 Define the characteristics of series and parallel resonant circuits.	
04.16 Construct and verify the operation of series and parallel resonant circuits.	
04.17 Analyze and troubleshoot R-C, R-L, and RLC circuits.	
04.18 Define the characteristics of frequency selective filter circuits.	
04.19 Construct and verify the operation of frequency selective filter circuits.	
04.20 Analyze and troubleshoot frequency selective filter circuits.	
04.21 Define the characteristics of polyphase circuits.	
04.22 Define basic motor theory and operation.	
04.23 Define basic generator theory and operation.	
04.24 Set up and operate power supplies for AC circuits.	
04.25 Set up and operate oscilloscopes for AC circuits.	
04.26 Set up and operate function generators for AC circuits.	

CTE Standards and Benchmarks		National Standards
04.27	Analyze and measure power in AC circuits.	
04.28	Set up and operate capacitor and inductor analyzers for AC circuits.	
04.29	Explain the theory of AC motor operation.	
04.30	Identify the practical applications for the use of an AC motor.	
05.0	Demonstrate proficiency in solid state devices--The student will be able to:	
05.01	Identify and define properties of semiconductor materials.	
05.02	Identify and define operating characteristics and applications of junction diodes.	
05.03	Identify and define operating characteristics and applications of special diodes, ex. Zener diodes.	
05.04	Construct diode circuits.	
05.05	Analyze and troubleshoot diode circuits.	
05.06	Identify and define operating characteristics and applications of bipolar transistors,	
05.07	Identify and define operating characteristics and applications of field effect transistors.	
05.08	Identify and define operating characteristics and applications of single-stage amplifiers.	
05.09	Construct single-stage amplifiers.	
05.10	Analyze and troubleshoot single-stage amplifiers.	
05.11	Construct thyristor circuitry.	
05.12	Analyze and troubleshoot thyristor circuitry.	
05.13	Set up and operate power supplies for solid-state devices.	
05.14	Set up and operate oscilloscopes for solid-state devices.	
05.15	Set up and operate function generators for solid-state devices.	
05.16	Set up and operate capacitor and inductor analyzers for solid-state devices.	
05.17	Set up and operate curve tracers.	
05.18	Set up and operate transistor testers.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Electronic Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J540200
CIP Number	0615030316
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	ELECTRONIC @7 7G TEC ELEC @7 7G AVIONICS @7 7G RADIO TV 7G TV PROD TEC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3023 – Electrical and Electronic Engineering Technicians 49-2094 – Electrical and Electronics Repairers, Commercial and Industrial Equipment
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 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.

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 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 for this program is 750 hours. **Electronic Technology 1** is a core program. It is recommended that students complete **Electronic Technology 1** or demonstrate mastery of the outcomes in that program prior to enrollment in **Electronic Technology 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0500	Electronics Equipment Repairer	375 hours	49-2094
B	EEV0616	Electronics Technician	375 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:

01.0 Demonstrate proficiency in digital circuits.
02.0 Demonstrate proficiency in fundamental micro-processors.
03.0 Demonstrate skills in technical recording utilizing industry recognized computer application software.
04.0 Demonstrate proficiency in analog circuits.

Florida Department of Education
Student Performance Standards

Program Title: **Electronic Technology 2**
PSAV Number: **J540200**

Course Number: EEV0500
Occupational Completion Point: A
Electronic Equipment Repairer – 375 Hours – SOC Code 49-2094

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks	National Standards
01.0 Demonstrate proficiency in digital circuits--The student will be able to:	
01.01 Define and apply numbering systems to codes and arithmetic operations.	
01.02 Analyze and minimize logic circuits using Boolean operations.	
01.03 Set up and operate logic probes for digital circuits.	
01.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.	
01.05 Set up and operate pulsers for digital circuits.	
01.06 Set up and operate oscilloscopes for digital circuits.	
01.07 Set up and operate logic analyzers for digital circuits.	
01.08 Set up and operate pulse generators for digital circuits.	
01.09 Identify types of logic gates and their truth tables.	
01.10 Construct combinational logic circuits using integrated circuits.	
01.11 Troubleshoot logic circuits.	
01.12 Analyze types of flip-flops and their truth tables.	
01.13 Construct flip-flops using integrated circuits.	
01.14 Troubleshoot flip-flops.	
01.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.	
01.16 Identify types of registers and counters.	

CTE Standards and Benchmarks	National Standards
01.17 Construct registers and counters using flip-flops and logic gates.	
01.18 Troubleshoot registers and counters.	
01.19 Analyze clock and timing circuits.	
01.20 Construct clock and timing circuits.	
01.21 Troubleshoot clock and timing circuits.	
01.22 Identify types of arithmetic-logic circuits.	
01.23 Construct arithmetic-logic circuits.	
01.24 Troubleshoot arithmetic-logic circuits.	
01.25 Identify types of encoding and decoding devices.	
01.26 Construct encoders and decoders.	
01.27 Troubleshoot encoders and decoders.	
01.28 Identify types of multiplexer and demultiplexer circuits.	
01.29 Construct multiplexer and demultiplexer circuits using integrated circuits.	
01.30 Troubleshoot multiplexer and demultiplexer circuits.	
01.31 Identify types of memory circuits.	
01.32 Relate the uses of digital-to-analog and analog-to-digital conversions.	
01.33 Construct digital-to-analog and analog-to-digital circuits.	
01.34 Troubleshoot digital-to-analog and analog-to-digital circuits.	
01.35 Identify types of digital displays.	
01.36 Construct digital display circuits.	
01.37 Troubleshoot digital display circuits.	
02.0 Demonstrate proficiency in fundamental microprocessors--The student will be able to:	
02.01 Identify central processing unit (CPU) building blocks and their uses (architecture).	
02.02 Safely install and remove a CPU without damaging.	
02.03 Analyze bus concepts.	
02.04 Analyze various memory schemes.	

CTE Standards and Benchmarks	National Standards
02.05 Use memory devices in circuits.	
02.06 Troubleshoot memory device circuits.	
02.07 Set up and operate oscilloscopes for microprocessor systems.	
02.08 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.	
02.09 Identify types of input and output devices and peripherals.	
02.10 Interface input and output ports to peripherals.	
02.11 Analyze and troubleshoot input and output ports.	
02.12 Compare and contrast macro processor programming language types.	
02.13 Diagram the macro processor programming sequence using a flow chart.	

Florida Department of Education
Student Performance Standards

Course Number: EEV0616
Occupational Completion Point: B
Electronics Technician – 375 Hours – SOC Code 17-3023

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
03.0	Demonstrate skills in technical recording utilizing industry recognized computer application software--The student will be able to:	
03.01	Draw and interpret electronic schematics.	
03.02	Record data and design curves and graphs.	
03.03	Write reports and make oral presentations.	
03.04	Maintain test logs.	
03.05	Make equipment failure reports.	
03.06	Specify and requisition simple electronic components.	
03.07	Compose technical letters and memoranda.	
03.08	Write formal reports of laboratory experiences.	
03.09	Draft preventive maintenance and calibration procedures.	
04.0	Demonstrate proficiency in analog circuits--The student will be able to:	
04.01	Identify and define operational characteristics and applications of multistage amplifiers.	
04.02	Construct multistage amplifiers.	
04.03	Analyze and troubleshoot multistage amplifiers.	
04.04	Identify and define operating characteristics and applications of linear integrated circuits.	
04.05	Identify and define operating characteristics and applications of basic power supplies and filters.	
04.06	Construct basic power supplies and filters.	
04.07	Identify and define operating characteristics and applications of differential and operational amplifiers.	
04.08	Construct differential and operational amplifier circuits.	

CTE Standards and Benchmarks	National Standards
04.09 Analyze and troubleshoot differential and operational amplifier circuits.	
04.10 Identify and define operating characteristics of audio power amplifiers.	
04.11 Construct audio power amplifiers.	
04.12 Analyze and troubleshoot audio power amplifiers.	
04.13 Identify and define operating characteristics and applications of power supply regulator circuits.	
04.14 Construct power supply regulator circuits.	
04.15 Analyze and troubleshoot power supply regulator circuits.	
04.16 Identify and define operating characteristics and applications of active filters.	
04.17 Construct active filter circuits.	
04.18 Analyze and troubleshoot active filter circuits.	
04.19 Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.	
04.20 Construct oscillator circuits.	
04.21 Analyze and troubleshoot oscillator circuits.	
04.22 Identify and define operating characteristics and applications of Liquid Crystal Display (LCD), Light Emitting Diode (LED), and Three Dimensional (3D) technologies.	
04.23 Identify and define operating characteristics and applications of optoelectronic devices.	
04.24 Set up and operate measuring instruments for analog circuits.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Gaming Machine Repair Technician**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J550100
CIP Number	0647000001
Grade Level	30, 31
Standard Length	270 hours
Teacher Certification	COMP SVC 7G ELECTRONIC @7 7G TEC ELEC @7 7G SLOT MACH 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9091 – Coin, Vending, and Amusement Machine Servicers and Repairers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	N/A

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 installation, configuration, operation, and maintenance of slot machines.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EER0320	Slot Machine Attendant	90 hours	49-9091
B	EER0321	Slot Machine Technician	180 hours	49-9091

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 an understanding of the gaming machine industry
02.0 Demonstrate proficiency in basic laboratory practices
03.0 Understand the theory of operation of various types of gaming equipment
04.0 Demonstrate proficiency in knowledge of chapter 551, and chapter 61d-14f.a.c. of Florida Statutes
05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
06.0 Demonstrate proficiency in customer relations
07.0 Demonstrate an understanding of Casino Rules, Policies and Procedures
08.0 Demonstrate an understanding of Preparedness for "Common" Casino problems and failures on property
09.0 Demonstrate an understanding of Preparedness for "Serious" Casino problems and failures on property
10.0 Demonstrate an understanding of Preparedness Training
11.0 Demonstrate proficiency in electronic fundamentals
12.0 Demonstrate proficiency in soldering and basic laboratory practices
13.0 Demonstrate proficiency in basic direct current (DC) circuits
14.0 Demonstrate proficiency in alternating current (AC) circuits
15.0 Demonstrate proficiency in solid state devices
16.0 Demonstrate proficiency in fundamental microprocessors
17.0 Demonstrate proficiency in using electronic test equipment and procedures on electronic slot and video machines
18.0 Apply Computer and electronic principles to gaming machines
19.0 Casino Rules, Policies and Procedures
20.0 Troubleshoot and repair gaming machines

Florida Department of Education
Student Performance Standards

Program Title: **Gaming Machine Repair Technician**
PSAV Number: **J550100**

Course Number: EER0320
Occupational Completion Point: A
Slot Machine Attendant – 90 Hours – SOC Code 49-9091

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the gaming machine industry--The student will be able to:
01.01	Identify various gaming manufacturers (i.e. IGT, Bally, Williams, Aristocrat, Atronic, Konami, AC Coin, Ainsworth, Aruze, Multimedia Games)
01.02	Discuss the difference between Class II and Class III slot machines
01.03	Understand the differences and similarities between older generation machines and newer generation machines.
01.04	Understand how to identify machine types.
01.05	Understand machine sub-assemblies: name, function, and operation.
01.06	Understand machine peripherals: printers, bill acceptors and player card assemblies.
02.0	Demonstrate proficiency in basic laboratory practices--The student will be able to:
02.01	Apply proper Occupational Safety Health Administration (OSHA) safety standards.
02.02	Make electrical/voice/data connections.
02.03	Identify and use hand tools properly.
02.04	Identify and use power tools properly.
02.05	Identify and use electronic instruments.
02.06	Demonstrate acceptable soldering and desoldering and rework and repair techniques.
02.07	Demonstrate electrostatic discharge (ESD) safety procedures.
03.0	Understand the theory of operation of various types of gaming equipment--The student will be able to:
03.01	Understand the operation of a three and five reel machines
03.02	Understand the operation of a video slot machines

CTE Standards and Benchmarks	
03.03	Understand the operation of stand-alone, linked or WAN linked progressive machines.
03.04	Understand the operation of a line game, buy pay and multiplier game machine.
03.05	Understand the operation of a Black Jack gaming machine.
03.06	Understand the operation of a Craps gaming machine.
03.07	Understand the operation of a Roulette gaming machine.
03.08	Understand the operation of touch multi game machines
03.09	Understand the operation of the couples, Big Bertha and bonus electronic slot machines.
03.10	Demonstrate proficiency in how to use tilt codes.
03.11	Demonstrate proficiency in how to use test codes.
03.12	Demonstrate proficiency in how to use block diagrams.
04.0	Demonstrate proficiency in knowledge of chapter 551, and chapter 61d-14f.a.c. of Florida Statutes--The student will be able to:
04.01	Achieve a passing grade on Florida Statute, Chapter 551 content.
04.02	Achieve a passing grade on Chapter 61D-14 - F.A.C. content.
04.03	Demonstrate knowledge of Federal Gaming Laws and Regulations as they pertain to gaming machines and the collection of taxes.
04.04	Demonstrate knowledge of Indian Gaming Regulatory Act – IGRA
04.05	Demonstrate knowledge of Native American Gaming Commission – NAGC
04.06	Demonstrate knowledge of Seminole Indian Compact Authorization
04.07	Demonstrate knowledge of Florida Statute, Chapter 849 - Gambling
05.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
05.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
05.02	Locate, organize and reference written information from various sources.
05.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
05.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
05.05	Apply active listening skills to obtain and clarify information.
05.06	Develop and interpret tables and charts to support written and oral communications.
05.07	Exhibit public relations skills that aid in achieving customer satisfaction.

CTE Standards and Benchmarks	
	05.08 Demonstrate appropriate walkie-talkie communication skills.
06.0	Demonstrate proficiency in customer relations--The student will be able to:
	06.01 Describe and demonstrate appropriate personal hygiene and professional attire.
	06.02 Describe and demonstrate the Hard and Soft skills of Customer Service.
	06.03 Describe and demonstrate needed Social Interactive skills.
	06.04 Describe and demonstrate effective listening techniques.
	06.05 Describe and apply techniques for instilling customer confidence and satisfaction.
	06.06 Describe and apply techniques for keeping the customer informed.
	06.07 Describe and apply effective follow-up techniques.
	06.08 Demonstrate discretion in interacting with customers in field and business environments.
	06.09 Demonstrate an understanding of basic conflict resolution.
07.0	Casino Rules, Policies and Procedures. – The student will be able to:
	07.01 Understand “Standard Operating Procedures – SOPs” are dictated by Federal, State and Native American Laws, Statutes, Regulations, Codes, Compacts and Acts.
	07.02 Understand the Casinos have policies and rules on employees dress, behavior and interaction with customers.
	07.03 Understand the job requirements for a Slot Attendant.
	07.04 Understand the operation and functions in the various types of reel and video electronic gaming machines.
	07.05 Understand the “Standing Operating Procedures” for payout and Jackpots and the various forms associated with the wins.
	07.06 Understand the “Standard Operating Procedures” for clearing machines problems: such as; Tilts, printers jams, money jams and player card problems.
	07.07 Understand the “Standard Operating Procedures” for handling Comps.
08.0	Preparedness for “Common” Casino problems and failures on property. – The student will be able to:
	08.01 Understand how to handle Customer behavior problems.
	08.02 Understand how to handle Customer health problems.
	08.03 Understand how to handle Customer cheating and scams.
	08.04 Understand how to handle other employee’s behavior problems.
	08.05 Understand how to handle other employee’s health problems.

CTE Standards and Benchmarks	
	08.06 Understand how to handle other employee's cheating and scams.
	08.07 Understand how to handle Network/Computer problems.
	08.08 Understand how to handle Communication problems.
	08.09 Understand how to handle Electrical/Power problems.
	08.10 Understand how to handle Liquid spills.
09.0	Preparedness for "Serious" Casino problems and failures on property. – The student will be able to:
	09.01 Understand how to handle Customer involved in an accident (minor or major and inside or on property.)
	09.02 Understand how to handle small or large number of Customers becoming sick (possible food or air pollution problems.)
	09.03 Understand how to handle the death of a Customer.
	09.04 Understand how to handle missing property of a Customer.
	09.05 Understand how to handle a robbery of the Casino or of a Customer.
	09.06 Understand how to handle a Fire on the property.
	09.07 Understand how to handle an Explosion or Bomb threat to the property.
	09.08 Understand how to handle various server weather conditions.
10.0	Preparedness Training. – The student will be able to:
	10.01 Understand the need for constant technology updating.
	10.02 Understand the need for Customer Service skills.
	10.03 Understand the need for Social Interactive skills.
	10.04 Understand the need for Compulsive Gambling skills.
	10.05 Understand the need for when and how to use the Heimlich maneuver.
	10.06 Understand the need for when and how to use the CPR.
	10.07 Understanding the need for when and how to use the Automated External Defibrillator – AED.
	10.08 Understand the need for when and how to use basic First Aid.
	10.09 Understand the need for when and how to use a Fire Extinguisher.

Florida Department of Education
Student Performance Standards

Course Number: EER0321
Occupational Completion Point: B
Slot Machine Technician – 180 Hours – SOC Code 49-9091

CTE Standards and Benchmarks	
11.0	Demonstrate proficiency in electronic fundamentals--The student will be able to:
11.01	Solve problems utilizing metric prefixes.
11.02	Identify sources of electricity.
11.03	Define voltage, current, resistance, power and energy.
11.04	Apply Ohm’s law and power formulas.
11.05	Read and interpret color codes and symbols to identify electrical/electronic components and values.
11.06	Measure properties of a circuit using appropriate test equipment.
11.07	Identify properties of an AC signal.
11.08	Identify AC sources.
11.09	Analyze and measure AC voltages using appropriate test equipment.
12.0	Demonstrate proficiency in soldering and basic laboratory practices--The student will be able to:
12.01	Apply proper Occupational Safety Health Administration (OSHA) safety standards.
12.02	Make electrical connections.
12.03	Identify and use hand tools properly.
12.04	Identify and use power tools properly.
12.05	Identify and use electronic instruments.
12.06	Demonstrate acceptable soldering techniques.
12.07	Demonstrate acceptable desoldering techniques.
12.08	Demonstrate electrostatic discharge (ESD) safety procedures.
12.09	Describe the construction of printed circuit boards (PCB's).
12.10	Explain the theoretical concepts of soldering.

CTE Standards and Benchmarks	
	12.11 Demonstrate rework and repair techniques.
13.0	Demonstrate proficiency in basic direct current (DC) circuits--The student will be able to:
	13.01 Demonstrate proficiency in basic DC circuits.
	13.02 Solve problems in electronic units utilizing metric prefixes.
	13.03 Identify sources of electricity.
	13.04 Define voltage, current, resistance, power and energy.
	13.05 Apply Ohm's law and power formulas.
	13.06 Read and interpret color codes and symbols to identify electrical components and values.
	13.07 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.
	13.08 Compute conductance and compute and measure resistance of conductors and insulators.
	13.09 Apply Ohm's law to series circuits.
	13.10 Construct and verify operation of series circuits.
	13.11 Analyze and troubleshoot series circuits.
	13.12 Apply Ohm's law to parallel circuits.
	13.13 Construct and verify the operation of parallel circuits.
	13.14 Analyze and troubleshoot parallel circuits.
14.0	Demonstrate proficiency in alternating current (AC) circuits--The student will be able to:
	14.01 Solve basic trigonometric problem as applicable to electronics.
	14.02 Define the characteristics of AC capacitive circuits.
	14.03 Construct and verify the operation of AC capacitive circuits.
	14.04 Analyze and troubleshoot AC capacitive circuits.
	14.05 Define the characteristics of AC inductive circuits.
	14.06 Construct and verify the operation of AC inductive circuits.
	14.07 Analyze and troubleshoot AC inductive circuits.
	14.08 Define and apply the principles of transformers to AC circuits.
	14.09 Construct and verify the operation of AC circuits utilizing transformers.

CTE Standards and Benchmarks	
14.10	Analyze and troubleshoot AC circuits utilizing transformers.
14.11	Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
14.12	Analyze and troubleshoot differentiator and integrator circuits.
14.13	Define the characteristics of Resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
14.14	Construct and verify the operation of series and parallel resonant circuits.
14.15	Define the characteristics of series and parallel resonant circuits.
14.16	Construct and verify the operation of series and parallel resonant circuits.
14.17	Analyze and troubleshoot R-C, R-L, and RLC circuits.
14.18	Define the characteristics of frequency selective filter circuits.
14.19	Construct and verify the operation of frequency selective filter circuits.
14.20	Analyze and troubleshoot frequency selective filter circuits.
14.21	Define the characteristics of polyphase circuits.
14.22	Define basic motor theory and operation.
14.23	Define basic generator theory and operation.
14.24	Set up and operate power supplies for AC circuits.
14.25	Analyze and measure power in AC circuits.
14.26	Set up and operate capacitor and inductor analyzers for AC circuits.
15.0	Demonstrate proficiency in solid state devices--The student will be able to:
15.01	Identify and define properties of semiconductor materials.
15.02	Identify and define operating characteristics and applications of junction diodes.
15.03	Identify and define operating characteristics and applications of special diodes.
15.04	Construct diode circuits.
15.05	Analyze and troubleshoot diode circuits.
15.06	Identify and define operating characteristics and applications of bipolar transistors,
15.07	Identify and define operating characteristics and applications of field effect transistors.
15.08	Identify and define operating characteristics and applications of single-stage amplifiers.

CTE Standards and Benchmarks	
	15.09 Construct single-stage amplifiers.
	15.10 Analyze and troubleshoot single-stage amplifiers.
	15.11 Construct thyristor circuitry.
	15.12 Analyze and troubleshoot thyristor circuitry.
	15.13 Set up and operate VOM for solid-state devices.
	15.14 Set up and operate DVM for solid-state devices.
	15.15 Set up and operate power supplies for solid-state devices.
	15.16 Set up and operate oscilloscopes for solid-state devices.
	15.17 Set up and operate function generators for solid-state devices.
	15.18 Set up and operate capacitor and inductor analyzers for solid-state devices.
	15.19 Set up and operate curve tracers.
	15.20 Set up and operate transistor testers.
16.0	Demonstrate proficiency in fundamental microprocessors--The student will be able to:
	16.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
	16.02 Analyze bus concepts.
	16.03 Analyze various memory schemes.
	16.04 Use memory devices in circuits.
	16.05 Troubleshoot memory device circuits.
	16.06 Set up and operate oscilloscopes for microprocessor systems.
	16.07 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
	16.08 Identify types of input and output devices and peripherals.
	16.09 Interface input and output ports to peripherals.
	16.10 Analyze and troubleshoot input and output ports.
	16.11 Write a macro processor program in assembly language.
	16.12 Write a macro processor program in machine language.
	16.13 Execute microprocessor instruction sets.

CTE Standards and Benchmarks	
17.0	Demonstrate proficiency in using electronic test equipment and procedures on electronic slot and video machines--The student will be able to:
17.01	Demonstrate proficiency in using electronic test instrumentation, digital meters, trace scopes, frequency counters, and functional generators.
17.02	Use a curve tracer to check all types of diodes, bi-polar transistors, and field effect transistors.
17.03	Use resistor color code and component recognition.
18.0	Apply electronic principles to gaming machines--The student will be able to:
18.01	Understand power systems (i.e. FLO, stepper motors, B/A, etc.)
18.02	Be proficient at troubleshooting half-wave, full-wave, bridge power supplies, and voltage doublers
18.03	Understand the basic theory of 3.3v, 5v, 12v, 24 volt DC, and 120 volt AC power systems
18.04	Understand how power enters and is distributes in gaming machines.
18.05	Understand the difference between AC and DC power in gaming machines.
18.06	Understand general power theory and how to troubleshoot gaming machine power problems.
18.07	Understand how the computer is an integral part of the Electronic Gaming. Machine (EGM).
18.08	Understand how the Random Number Generator (RNG) functions in the Electronic Gaming Machine.
18.09	Understand how the stepper motor functions as an integral part of a reel gaming machine.
18.10	Understand how the various types of Electronic Gaming Machines (EGM) functions and operates.
18.11	Understand how machine peripherals: printers, bill acceptors and player card assemblies functions and operates.
18.12	Understand how the Par tables coordinate with the Jackpots and pay outs.
19.0	Casino Rules, Policies and Procedures – The student will be able to:
19.01	Understand “Standard Operating Procedures – SOPs” are dictated by Federal, State and Native American Laws, Statutes, Regulations, Codes, Compacts and Acts.
19.02	Understand the Casinos have policies and rules on employees dress, behavior and interaction with customers.
19.03	Understand the job requirements for a Slot Technician.
19.04	Understand the operation and functions in the various types of reel and video electronic gaming machines.
19.05	Understand the “Standing Operating Procedures” for moving and rearranging Electronic Gaming Machines.
19.06	Understand the “Standing Operating Procedures” for RAM Clearing and installing software on Electronic Gaming Machines.
19.07	Understand the “Standard Operating Procedures” for clearing machines problems: such as; Tilts, printers jams, money jams and player card problems.

CTE Standards and Benchmarks	
19.08	Understand the “Standard Operating Procedures” for “No Hot Swapping.”
19.09	Understand the “Standing Operating Procedures” for payout and Jackpots and the various forms associated with the wins.
19.10	Understand the “Standard Operating Procedures” for handling Comps.
20.0	Troubleshoot and repair gaming machines--The student will be able to:
20.01	Use system machine diagnostics software to generate, operate, and maintain program logos to identify failed system components.
20.02	Isolate data communications system faults to specific sub systems.
20.03	Isolate system malfunction by relating program execution to specific groups of circuits.
20.04	Set up CGM equipment, determine faults, and take corrective action, insuring the integrity of components as well as student’s own safety in the repair.
20.05	Understand player tracking and progressive jackpots.
20.06	Demonstrate proficiency in ticket printer jams and loading
20.07	Demonstrate proficiency in assembly and disassembly of reels coin mechanisms and hoppers.
20.08	Understand the function of a coin acceptor (i.e. mechanical and electronic coin comparators.
20.09	Understanding of operation and calibration of coin comparators.
20.10	Understand how to use an oscilloscope to calibrate a bill validator.
20.11	Demonstrate proficiency in identify malfunctions and diagnose repairs needed in gaming machine microprocessor boards, monitors, bad switches, bad reels, and wiring to restore machine to working order.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

N/A

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Industrial Machinery Maintenance 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J590100
CIP Number	0647030303
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to the understanding of all aspects of the industrial-machinery maintenance-technology industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0450	Industrial Machinery Maintenance Assistant	450 hours	49-9041
B	ETI0456	Machinery Maintenance Mechanic	300 hours	49-9041

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 Apply safety rules and procedures.
02.0 Explain the basic elements of physics as related to Industrial Machinery Maintenance and Repair.
03.0 Explain basic electricity and electronics.
04.0 Perform mathematical calculations.
05.0 Read plans and drawings.
06.0 Perform measuring and layout operations.
07.0 Use and maintain hand tools.
08.0 Use and maintain portable power tools.
09.0 Handle and apply lubricants.
10.0 Perform benchwork skills.
11.0 Perform gas and electric arc welding and cutting operations.
12.0 Perform rigging functions.
13.0 Install and remove machinery.
14.0 Demonstrate conveyor-maintenance techniques.
15.0 Identify common troubles and basic troubleshooting techniques.
16.0 Plan an elementary predictive-preventive-maintenance (PPM) schedule.
17.0 Perform gas- and arc-welding procedures.
18.0 Perform machine-shop operations.
19.0 Maintain piping and tubing systems.
20.0 Troubleshoot electrical circuits.
21.0 Install and maintain drive components.
22.0 Maintain reciprocating, positive-displacement, and rotary air compressors.
23.0 Maintain and repair hydraulic-system components.
24.0 Troubleshoot hydraulic systems.
25.0 Maintain and troubleshoot pneumatic systems.
26.0 Maintain and troubleshoot fluid-drive systems.

Florida Department of Education
Student Performance Standards

Program Title: **Industrial Machinery Maintenance 1**
PSAV Number: **J590100**

Course Number: ETI0450
Occupational Completion Point: A
Industrial Machinery Maintenance Assistance – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Apply safety rules and procedures--The student will be able to:	
01.01	Practice shop safety rules and procedures.	
01.02	Practice personal safety rules and procedures.	
01.03	Practice fire safety rules and procedures.	
01.04	Practice electrical safety rules and procedures.	
01.05	Practice tool safety rules and procedures.	
01.06	Practice ladder and scaffolding safety rules and procedures.	
01.07	Maintain a clean work and shop area.	
01.08	Perform tag lockout procedures.	
01.09	Identify Occupational Safety and Health Administration (OSHA) requirements and procedures.	
01.10	Use Materials Safety Data Sheets (MSDS).	
02.0	Explain the basic elements of physics as related to Industrial Machinery Maintenance and repair--The student will be able to:	
02.01	Explain the standards of measurement and the impact of action and working forces, including tension, compression, torque, and shear.	
02.02	Identify the principles and laws of motion and explain how they affect acceleration and deceleration.	
02.03	Explain the relationship of work, power, and energy to the types of collisions and conservation of momentum.	
02.04	Explain the operation of simple machines, including the lever, inclined plane, screw, wedge, wheel and axle, pulley, and jacking screws.	

CTE Standards and Benchmarks		National Standards
02.05	Identify the ways of producing power for mechanical efficiency, in terms of gear ratios, work forces, and the types of work done by a crane hook, forklift truck, and screw or bolt.	
02.06	Use linear, liquid, and weight units of measurement to measure areas, areas within areas, and volume.	
02.07	Describe the mechanical and chemical properties of materials commonly used in industry.	
02.08	Explain the laws and conditions governing static and kinetic friction, the problems caused by friction, and the effects of the angle of repose.	
02.09	Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
02.10	Draw conclusions or make inferences from data.	
02.11	Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.	
02.12	Explain pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and Kilopascal (kPa).	
03.0	Explain basic electricity and electronics--The student will be able to:	
03.01	Define electrical/electronics terms.	
03.02	Explain the theory and application of magnetism.	
03.03	Explain Ohm's law.	
03.04	Describe direct current (DC) and alternating current (AC) circuits.	
03.05	Identify the advantages and disadvantages of alternating current (AC) and direct current (DC) motors for various applications.	
03.06	Describe the use of programmable logic controllers (PLCs) in the industry.	
04.0	Perform mathematical calculations--The student will be able to:	
04.01	Make job-related decimal and fraction calculations.	
04.02	Solve job-related problems by adding, subtracting, multiplying, and dividing numbers.	
04.03	Solve job-related problems using a hand-held calculator.	
04.04	Solve job-related problems using basic formulas.	
04.05	Solve job-related problems using basic geometry.	
04.06	Measure a work piece and compare the measurements with blueprint specifications.	
04.07	Solve job-related problems using mathematical handbooks, charts, and tables.	
04.08	Convert measurements from English to metric and from metric to English units.	

CTE Standards and Benchmarks		National Standards
	04.09 Solve job-related problems using proportions.	
	04.10 Solve job-related problems using statistics.	
05.0	Read plans and drawings--The student will be able to:	
	05.01 Identify dimensions.	
	05.02 Identify lists of materials and specifications.	
	05.03 Identify section and detail views.	
	05.04 Sketch and dimension a part.	
	05.05 Disassemble and assemble parts using an exploded-view drawing.	
	05.06 Interpret blueprint abbreviations.	
	05.07 Identify dimensioning of radii, round holes, fillets, and chamfers.	
	05.08 Identify screw threads and bolt types.	
	05.09 Apply dimensional tolerances.	
	05.10 Identify the metal-fabrication symbols used in blueprints.	
06.0	Perform measuring and layout operations--The student will be able to:	
	06.01 Perform basic geometric-construction operations.	
	06.02 Safely use marking gauges, center punches, scribes, surface gauges, squares, dividers, dial indicators, protractors, surface plates, depth gauges, and circumference rules.	
	06.03 Develop patterns using parallel lines, radial lines, and triangulation.	
	06.04 Make metal-fabrication sketches.	
	06.05 Read and measure with steel rules.	
	06.06 Read and measure with micrometers.	
	06.07 Read and measure with vernier tools.	
	06.08 Read and measure with dial calipers.	
	06.09 Read and measure with dial indicators.	
07.0	Use and maintain hand tools--The student will be able to:	
	07.01 Demonstrate the safe use of hand tools such as screwdrivers, hammers, wrenches, pliers, hacksaws, punches, chisels, drills, files, tin snips, taps, and dies.	

CTE Standards and Benchmarks		National Standards
07.02	Use measuring devices.	
07.03	Use wrenches and screwdrivers.	
07.04	Use pipefitting tools.	
07.05	Use sheet-metal tools.	
07.06	Safely use ropes, slings, pulleys, and block and tackle.	
07.07	Select the proper tool for each job application.	
07.08	Select correct tools for metric and standard fasteners.	
07.09	Identify state-of-the-art innovations and explore their uses.	
07.10	Identify and select fasteners for various applications, taking into account the effects of corrosion on each, including threaded fasteners, nuts, washers, rivets, locking pins, keys, self-tapping screws, locking-nut fasteners, and self-retaining nuts.	
07.11	Describe the techniques and liability issues regarding retrofitting fasteners for ease of removal.	
08.0	Use and maintain portable power tools--The student will be able to:	
08.01	Demonstrate the safe use of portable power tools, drills, belt and disc sanders, grinders, circular saws, saber saws, metal shears, electric and pneumatic impact wrenches, rotary and pneumatic chipping hammers, drill presses, and bench grinders.	
08.02	Use and maintain light- and heavy-duty drills.	
08.03	Use and maintain electric hammers.	
08.04	Use and maintain pneumatic drills and hammers.	
08.05	Use and maintain power screwdrivers and nut runners.	
08.06	Use and maintain linear motion saws.	
08.07	Use and maintain circular saws.	
08.08	Use and maintain belt, pad, and disc sanders.	
08.09	Use and maintain grinders and shears.	
09.0	Handle and apply lubricants--The student will be able to:	
09.01	Explain the functions of lubrication.	
09.02	Explain the properties of oil lubricants and the factors determining the selection of lubricants.	
09.03	Identify the types, advantages, and functions of lubricant additives.	

CTE Standards and Benchmarks		National Standards
09.04	Explain the types of circulating oils and their purposes.	
09.05	Identify grease application.	
09.06	Identify lubricating systems and methods.	
09.07	Explain lubricant storage and handling methods.	
09.08	Explain the types of oil filters and their uses.	
09.09	Lubricate a piece of industrial equipment.	
09.10	Define the role of preventive maintenance in total equipment maintenance.	
09.11	Describe the major tasks of preventive maintenance: cleaning, inspection, lubrication, minor repair, and information feedback.	
09.12	Review a typical maintenance program.	
10.0	Perform benchwork skills--The student will be able to:	
10.01	Identify safety and shop rules.	
10.02	Cut materials by using hand hacksaws.	
10.03	Cut threads by using hand taps.	
10.04	Cut threads by using dies.	
10.05	Repair threads by chasing and thread inserts.	
10.06	Install dowel pins using tapered and straight reamers.	
10.07	Ream holes by using tapered and straight reamers.	
10.08	Hand-sharpen cutting tools by using abrasive stones.	
10.09	Hone and lap surfaces.	
10.10	Remove damaged screws and other hardware.	
10.11	Deburr workpieces.	
11.0	Perform gas and electric arc welding and cutting operations--The student will be able to:	
11.01	Identify the properties of the most commonly used metals and alloys, including hardness and malleability.	
11.02	Identify the processes and effects of tempering, annealing, and case hardening.	
11.03	Identify welding cylinders, regulators, hoses, pressure gauges, and torches.	
11.04	Describe welding-equipment safety procedures.	

CTE Standards and Benchmarks	National Standards
11.05 Demonstrate proper flame settings.	
11.06 Demonstrate basic gas-welding skills.	
11.07 Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.	
11.08 Demonstrate freehand and guide cutting of various metal thicknesses.	
11.09 Identify the uses of the following welding techniques: laser, ultrasonic, resistance, and percussion.	
11.10 Perform basic electric arc welding procedures.	
12.0 Perform rigging functions--The student will be able to:	
12.01 Demonstrate the safety procedures for performing rigging and lifting operations.	
12.02 Identify and inspect fiber and wire rope.	
12.03 Tie knots and hitches.	
12.04 Identify and use the components of rigging hardware.	
12.05 Perform rigging and lifting operations.	
12.06 Demonstrate the proper operation of a forklift.	
13.0 Install and remove machinery--The student will be able to:	
13.01 Identify the safety procedures for installing and removing machinery.	
13.02 Identify the equipment required for machine installation and removal.	
13.03 Prepare an area for machine installation per the manufacturer's specifications.	
13.04 Rig, lift, and transport machinery to the installation site.	
13.05 Install electrical hookups to machinery.	
13.06 Install air hydraulic hookups to machinery.	
13.07 Perform an assigned machine retrofit per the manufacturer's specifications.	
13.08 Perform an assigned machine removal and transport per specification requirements.	
13.09 Explain the importance of vibration detection.	
14.0 Demonstrate conveyor-maintenance techniques--The student will be able to:	
14.01 Identify the types of conveyors.	
14.02 Identify the safety requirements and precautions for conveyor-maintenance operations.	

CTE Standards and Benchmarks	National Standards
14.03 Adjust the tracking of a belt.	
14.04 Check a belt for wear.	
14.05 Identify the types of splices.	
14.06 Identify splicing equipment and procedures.	
14.07 Demonstrate conveyor-maintenance techniques, including making splices with splicing equipment.	
15.0 Identify common troubles and basic troubleshooting techniques--The student will be able to:	
15.01 Analyze the possible causes of common troubles in industrial machinery performance.	
15.02 Identify basic troubleshooting techniques for bearings.	
15.03 Identify basic troubleshooting techniques for pumps.	
15.04 Identify basic troubleshooting techniques for drive systems.	
15.05 Identify basic troubleshooting techniques for electrical circuits.	
15.06 Identify basic troubleshooting techniques for hydraulics.	
15.07 Identify basic troubleshooting techniques for pneumatics.	
15.08 Identify basic troubleshooting techniques for PLCs.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0456
Occupational Completion Point: B
Machinery Maintenance Mechanic – 300 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Plan an elementary predictive-preventive-maintenance (PPM) schedule--The student will be able to:	
16.01	List the types of predictive-preventive maintenance.	
16.02	Describe the purpose of preventive-maintenance schedules.	
16.03	Create a preventive-maintenance schedule form using a machine manual or the manufacturer recommendations.	
16.04	Identify troubles caused by the lack of preventive maintenance.	
16.05	Create a maintenance log and make entries for a machine or equipment.	
16.06	Create a preventive-maintenance schedule from a maintenance- failures log.	
17.0	Perform gas- and arc-welding procedures--The student will be able to:	
17.01	Demonstrate the safety procedures for performing gas and arc welding and for transporting equipment.	
17.02	Identify the components of an oxyfuel rig.	
17.03	Set up and shut down an oxyfuel rig.	
17.04	Weld beads in a flat position.	
17.05	Weld an outside corner joint using a filler rod.	
17.06	Cut metal of various thicknesses'.	
17.07	Weld beads in a flat position using E-6010 and E-7018 electrodes.	
17.08	Weld beads in horizontal and in vertical positions using E-6010 and E-7018 electrodes.	
17.09	Weld beads in an overhead position using E-6010 and E-7018 electrodes.	
17.10	Weld beads using a MIG welder.	
17.11	Weld beads using a TIG welder.	

CTE Standards and Benchmarks	National Standards
17.12 Solder and braze metals.	
17.13 Cut stainless steel and aluminum with a plasma-arc rig.	
18.0 Perform machine-shop operations--The student will be able to:	
18.01 Demonstrate safety in performing machine-shop operations.	
18.02 Identify the types of cutting tools.	
18.03 Bore a hole to a specified size.	
18.04 Chase an external V-thread.	
18.05 Identify the different types of work-holding devices.	
18.06 Prepare metal for finishing.	
18.07 Set up, use, and adjust an arbor press.	
18.08 Set up, use, and adjust a hydraulic press.	
18.09 Set up, use, and adjust broaching tools.	
18.10 Cut keyways with an end mill.	
19.0 Maintain piping and tubing systems--The student will be able to:	
19.01 Identify the components of a piping system.	
19.02 Explain the maintenance considerations of metallic and nonmetallic piping systems.	
19.03 Describe the safety requirements for working with piping and tubing systems.	
19.04 Join copper tubing.	
19.05 Join common fittings.	
19.06 Join metallic pipe.	
19.07 Join plastic pipe.	
19.08 Explain valve operation and maintenance.	
19.09 Explain the importance of strainers, filters, and traps in piping systems.	
19.10 Bend back-to-back, stub-ups, and doglegs in electrical metallic tubing (EMT).	
20.0 Troubleshoot electrical circuits--The student will be able to:	
20.01 Describe the safety requirements and precautions for troubleshooting electrical circuits.	

CTE Standards and Benchmarks	National Standards
20.02 Disconnect and reconnect electric motors.	
20.03 Identify the parts and function of electrical control equipment.	
20.04 Define digital devices and PLC logic/ladder logic to troubleshoot.	
20.05 Identify the function of input and output devices and the controller.	
20.06 Explain how to troubleshoot a sequence of events.	
20.07 Use and maintain electrical test equipment for troubleshooting.	
21.0 Install and maintain drive components--The student will be able to:	
21.01 Demonstrate safety procedures for installing and maintaining drive components.	
21.02 Identify the types of bearings, their cross-referencing, and their uses.	
21.03 Remove, inspect, and/or replace bearings.	
21.04 Remove and replace seals.	
21.05 Perform shaft alignment.	
21.06 Identify the types of belts.	
21.07 Identify the types of chains.	
21.08 Perform tension adjustments and alignment on belt and chain drives.	
21.09 Troubleshoot belt and chain drives.	
21.10 Identify the types of gears.	
21.11 Remove, replace, and align gears, sprockets, and couplings.	
21.12 Remove, replace, or repair V-joints and jack shafts.	
21.13 Adjust gear backlash.	
21.14 Troubleshoot gear drives.	
21.15 Disassemble, inspect, reassemble, and adjust clutches.	
21.16 Identify the types of variable-speed drives.	
21.17 Troubleshoot variable-speed drives.	
21.18 Identify the types of cams and link mechanisms.	
21.19 Troubleshoot cam-and-link mechanism problems.	

CTE Standards and Benchmarks		National Standards
22.0	Maintain reciprocating, positive-displacement, and rotary air compressors--The student will be able to:	
22.01	Relate force, weight, mass, and density to a pneumatic system.	
22.02	Demonstrate the safety procedures for maintaining reciprocating, positive-displacement, and rotary air compressors.	
22.03	Demonstrate the operation of reciprocating compressors.	
22.04	Demonstrate the operation of positive-displacement and rotary air compressors.	
22.05	Demonstrate primary and secondary air treatment.	
22.06	Demonstrate the operation of valves, cylinders, and motors.	
22.07	Check oil level.	
22.08	Change oil.	
22.09	Drain water from tank.	
22.10	Test for efficiency of compressor.	
22.11	Inspect storage tank for quality.	
22.12	Test pressure control switch.	
23.0	Maintain and repair hydraulic-system components--The student will be able to:	
23.01	Explain the safety procedures for installing hydraulic lines.	
23.02	Explain Pascal's law.	
23.03	Explain Bernoulli's principle.	
23.04	Explain how heat and pressure relate to power and transmission.	
23.05	Describe the physical and chemical properties of a fluid.	
23.06	Install and maintain a contaminant-removal system.	
23.07	Determine reservoir requirements.	
23.08	Classify and select pumps for specific applications.	
23.09	Compute hose requirements.	
23.10	Install hydraulic lines.	
23.11	Select and install control valves.	
24.0	Troubleshoot hydraulic systems--The student will be able to:	

CTE Standards and Benchmarks	National Standards
24.01 Explain the safety procedures for troubleshooting hydraulic systems.	
24.02 Read a hydraulic schematic.	
24.03 Install hydraulic components.	
24.04 Connect electrically controlled valves.	
24.05 Explain hydraulic-system troubleshooting techniques.	
24.06 Repair and replace valves.	
24.07 Repair and replace cylinders.	
24.08 Repair and replace pumps and motors.	
25.0 Maintain and troubleshoot pneumatic systems--The student will be able to:	
25.01 Explain the safety procedures for troubleshooting pneumatic systems.	
25.02 Diagram an air supply system.	
25.03 Install system components.	
25.04 Demonstrate system-maintenance techniques.	
25.05 Explain proper troubleshooting procedures.	
25.06 Troubleshoot air compressors.	
25.07 Troubleshoot, repair, and install control valves.	
25.08 Troubleshoot air motors.	
26.0 Maintain and troubleshoot fluid-drive systems--The student will be able to:	
26.01 Explain the safety procedures for maintaining and troubleshooting fluid-drive systems.	
26.02 Install adjustable-speed drives.	
26.03 Troubleshoot adjustable-speed drives.	
26.04 Explain the operation of fluid couplings.	
26.05 Install fluid couplings.	
26.06 Install torque converters.	
26.07 Perform preventive maintenance.	
26.08 Apply a "dynamic" magnetic/mechanical braking device to a motor.	
26.09 Mount the equipment.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Industrial Machinery Maintenance 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J590200
CIP Number	0647030304
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to the understanding of all aspects of the industrial-machinery maintenance-technology industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 for this program is 600 hours. **Industrial Machinery Maintenance 1** is a core program. It is recommended students complete **Industrial Machinery Maintenance 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Industrial Machinery Maintenance 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0457	Machinery Maintenance Technician	150 hours	49-9041
B	ETI0458	Industrial Maintenance Specialist	450 hours	49-9041

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 Maintain and troubleshoot robotic systems.
02.0 Perform pump maintenance and repair.
03.0 Explain the operation of industrial-pollution control systems.
04.0 Troubleshoot air-conditioning and refrigeration systems.
05.0 Identify boilers.
06.0 Maintain internal combustion engines.
07.0 Prepare for machinery startup.
08.0 Apply vibration-analysis skills.
09.0 Perform machinery balancing.
10.0 Demonstrate predictive-preventive-maintenance (PPM) technologies.
11.0 Use computer-maintenance-management systems (CMMS).
12.0 Perform failure analysis (FA).
13.0 Improve rotating-equipment performance.
14.0 Generate machine improvements and maintenance management.

Florida Department of Education
Student Performance Standards

Program Title: **Industrial Machinery Maintenance 2**
PSAV Number: **I470303**

Course Number: ETI0457
Occupational Completion Point: A
Machinery Maintenance Technician – 150 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Maintain and troubleshoot robotic systems--The student will be able to:	
01.01	Identify uses of robotics in industry.	
01.02	Identify safety procedures related to robotic systems.	
01.03	Identify mechanical, hydraulic, pneumatic, and electric/electronic components of robotic systems.	
01.04	Perform routine maintenance and calibration of robotic systems.	
01.05	Remove, replace and adjust robotic system components.	
02.0	Perform pump maintenance and repair--The student will be able to:	
02.01	Demonstrate the safety procedures for performing pump maintenance.	
02.02	Determine pump capacity and system requirements.	
02.03	Perform pump maintenance.	
02.04	Identify packing and seal requirements.	
02.05	Explain the operating principles of centrifugal, propeller and turbine rotary, reciprocating, diaphragm, positive placement, and vacuum pumps.	
02.06	Disassemble and reassemble a pump.	
03.0	Explain the operation of industrial-pollution control systems--The student will be able to:	
03.01	Explain the operation of air-pollution control systems.	
03.02	Explain the operation of water-pollution control systems.	
03.03	Explain the operation of solid-waste pollution control systems.	

CTE Standards and Benchmarks		National Standards
	03.04 Explain the operation of noise-pollution control systems.	
04.0	Troubleshoot air-conditioning and refrigeration systems--The student will be able to:	
	04.01 Explain the principles of refrigeration.	
	04.02 Identify the major components.	
	04.03 Describe the functions of electrical systems.	
	04.04 Troubleshoot air-conditioning and refrigeration systems.	
	04.05 Explain the requirement for recovery of hazardous materials and related safety procedures.	
05.0	Identify boilers--The student will be able to:	
	05.01 Identify the various types and components of heat exchangers.	
	05.02 Identify the various types and components of boilers.	
	05.03 Identify the various types and components of fractioning columns.	
	05.04 Identify the uses of steam.	
06.0	Maintain internal combustion engines--The student will be able to:	
	06.01 Explain the basic principles of operation of the two-stroke-cycle combustion engine.	
	06.02 Identify the types of engines.	
	06.03 Locate engine serial and model numbers.	
	06.04 Identify engine assemblies and systems.	
	06.05 Troubleshoot and evaluate engine performance.	
	06.06 Perform routine maintenance on engine operating systems including air intake and exhaust, fuel, lubrication, ignition, starting and governing.	
	06.07 Perform engine tune-up and adjustment procedures.	
	06.08 Remove and replace engine assemblies.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0458
Occupational Completion Point: B
Industrial Maintenance Specialist – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
07.0	Prepare for machinery startup--The student will be able to:	
07.01	Describe the requirements and precautions for machinery startup.	
07.02	Align machinery using wire line, transit, dial indicators, a computer, and laser-alignment devices.	
07.03	Position and secure machinery on a foundation.	
07.04	Level machinery and install balance-vibration dampeners.	
07.05	Identify pipe-stress standards for machine-maintenance applications.	
07.06	Perform finish alignment and check for pipe stresses in machinery- maintenance applications.	
08.0	Apply vibration-analysis skills--The student will be able to:	
08.01	Collect vibration data.	
08.02	Interpret vibration data.	
08.03	Determine velocity, acceleration, spike energy, frequency, amplitude, and other vibration sources.	
08.04	Describe the safety requirements and precautions for vibration analysis.	
08.05	Operate and use vibration software.	
08.06	Predict and verify the condition of machinery in an industrial setting using vibration tools.	
08.07	Explain the approximately 25 sources of vibration.	
08.08	Explain the bearing frequency (BIFO) formulas.	
08.09	Demonstrate proficiency in vibration detection.	
09.0	Perform machinery balancing--The student will be able to:	
09.01	Describe the safety requirements and precautions for balancing procedures and equipment.	

CTE Standards and Benchmarks		National Standards
	09.02 Identify the principles of static balancing.	
	09.03 Perform a vector balance in the classroom.	
	09.04 Identify balancing standards, ISO 1940 or equal.	
	09.05 Perform a stand balance in a shop.	
	09.06 Perform a field balance in an industrial setting.	
	09.07 Use portable or stationary balancing equipment.	
10.0	Demonstrate predictive-preventive-maintenance (PPM) technologies--The student will be able to:	
	10.01 Explain the use of infrared thermography.	
	10.02 Explain the use of ultrasound technology.	
	10.03 Explain the use of advanced alignment techniques (optical and Essinger bars).	
	10.04 Explain the use of oil ferrography and the types of oil sampling.	
	10.05 Explain the use of shock pulse equipment.	
	10.06 Describe the safety requirements for PPM technologies.	
	10.07 Demonstrate the use of one of the above predictive-maintenance procedures.	
	10.08 Plan an advanced PPM schedule.	
11.0	Use computer-maintenance-management systems (CMMS)--The student will be able to:	
	11.01 Operate CMMS software.	
	11.02 Enter and close a maintenance work order with CMMS.	
	11.03 Schedule a series of maintenance tasks.	
	11.04 Write a detailed maintenance job plan.	
	11.05 Order parts and supplies for a maintenance work order.	
	11.06 Determine the personnel resources needed for a maintenance job.	
12.0	Perform failure analysis (FA)--The student will be able to:	
	12.01 Conduct/lead a failure analysis meeting to determine the root cause of a failure.	
	12.02 Create a failure-analysis form and write a minimum of two different types of failure-analysis reports.	
	12.03 Explain the types of bearing failures.	

CTE Standards and Benchmarks	National Standards
12.04 Explain the types of shaft fatigues and failures.	
12.05 Explain the types of lubrication breakdowns.	
12.06 Estimate the cost and the impact on production of a specific failure.	
13.0 Improve rotating-equipment performance--The student will be able to:	
13.01 Calculate shaft-deflection ratios and use the results to improve shaft design.	
13.02 Draw or sketch equipment bases and supports of sturdy construction.	
13.03 Demonstrate and install advanced labyrinth-sealing devices.	
13.04 Demonstrate and install advanced mechanical-sealing devices.	
13.05 Run the Gates Belts or another interactive belt-design-and- tensioning computer program applied to various drives.	
13.06 Explain the benefits of synthetic oils and greases.	
13.07 Explain MTBF (mean time between equipment failure) and its cost impact when machinery life is extended.	
13.08 List seven specific machinery-improvement ideas in detail.	
14.0 Generate machine improvements and maintenance management--The student will be able to:	
14.01 Review and critique machinery and base design for improvement, before the equipment is placed on order.	
14.02 Identify the essential elements of effective maintenance management:	
a. Reward system	
b. Predictive-preventive maintenance	
c. Planning	
d. Work-order systems	
e. Organizations	
f. Goals and tracking	
g. Facilities	
h. Storerooms	
i. Contractors	
j. Shutdowns	
14.03 Write a report on the design and effective use of at least two of the essential elements of management.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Millwright 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J590400
CIP Number	0647030305
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to the understanding of all aspects of the industrial-machinery maintenance-technology industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0450	Industrial Machinery Maintenance Assistant	450 hours	49-9041
B	ETI0456	Machinery Maintenance Mechanic	300 hours	49-9041

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 Apply safety rules and procedures.
02.0 Explain the basic elements of physics as related to Industrial Machinery Maintenance and Repair.
03.0 Explain basic electricity and electronics.
04.0 Perform mathematical calculations.
05.0 Read plans and drawings.
06.0 Perform measuring and layout operations.
07.0 Use and maintain hand tools.
08.0 Use and maintain portable power tools.
09.0 Handle and apply lubricants.
10.0 Perform benchwork skills.
11.0 Perform gas and electric arc welding and cutting operations.
12.0 Perform rigging functions.
13.0 Install and remove machinery.
14.0 Demonstrate conveyor-maintenance techniques.
15.0 Identify common troubles and basic troubleshooting techniques.
16.0 Plan an elementary predictive-preventive-maintenance (PPM) schedule.
17.0 Perform gas- and arc-welding procedures.
18.0 Perform machine-shop operations.
19.0 Maintain piping and tubing systems.
20.0 Troubleshoot electrical circuits.
21.0 Install and maintain drive components.
22.0 Maintain reciprocating, positive-displacement, and rotary air compressors.
23.0 Maintain and repair hydraulic-system components.
24.0 Troubleshoot hydraulic systems.
25.0 Maintain and troubleshoot pneumatic systems.
26.0 Maintain and troubleshoot fluid-drive systems.

Florida Department of Education
Student Performance Standards

Program Title: **Millwright 1**
PSAV Number: **J590400**

Course Number: ETI0450
Occupational Completion Point: A
Industrial Machinery Maintenance Assistance – 450 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Apply safety rules and procedures--The student will be able to:	
01.01	Practice shop safety rules and procedures.	
01.02	Practice personal safety rules and procedures.	
01.03	Practice fire safety rules and procedures.	
01.04	Practice electrical safety rules and procedures.	
01.05	Practice tool safety rules and procedures.	
01.06	Practice ladder and scaffolding safety rules and procedures.	
01.07	Maintain a clean work and shop area.	
01.08	Perform tag lockout procedures.	
01.09	Identify Occupational Safety and Health Administration (OSHA) requirements and procedures.	
01.10	Use Materials Safety Data Sheets (MSDS).	
02.0	Explain the basic elements of physics as related to Industrial Machinery Maintenance and repair--The student will be able to:	
02.01	Explain the standards of measurement and the impact of action and working forces, including tension, compression, torque, and shear.	
02.02	Identify the principles and laws of motion and explain how they affect acceleration and deceleration.	
02.03	Explain the relationship of work, power, and energy to the types of collisions and conservation of momentum.	
02.04	Explain the operation of simple machines, including the lever, inclined plane, screw, wedge, wheel and axle, pulley, and jacking screws.	

CTE Standards and Benchmarks		National Standards
02.05	Identify the ways of producing power for mechanical efficiency, in terms of gear ratios, work forces, and the types of work done by a crane hook, forklift truck, and screw or bolt.	
02.06	Use linear, liquid, and weight units of measurement to measure areas, areas within areas, and volume.	
02.07	Describe the mechanical and chemical properties of materials commonly used in industry.	
02.08	Explain the laws and conditions governing static and kinetic friction, the problems caused by friction, and the effects of the angle of repose.	
02.09	Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
02.10	Draw conclusions or make inferences from data.	
02.11	Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.	
02.12	Explain pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and Kilopascal (kPa).	
03.0	Explain basic electricity and electronics--The student will be able to:	
03.01	Define electrical/electronics terms.	
03.02	Explain the theory and application of magnetism.	
03.03	Explain Ohm's law.	
03.04	Describe direct current (DC) and alternating current (AC) circuits.	
03.05	Identify the advantages and disadvantages of alternating current (AC) and direct current (DC) motors for various applications.	
03.06	Describe the use of programmable logic controllers (PLCs) in the industry.	
04.0	Perform mathematical calculations--The student will be able to:	
04.01	Make job-related decimal and fraction calculations.	
04.02	Solve job-related problems by adding, subtracting, multiplying, and dividing numbers.	
04.03	Solve job-related problems using a hand-held calculator.	
04.04	Solve job-related problems using basic formulas.	
04.05	Solve job-related problems using basic geometry.	
04.06	Measure a work piece and compare the measurements with blueprint specifications.	
04.07	Solve job-related problems using mathematical handbooks, charts, and tables.	
04.08	Convert measurements from English to metric and from metric to English units.	

CTE Standards and Benchmarks		National Standards
	04.09 Solve job-related problems using proportions.	
	04.10 Solve job-related problems using statistics.	
05.0	Read plans and drawings--The student will be able to:	
	05.01 Identify dimensions.	
	05.02 Identify lists of materials and specifications.	
	05.03 Identify section and detail views.	
	05.04 Sketch and dimension a part.	
	05.05 Disassemble and assemble parts using an exploded-view drawing.	
	05.06 Interpret blueprint abbreviations.	
	05.07 Identify dimensioning of radii, round holes, fillets, and chamfers.	
	05.08 Identify screw threads and bolt types.	
	05.09 Apply dimensional tolerances.	
	05.10 Identify the metal-fabrication symbols used in blueprints.	
06.0	Perform measuring and layout operations--The student will be able to:	
	06.01 Perform basic geometric-construction operations.	
	06.02 Safely use marking gauges, center punches, scribes, surface gauges, squares, dividers, dial indicators, protractors, surface plates, depth gauges, and circumference rules.	
	06.03 Develop patterns using parallel lines, radial lines, and triangulation.	
	06.04 Make metal-fabrication sketches.	
	06.05 Read and measure with steel rules.	
	06.06 Read and measure with micrometers.	
	06.07 Read and measure with vernier tools.	
	06.08 Read and measure with dial calipers.	
	06.09 Read and measure with dial indicators.	
07.0	Use and maintain hand tools--The student will be able to:	
	07.01 Demonstrate the safe use of hand tools such as screwdrivers, hammers, wrenches, pliers, hacksaws, punches, chisels, drills, files, tin snips, taps, and dies.	

CTE Standards and Benchmarks		National Standards
07.02	Use measuring devices.	
07.03	Use wrenches and screwdrivers.	
07.04	Use pipefitting tools.	
07.05	Use sheet-metal tools.	
07.06	Safely use ropes, slings, pulleys, and block and tackle.	
07.07	Select the proper tool for each job application.	
07.08	Select correct tools for metric and standard fasteners.	
07.09	Identify state-of-the-art innovations and explore their uses.	
07.10	Identify and select fasteners for various applications, taking into account the effects of corrosion on each, including threaded fasteners, nuts, washers, rivets, locking pins, keys, self-tapping screws, locking-nut fasteners, and self-retaining nuts.	
07.11	Describe the techniques and liability issues regarding retrofitting fasteners for ease of removal.	
08.0	Use and maintain portable power tools--The student will be able to:	
08.01	Demonstrate the safe use of portable power tools, drills, belt and disc sanders, grinders, circular saws, saber saws, metal shears, electric and pneumatic impact wrenches, rotary and pneumatic chipping hammers, drill presses, and bench grinders.	
08.02	Use and maintain light- and heavy-duty drills.	
08.03	Use and maintain electric hammers.	
08.04	Use and maintain pneumatic drills and hammers.	
08.05	Use and maintain power screwdrivers and nut runners.	
08.06	Use and maintain linear motion saws.	
08.07	Use and maintain circular saws.	
08.08	Use and maintain belt, pad, and disc sanders.	
08.09	Use and maintain grinders and shears.	
09.0	Handle and apply lubricants--The student will be able to:	
09.01	Explain the functions of lubrication.	
09.02	Explain the properties of oil lubricants and the factors determining the selection of lubricants.	
09.03	Identify the types, advantages, and functions of lubricant additives.	

CTE Standards and Benchmarks		National Standards
09.04	Explain the types of circulating oils and their purposes.	
09.05	Identify grease application.	
09.06	Identify lubricating systems and methods.	
09.07	Explain lubricant storage and handling methods.	
09.08	Explain the types of oil filters and their uses.	
09.09	Lubricate a piece of industrial equipment.	
09.10	Define the role of preventive maintenance in total equipment maintenance.	
09.11	Describe the major tasks of preventive maintenance: cleaning, inspection, lubrication, minor repair, and information feedback.	
09.12	Review a typical maintenance program.	
10.0	Perform benchwork skills--The student will be able to:	
10.01	Identify safety and shop rules.	
10.02	Cut materials by using hand hacksaws.	
10.03	Cut threads by using hand taps.	
10.04	Cut threads by using dies.	
10.05	Repair threads by chasing and thread inserts.	
10.06	Install dowel pins using tapered and straight reamers.	
10.07	Ream holes by using tapered and straight reamers.	
10.08	Hand-sharpen cutting tools by using abrasive stones.	
10.09	Hone and lap surfaces.	
10.10	Remove damaged screws and other hardware.	
10.11	Deburr workpieces.	
11.0	Perform gas and electric arc welding and cutting operations--The student will be able to:	
11.01	Identify the properties of the most commonly used metals and alloys, including hardness and malleability.	
11.02	Identify the processes and effects of tempering, annealing, and case hardening.	
11.03	Identify welding cylinders, regulators, hoses, pressure gauges, and torches.	
11.04	Describe welding-equipment safety procedures.	

CTE Standards and Benchmarks	National Standards
11.05 Demonstrate proper flame settings.	
11.06 Demonstrate basic gas-welding skills.	
11.07 Demonstrate procedures for adjusting and operating the oxyacetylene cutting torch.	
11.08 Demonstrate freehand and guide cutting of various metal thicknesses.	
11.09 Identify the uses of the following welding techniques: laser, ultrasonic, resistance, and percussion.	
11.10 Perform basic electric arc welding procedures.	
12.0 Perform rigging functions--The student will be able to:	
12.01 Demonstrate the safety procedures for performing rigging and lifting operations.	
12.02 Identify and inspect fiber and wire rope.	
12.03 Tie knots and hitches.	
12.04 Identify and use the components of rigging hardware.	
12.05 Perform rigging and lifting operations.	
12.06 Demonstrate the proper operation of a forklift.	
13.0 Install and remove machinery--The student will be able to:	
13.01 Identify the safety procedures for installing and removing machinery.	
13.02 Identify the equipment required for machine installation and removal.	
13.03 Prepare an area for machine installation per the manufacturer's specifications.	
13.04 Rig, lift, and transport machinery to the installation site.	
13.05 Install electrical hookups to machinery.	
13.06 Install air hydraulic hookups to machinery.	
13.07 Perform an assigned machine retrofit per the manufacturer's specifications.	
13.08 Perform an assigned machine removal and transport per specification requirements.	
13.09 Explain the importance of vibration detection.	
14.0 Demonstrate conveyor-maintenance techniques--The student will be able to:	
14.01 Identify the types of conveyors.	
14.02 Identify the safety requirements and precautions for conveyor-maintenance operations.	

CTE Standards and Benchmarks	National Standards
14.03 Adjust the tracking of a belt.	
14.04 Check a belt for wear.	
14.05 Identify the types of splices.	
14.06 Identify splicing equipment and procedures.	
14.07 Demonstrate conveyor-maintenance techniques, including making splices with splicing equipment.	
15.0 Identify common troubles and basic troubleshooting techniques--The student will be able to:	
15.01 Analyze the possible causes of common troubles in industrial machinery performance.	
15.02 Identify basic troubleshooting techniques for bearings.	
15.03 Identify basic troubleshooting techniques for pumps.	
15.04 Identify basic troubleshooting techniques for drive systems.	
15.05 Identify basic troubleshooting techniques for electrical circuits.	
15.06 Identify basic troubleshooting techniques for hydraulics.	
15.07 Identify basic troubleshooting techniques for pneumatics.	
15.08 Identify basic troubleshooting techniques for PLCs.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0456
Occupational Completion Point: B
Machinery Maintenance Mechanic – 300 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
16.0	Plan an elementary predictive-preventive-maintenance (PPM) schedule--The student will be able to:	
16.01	List the types of predictive-preventive maintenance.	
16.02	Describe the purpose of preventive-maintenance schedules.	
16.03	Create a preventive-maintenance schedule form using a machine manual or the manufacturer recommendations.	
16.04	Identify troubles caused by the lack of preventive maintenance.	
16.05	Create a maintenance log and make entries for a machine or equipment.	
16.06	Create a preventive-maintenance schedule from a maintenance-failures log.	
17.0	Perform gas- and arc-welding procedures--The student will be able to:	
17.01	Demonstrate the safety procedures for performing gas and arc welding and for transporting equipment.	
17.02	Identify the components of an oxyfuel rig.	
17.03	Set up and shut down an oxyfuel rig.	
17.04	Weld beads in a flat position.	
17.05	Weld an outside corner joint using a filler rod.	
17.06	Cut metal of various thicknesses'.	
17.07	Weld beads in a flat position using E-6010 and E-7018 electrodes.	
17.08	Weld beads in horizontal and in vertical positions using E-6010 and E-7018 electrodes.	
17.09	Weld beads in an overhead position using E-6010 and E-7018 electrodes.	
17.10	Weld beads using a MIG welder.	
17.11	Weld beads using a TIG welder.	

CTE Standards and Benchmarks	National Standards
17.12 Solder and braze metals.	
17.13 Cut stainless steel and aluminum with a plasma-arc rig.	
18.0 Perform machine-shop operations--The student will be able to:	
18.01 Demonstrate safety in performing machine-shop operations.	
18.02 Identify the types of cutting tools.	
18.03 Bore a hole to a specified size.	
18.04 Chase an external V-thread.	
18.05 Identify the different types of work-holding devices.	
18.06 Prepare metal for finishing.	
18.07 Set up, use, and adjust an arbor press.	
18.08 Set up, use, and adjust a hydraulic press.	
18.09 Set up, use, and adjust broaching tools.	
18.10 Cut keyways with an end mill.	
19.0 Maintain piping and tubing systems--The student will be able to:	
19.01 Identify the components of a piping system.	
19.02 Explain the maintenance considerations of metallic and nonmetallic piping systems.	
19.03 Describe the safety requirements for working with piping and tubing systems.	
19.04 Join copper tubing.	
19.05 Join common fittings.	
19.06 Join metallic pipe.	
19.07 Join plastic pipe.	
19.08 Explain valve operation and maintenance.	
19.09 Explain the importance of strainers, filters, and traps in piping systems.	
19.10 Bend back-to-back, stub-ups, and doglegs in electrical metallic tubing (EMT).	
20.0 Troubleshoot electrical circuits--The student will be able to:	
20.01 Describe the safety requirements and precautions for troubleshooting electrical circuits.	

CTE Standards and Benchmarks	National Standards
20.02 Disconnect and reconnect electric motors.	
20.03 Identify the parts and function of electrical control equipment.	
20.04 Define digital devices and PLC logic/ladder logic to troubleshoot.	
20.05 Identify the function of input and output devices and the controller.	
20.06 Explain how to troubleshoot a sequence of events.	
20.07 Use and maintain electrical test equipment for troubleshooting.	
21.0 Install and maintain drive components--The student will be able to:	
21.01 Demonstrate safety procedures for installing and maintaining drive components.	
21.02 Identify the types of bearings, their cross-referencing, and their uses.	
21.03 Remove, inspect, and/or replace bearings.	
21.04 Remove and replace seals.	
21.05 Perform shaft alignment.	
21.06 Identify the types of belts.	
21.07 Identify the types of chains.	
21.08 Perform tension adjustments and alignment on belt and chain drives.	
21.09 Troubleshoot belt and chain drives.	
21.10 Identify the types of gears.	
21.11 Remove, replace, and align gears, sprockets, and couplings.	
21.12 Remove, replace, or repair V-joints and jack shafts.	
21.13 Adjust gear backlash.	
21.14 Troubleshoot gear drives.	
21.15 Disassemble, inspect, reassemble, and adjust clutches.	
21.16 Identify the types of variable-speed drives.	
21.17 Troubleshoot variable-speed drives.	
21.18 Identify the types of cams and link mechanisms.	
21.19 Troubleshoot cam-and-link mechanism problems.	

CTE Standards and Benchmarks		National Standards
22.0	Maintain reciprocating, positive-displacement, and rotary air compressors--The student will be able to:	
22.01	Relate force, weight, mass, and density to a pneumatic system.	
22.02	Demonstrate the safety procedures for maintaining reciprocating, positive-displacement, and rotary air compressors.	
22.03	Demonstrate the operation of reciprocating compressors.	
22.04	Demonstrate the operation of positive-displacement and rotary air compressors.	
22.05	Demonstrate primary and secondary air treatment.	
22.06	Demonstrate the operation of valves, cylinders, and motors.	
22.07	Check oil level.	
22.08	Change oil.	
22.09	Drain water from tank.	
22.10	Test for efficiency of compressor.	
22.11	Inspect storage tank for quality.	
22.12	Test pressure control switch.	
23.0	Maintain and repair hydraulic-system components--The student will be able to:	
23.01	Explain the safety procedures for installing hydraulic lines.	
23.02	Explain Pascal's law.	
23.03	Explain Bernoulli's principle.	
23.04	Explain how heat and pressure relate to power and transmission.	
23.05	Describe the physical and chemical properties of a fluid.	
23.06	Install and maintain a contaminant-removal system.	
23.07	Determine reservoir requirements.	
23.08	Classify and select pumps for specific applications.	
23.09	Compute hose requirements.	
23.10	Install hydraulic lines.	
23.11	Select and install control valves.	
24.0	Troubleshoot hydraulic systems--The student will be able to:	

CTE Standards and Benchmarks	National Standards
24.01 Explain the safety procedures for troubleshooting hydraulic systems.	
24.02 Read a hydraulic schematic.	
24.03 Install hydraulic components.	
24.04 Connect electrically controlled valves.	
24.05 Explain hydraulic-system troubleshooting techniques.	
24.06 Repair and replace valves.	
24.07 Repair and replace cylinders.	
24.08 Repair and replace pumps and motors.	
25.0 Maintain and troubleshoot pneumatic systems--The student will be able to:	
25.01 Explain the safety procedures for troubleshooting pneumatic systems.	
25.02 Diagram an air supply system.	
25.03 Install system components.	
25.04 Demonstrate system-maintenance techniques.	
25.05 Explain proper troubleshooting procedures.	
25.06 Troubleshoot air compressors.	
25.07 Troubleshoot, repair, and install control valves.	
25.08 Troubleshoot air motors.	
26.0 Maintain and troubleshoot fluid-drive systems--The student will be able to:	
26.01 Explain the safety procedures for maintaining and troubleshooting fluid-drive systems.	
26.02 Install adjustable-speed drives.	
26.03 Troubleshoot adjustable-speed drives.	
26.04 Explain the operation of fluid couplings.	
26.05 Install fluid couplings.	
26.06 Install torque converters.	
26.07 Perform preventive maintenance.	
26.08 Apply a "dynamic" magnetic/mechanical braking device to a motor.	
26.09 Mount the equipment.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

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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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Millwright 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J590500
CIP Number	0647030306
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	TEC CONSTR @7 7G MILLWRIGHT 7G BLDG CONST @7 7G IND ENGR 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9041 – Industrial Machinery Mechanics 49-9044 – Millwrights
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to the understanding of all aspects of the industrial-machinery maintenance-technology industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 for this program is 600 hours. **Millwright 1** is a core program. It is recommended students complete **Millwright 1,** or demonstrate mastery of the outcomes in that program, prior to enrollment in **Millwright 2**.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ETI0457	Machinery Maintenance Technician	150 hours	49-9041
B	ETI0459	Millwright	450 hours	49-9044

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 Maintain and troubleshoot robotic systems.
02.0 Perform pump maintenance and repair.
03.0 Explain the operation of industrial-pollution control systems.
04.0 Troubleshoot air-conditioning and refrigeration systems.
05.0 Identify boilers.
06.0 Maintain internal combustion engines.
07.0 Perform metal fabrication.
08.0 Perform precision layout.
09.0 Perform advanced rigging.
10.0 Install, remove and align machinery.

Florida Department of Education
Student Performance Standards

Program Title: **Millwright 2**
PSAV Number: **J590500**

Course Number: ETI0457
Occupational Completion Point: A
Machinery Maintenance Technician – 150 Hours – SOC Code 49-9041

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
01.0	Maintain and troubleshoot robotic systems--The student will be able to:	
01.01	Identify uses of robotics in industry.	
01.02	Identify safety procedures related to robotic systems.	
01.03	Identify mechanical, hydraulic, pneumatic, and electric/electronic components of robotic systems.	
01.04	Perform routine maintenance and calibration of robotic systems.	
01.05	Remove, replace and adjust robotic system components.	
02.0	Perform pump maintenance and repair--The student will be able to:	
02.01	Demonstrate the safety procedures for performing pump maintenance.	
02.02	Determine pump capacity and system requirements.	
02.03	Perform pump maintenance.	
02.04	Identify packing and seal requirements.	
02.05	Explain the operating principles of centrifugal, propeller and turbine rotary, reciprocating, diaphragm, positive placement, and vacuum pumps.	
02.06	Disassemble and reassemble a pump.	
03.0	Explain the operation of industrial-pollution control systems--The student will be able to:	
03.01	Explain the operation of air-pollution control systems.	
03.02	Explain the operation of water-pollution control systems.	
03.03	Explain the operation of solid-waste pollution control systems.	

CTE Standards and Benchmarks		National Standards
	03.04 Explain the operation of noise-pollution control systems.	
04.0	Troubleshoot air-conditioning and refrigeration systems--The student will be able to:	
	04.01 Explain the principles of refrigeration.	
	04.02 Identify the major components.	
	04.03 Describe the functions of electrical systems.	
	04.04 Troubleshoot air-conditioning and refrigeration systems.	
	04.05 Explain the requirement for recovery of hazardous materials and related safety procedures.	
05.0	Identify boilers--The student will be able to:	
	05.01 Identify the various types and components of heat exchangers.	
	05.02 Identify the various types and components of boilers.	
	05.03 Identify the various types and components of fractioning columns.	
	05.04 Identify the uses of steam.	
06.0	Maintain internal combustion engines--The student will be able to:	
	06.01 Explain the basic principles of operation of the two-stroke-cycle combustion engine.	
	06.02 Identify the types of engines.	
	06.03 Locate engine serial and model numbers.	
	06.04 Identify engine assemblies and systems.	
	06.05 Troubleshoot and evaluate engine performance.	
	06.06 Perform routine maintenance on engine operating systems including air intake and exhaust, fuel, lubrication, ignition, starting and governing.	
	06.07 Perform engine tune-up and adjustment procedures.	
	06.08 Remove and replace engine assemblies.	

Florida Department of Education
Student Performance Standards

Course Number: ETI0459
Occupational Completion Point: B
Millwright – 450 Hours – SOC Code 49-9044

Note: This course is pending alignment in the following categories: National Standards

CTE Standards and Benchmarks		National Standards
07.0	Perform metal fabrication--The student will be able to:	
07.01	Field sketch equipment supports for applications in the millwright industry.	
07.02	Read and interpret requirements in an OSHA 1910.211-219 and ANSI B15.1.	
07.03	Create, design, draw, fabricate, and paint an OSHA-approved guard.	
07.04	Use a Cut-A-Matic to make precision cuts.	
08.0	Perform precision layout--The student will be able to:	
08.01	Locate an existing benchmark and transfer it to various positions around a work area or site.	
08.02	Use the triangle procedure to check established benchmarks with an optical level and a transit.	
08.03	Identify and establish centerlines of equipment related to building columns.	
09.0	Perform advanced rigging --The student will be able to:	
09.01	Perform and interpret all rigging hand signals.	
09.02	Interpret and apply load charts for slings, chokers, and cables.	
09.03	Determine the weight of a load.	
09.04	Determine the method of lifting.	
09.05	Identify crane capacity, including the boom angle and load-swing radius.	
09.06	Identify and take the necessary precautions to accommodate weather conditions, load capacity, equipment, and safety factors.	
09.07	Balance different types of loads.	
10.0	Install, remove, and align machinery --The student will be able to:	
10.01	Identify the equipment required for machine installation and removal in millwright applications.	

CTE Standards and Benchmarks		National Standards
10.02	Operate levers, inclined planes, screws, wedges, wheel and axle assemblies, pulleys, and jacking screws.	
10.03	Perform site-clearance operations and demolition and salvage procedures.	
10.04	Explain the principles of machine alignment.	
10.05	Explain the principles of shaft alignment.	
10.06	Explain the relationship of structural problems to misalignment.	
10.07	Explain the use of thermal growth by calculation and field-growth techniques such as Essinger bars.	
10.08	Align machinery using wire line, transit, dial indicators, a computer, and laser-alignment devices.	
10.09	Perform laser horizontal and vertical alignment.	
10.10	Perform the train alignment of three or more machines and graph the results.	
10.11	Prepare an area for machine installation according to the manufacturer's specifications for selected applications.	
10.12	Position and secure machinery on a foundation.	
10.13	Level machinery and install balance-vibration dampeners.	
10.14	Identify pipe-stress standards for millwright applications.	
10.15	Perform finish alignment and check for pipe stresses in millwright applications.	

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. 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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Course Title: **Manufacturing Cooperative Education - OJT**
Course Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Cooperative Education - OJT	
Course Number	J609999
CIP Number	06149999CP
Grade Level	30, 31
Standard Length	Multiple hours
Teacher Certification	Any District Certification appropriate to the students' chosen career field
CTSO	SkillsUSA

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 cluster(s); 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 cluster(s).

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Manufacturing Cooperative Education OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

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

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 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Program Title: **Manufacturing Cooperative Education OJT**
PSAV Number: **J609999**

Standards and Benchmarks
01.0 Perform designated job skills--The student will be able to:
01.01 Perform tasks as outlined in the training plan.
01.02 Demonstrate job performance skills.
01.03 Demonstrate safety procedures on the job.
01.04 Maintain appropriate records.
01.05 Attain an acceptable level of productivity.
01.06 Demonstrate appropriate dress and grooming habits.
02.0 Demonstrate work ethics--The student will be able to:
02.01 Follow directions.
02.02 Demonstrate good human relations skills on the job.
02.03 Demonstrate good work habits.
02.04 Demonstrate acceptable business ethics.

Additional Information

Special Notes

There is a **Cooperative Education Manual** available online that has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE website at http://www.fldoe.org/workforce/dwdframe/pdf/STEPS-Manual.pdf.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization(s) for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Major Appliance and Refrigeration Repair 1**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J620100
CIP Number	0647010602
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	APPLI REPR @7 7G GAS FITTER 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9031 – Home Appliance Repairers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, electrical and refrigeration skills, analyzing, diagnosing and repairing washers, dryers, dishwashers, trash compactors, ranges, refrigerators, freezers, microwave ovens, and window air conditioners.

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 following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EER0310	Appliance Helper	300 hours	49-9031
B	EER0315	Laundry Technician	300 hours	49-9031

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 Apply proper laboratory practices.
02.0 Apply electrical fundamentals.
03.0 Apply gas fundamentals.
04.0 Install, troubleshoot and repair electric clothes dryers.
05.0 Install, troubleshoot and repair gas clothes dryers.
06.0 Install, troubleshoot and repair clothes washers.

Florida Department of Education
Student Performance Standards

Program Title: **Major Appliance and Refrigeration Repair 1**
PSAV Number: **J620100**

Course Number: EER0310
Occupational Completion Point: A
Appliance Helper – 300 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
01.0	Apply proper laboratory practices--The student will be able to:
01.01	Use industry accepted safety practices.
01.02	Explain appropriate first aid for electrical shock and potential shop accidents.
01.03	Perform appropriate record keeping functions.
01.04	Explain and demonstrate the proper use and care of hand tools.
01.05	Explain and demonstrate the proper use and care of meters and test equipment.
01.06	Explain and demonstrate the proper use and care of power tools.
02.0	Apply electrical fundamentals--The student will be able to:
02.01	Explain electron theory.
02.02	Identify circuits from schematics and diagrams using commonly accepted symbols.
02.03	Explain Ohm's Law.
02.04	Measure resistance.
02.05	Measure voltage.
02.06	Measure amperage.
02.07	Measure wattage.
02.08	Explain and construct series circuits.
02.09	Explain and construct parallel circuits.
02.10	Explain and construct combination circuits.
02.11	Explain inductance and magnetism and their relationship to electric motors.

CTE Standards and Benchmarks	
	02.12 Describe how electric motors function.
	02.13 Explain the function of capacitors and how to troubleshoot them.
	02.14 Explain the function of relay and switches and how to troubleshoot them.
	02.15 Explain the function of capacitors and transformers in major appliances.
	02.16 Explain the concept and rationale of motor protection.
	02.17 Describe how a compressor functions.
03.0	Apply gas fundamentals--The student will be able to:
	03.01 Explain common use terms.
	03.02 Explain different types of gas.
	03.03 Explain specific gravity.
	03.04 Diagram and explain basic components of a gas burner.
	03.05 Explain requirements for burning.
	03.06 Perform pressure tests on gas systems.

Florida Department of Education
Student Performance Standards

Course Number: EER0315
Occupational Completion Point: B
Laundry Technician – 300 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
04.0	Install, troubleshoot, and repair electric clothes dryer--The student will be able to:
04.01	Install an electric dryer.
04.02	Identify components and their function.
04.03	Troubleshoot timers and components.
04.04	Remove and replace manual timer, electronic controls or components.
04.05	Troubleshoot drive motors and components.
04.06	Remove and replace drive motor or component.
04.07	Troubleshoot heating elements and components.
04.08	Remove and replace element or component.
04.09	Remove and replace thermostats.
04.10	Troubleshoot thermostats.
04.11	Troubleshoot bearings and components.
04.12	Remove and replace bearing or component.
04.13	Troubleshoot belts and pulleys.
04.14	Remove and replace belt or pulley.
04.15	Troubleshoot rollers and glides.
04.16	Remove and replace roller or glides.
04.17	Troubleshoot filters.
04.18	Remove and replace filter.
04.19	Troubleshoot seals.
04.20	Remove and replace seals.

CTE Standards and Benchmarks	
	04.21 Troubleshoot push-to-start switch.
	04.22 Remove and replace push-to-start switch.
	04.23 Troubleshoot door switches.
	04.24 Remove and replace door switches.
	04.25 Troubleshoot selector switches.
	04.26 Remove and replace selector switches.
	04.27 Remove and replace sensor and electronic control.
	04.28 Troubleshoot sensor and electronic control.
	04.29 Perform operational check.
	04.30 Instruct consumer on use and care.
05.0	Install, troubleshoot and repair gas clothes dryers--The student will be able to:
	05.01 Install a gas dryer.
	05.02 Identify components and their function.
	05.03 Read and interpret schematics and diagrams.
	05.04 Troubleshoot electric ignition components.
	05.05 Remove and replace electric ignition components.
	05.06 Troubleshoot timers and electronic controls and components.
	05.07 Remove and replace timer electronic control or component.
	05.08 Troubleshoot drive motors.
	05.09 Remove and replace drive motor.
	05.10 Troubleshoot gas burner.
	05.11 Remove and replace gas burner.
	05.12 Troubleshoot thermostats.
	05.13 Remove and replace thermostat.
	05.14 Troubleshoot gas valves.
	05.15 Remove and replace gas valve.

CTE Standards and Benchmarks	
05.16	Troubleshoot thermocouples.
05.17	Remove and replace thermocouple.
05.18	Troubleshoot flame switch.
05.19	Remove and replace flame switch.
05.20	Troubleshoot bearing assemblies and components.
05.21	Remove and replace bearing or component.
05.22	Troubleshoot belts and pulleys.
05.23	Remove and replace belt or pulley.
05.24	Troubleshoot rollers and glides.
05.25	Remove and replace roller or glide.
05.26	Troubleshoot seals.
05.27	Remove and replace seals.
05.28	Troubleshoot door switches.
05.29	Remove and replace door switch.
05.30	Troubleshoot selector switches.
05.31	Remove and replace selector switch.
05.32	Troubleshoot motor switches.
05.33	Remove and replace motor switch.
05.34	Perform operational check.
05.35	Instruct consumer on use and care.
06.0	Install, troubleshoot and repair clothes washers--The student will be able to:
06.01	Install a clothes washer.
06.02	Identify components and their function.
06.03	Read and interpret schematics and diagrams.
06.04	Troubleshoot manual timers, electronic controls and components.
06.05	Remove and replace timer or component.

CTE Standards and Benchmarks
06.06 Troubleshoot selector switches.
06.07 Remove and replace selector switch.
06.08 Troubleshoot water level switches and components.
06.09 Remove and replace water level switch or component.
06.10 Troubleshoot water inlet valves and components.
06.11 Remove and replace water inlet valve or component.
06.12 Troubleshoot hoses.
06.13 Remove and replace hoses.
06.14 Troubleshoot water pumps and components.
06.15 Remove and replace water pump or component.
06.16 Troubleshoot filters to include front load washers.
06.17 Remove and replace filters to include front load washers.
06.18 Troubleshoot drive motors and components.
06.19 Remove and replace drive motor or component.
06.20 Troubleshoot belts and pulleys.
06.21 Remove and replace belt or pulley.
06.22 Troubleshoot transmissions and components.
06.23 Remove and replace transmission or component.
06.24 Troubleshoot bearings.
06.25 Remove and replace bearings.
06.26 Troubleshoot water and oil seals.
06.27 Remove and replace water and oil seals.
06.28 Troubleshoot clutches.
06.29 Remove and replace clutch.
06.30 Troubleshoot brakes.
06.31 Remove and replace brake.

CTE Standards and Benchmarks
06.32 Troubleshoot lid switches and components.
06.33 Remove and replace lid switch or component.
06.34 Perform operational check.
06.35 Instruct consumer on use and care.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

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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 at http://www.fldoe.org/workforce/dwdframe/rtf/basicskills-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

The PSAV component of this program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

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Revised: 2/27/2014

2014 – 2015

Florida Department of Education
Curriculum Framework

Program Title: **Major Appliance and Refrigeration Repair 2**
Program Type: **Career Preparatory**
Career Cluster: **Manufacturing**

PSAV – Career Preparatory	
Program Number	J620200
CIP Number	0647010603
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	APPLI REPR @7 7G GAS FITTER 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9031 – Home Appliance Repairers
Facility Code	245 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 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.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, electrical and refrigeration skills, analyzing, diagnosing and repairing washers, dryers, dishwashers, trash compactors, ranges, refrigerators, freezers, microwave ovens, and window air conditioners.

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 900 hours. **Major Appliance and Refrigeration Repair 1** is a core program. It is recommended students complete **Major Appliance and Refrigeration Repair 1,** or demonstrates mastery of the outcomes in that program, prior to enrollment in **Major Appliance and Refrigeration Repair 2.**

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EER0317	Kitchen Technician	450 hours	49-9031
B	ACR0046	Refrigeration Technician	450 hours	49-9031

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 Install, troubleshoot and repair electric ranges.
02.0 Install, troubleshoot and repair microwave ovens.
03.0 Install, troubleshoot and repair gas ranges.
04.0 Install, troubleshoot and repair dishwashers.
05.0 Utilize fundamentals of refrigeration.
06.0 Work with tubing and fittings.
07.0 Install, troubleshoot and repair refrigerators, icemakers and freezers.
08.0 Install, troubleshoot and repair window air conditioners.

Florida Department of Education
Student Performance Standards

Program Title: **Major Appliance and Refrigeration Repair 2**
PSAV Number: **J620200**

Course Number: EER0317
Occupational Completion Point: A
Kitchen Technician – 450 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
01.0	Install, troubleshoot, and repair electric ranges--The student will be able to:
01.01	Install an electric range.
01.02	Describe the operation and application of components.
01.03	Read and interpret schematics and diagrams.
01.04	Troubleshoot clocks/timers.
01.05	Remove and replace clocks/timers.
01.06	Troubleshoot surface unit switches and components.
01.07	Remove and replace surface switches or components.
01.08	Troubleshoot oven thermostats and components.
01.09	Remove and replace oven thermostats or components.
01.10	Troubleshoot oven selector switches and components.
01.11	Remove and replace oven selector switches or components including induction cook-tops and ranges.
01.12	Troubleshoot surface units and components including induction cook-tops and ranges.
01.13	Remove and replace surface units or components including induction cook-tops and ranges.
01.14	Troubleshoot bake and broil elements.
01.15	Remove and replace bake and broil elements.
01.16	Troubleshoot electronic controls.
01.17	Remove and replace electronic controls.
01.18	Troubleshoot time delay relays.

CTE Standards and Benchmarks	
01.19	Remove and replace time delay relay.
01.20	Troubleshoot oven sensors and components.
01.21	Remove and replace oven sensor or component.
01.22	Troubleshoot door locks and components.
01.23	Remove and replace door lock or component.
01.24	Troubleshoot fans.
01.25	Remove and replace fan.
01.26	Troubleshoot gaskets and seals.
01.27	Remove and replace gasket or seals.
01.28	Perform operational check.
01.29	Instruct consumer on use and care.
02.0	Install, troubleshoot, and repair microwave ovens--The student will be able to:
02.01	Install a microwave oven.
02.02	Describe the operation and application of components.
02.03	Read and interpret schematics and diagrams.
02.04	Troubleshoot clocks/timers/electronic controls.
02.05	Remove and replace clocks/timers/electronic controls.
02.06	Troubleshoot door switches.
02.07	Remove and replace door switches.
02.08	Troubleshoot relays.
02.09	Remove and replace relays.
02.10	Troubleshoot thermal protectors.
02.11	Remove and replace thermal protectors.
02.12	Troubleshoot the power transformer.
02.13	Remove and replace the power transformer.
02.14	Troubleshoot the high voltage diode.

CTE Standards and Benchmarks	
02.15	Remove and replace the high voltage diode.
02.16	Troubleshoot the capacitor.
02.17	Remove and replace the capacitor.
02.18	Troubleshoot the magnetron.
02.19	Remove and replace the magnetron.
02.20	Troubleshoot the fan.
02.21	Remove and replace the fan.
02.22	Troubleshoot the stirrer blade and motor.
02.23	Remove and replace the stirrer blade and motor.
02.24	Troubleshoot the turntable motor.
02.25	Remove and replace the turntable motor.
02.26	Perform operational check.
02.27	Instruct consumer on use and care.
03.0	Install, troubleshoot, and repair gas ranges--The student will be able to:
03.01	Install a gas range.
03.02	Identify components and their function.
03.03	Read and interpret schematics and diagrams.
03.04	Troubleshoot clocks/timers/electronic controls.
03.05	Remove and replace clocks/timers/electronic controls.
03.06	Troubleshoot oven thermostats.
03.07	Remove and replace oven thermostats.
03.08	Troubleshoot oven selector switches.
03.09	Remove and replace oven selector switches.
03.10	Troubleshoot self-clean relays.
03.11	Remove and replace self-clean relays.
03.12	Troubleshoot oven sensors.

CTE Standards and Benchmarks	
03.13	Remove and replace oven sensor.
03.14	Troubleshoot door locks.
03.15	Remove and replace door lock.
03.16	Troubleshoot fans.
03.17	Remove and replace fan.
03.18	Troubleshoot gas valves for surface burners.
03.19	Remove and replace gas valve for surface burner.
03.20	Troubleshoot gas valve for oven.
03.21	Remove and replace gas valve for oven.
03.22	Troubleshoot electric igniters.
03.23	Remove and replace electric igniter.
03.24	Troubleshoot safety valves.
03.25	Remove and replace safety valve.
03.26	Troubleshoot pressure regulators.
03.27	Remove and replace pressure regulator.
03.28	Troubleshoot door seals/gaskets.
03.29	Remove and replace door seal/gasket.
03.30	Perform operational check.
03.31	Instruct consumer on use and care.
04.0	Install, troubleshoot, and repair dishwashers--The student will be able to:
04.01	Install a dishwasher.
04.02	Identify components and their function.
04.03	Read and interpret schematics and diagrams.
04.04	Troubleshoot timers and electronic control or components.
04.05	Remove and replace timer and electronic control or component.
04.06	Troubleshoot selector switches.

CTE Standards and Benchmarks
04.07 Remove and replace selector switch.
04.08 Troubleshoot float switches.
04.09 Remove and replace float switch.
04.10 Troubleshoot door switches.
04.11 Remove and replace door switch.
04.12 Troubleshoot motors and components.
04.13 Remove and replace motor and component.
04.14 Troubleshoot heating elements.
04.15 Remove and replace heating element.
04.16 Troubleshoot relays.
04.17 Remove and replace relay.
04.18 Troubleshoot water valves and components.
04.19 Remove and replace water valve or component.
04.20 Troubleshoot hoses.
04.21 Remove and replace hoses.
04.22 Troubleshoot pumps and components.
04.23 Remove and replace pump or component.
04.24 Troubleshoot seals.
04.25 Remove and replace seals.
04.26 Troubleshoot dispensers and components.
04.27 Remove and replace dispenser or component.
04.28 Troubleshoot spray arms.
04.29 Remove and replace spray arm.
04.30 Troubleshoot blower motors.
04.31 Remove and replace blower motor.
04.32 Troubleshoot thermostats.

CTE Standards and Benchmarks
04.33 Remove and replace thermostat.
04.34 Perform operational check.
04.35 Instruct consumer on use and care.

Florida Department of Education
Student Performance Standards

Course Number: ACR0046
Occupational Completion Point: B
Refrigeration Technician – 450 Hours – SOC Code 49-9031

CTE Standards and Benchmarks	
05.0	Utilize the fundamentals of refrigeration--The student will be able to:
05.01	Explain commonly used terms.
05.02	Perform heat transfer, measuring and temperature conversions.
05.03	Perform pressure measuring and conversion calculations.
05.04	Explain the concept of state of matter.
05.05	Explain the differences in refrigerants and their uses.
05.06	Diagram and explain the functions of the components of basic refrigeration systems.
05.07	Identify purpose and importance of CFC recover/recycling.
05.08	Identify operation of recovery system components.
05.09	Recover and recycle refrigerants.
06.0	Work with tubing and fittings--The student will be able to:
06.01	Identify types and uses of solders and brazing alloys.
06.02	Identify types and sizes of tubing and fittings.
06.03	Measure, cut, flare, swage and bend tubing.
06.04	Soft solder with acetylene.
06.05	Braze with acetylene and oxyacetylene.
06.06	Fabricate replacement sections of tubing for appliances.
07.0	Install, troubleshoot, and repair refrigeration icemakers and freezers--The student will be able to:
07.01	Install a refrigerator and a freezer.
07.02	Identify components, electronic controls, variable speed compressors and their functions.
07.03	Read and interpret schematics and diagrams.

CTE Standards and Benchmarks	
	07.04 Troubleshoot gaskets and seals.
	07.05 Remove and replace gaskets and seals.
	07.06 Troubleshoot light and fan switches.
	07.07 Remove and replace light and fan switches.
	07.08 Troubleshoot fans.
	07.09 Remove and replace fans.
	07.10 Troubleshoot the manual and electronic adaptive controls defrost timers.
	07.11 Remove and replace the manual and electronic adaptive control defrost timers.
	07.12 Troubleshoot the defrost thermostats and thermistors.
	07.13 Remove and replace the defrost thermostats and thermistors.
	07.14 Troubleshoot the defrost heater.
	07.15 Remove and replace the defrost heater.
	07.16 Troubleshoot the cold control.
	07.17 Remove and replace cold control.
	07.18 Troubleshoot icemakers.
	07.19 Remove and repair icemakers.
	07.20 Use test equipment to determine operating conditions of a refrigeration system.
	07.21 Troubleshoot refrigeration system.
	07.22 Remove and replace compressors.
	07.23 Remove and replace condensers, evaporators, metering devices and dryers.
	07.24 Perform operational check.
	07.25 Instruct consumers on use and care.
08.0	Install, troubleshoot, and repair window air conditioners-–The student will be able to:
	08.01 Install a window air conditioner.
	08.02 Identify components and their functions to include multi-split systems and electronic controls.
	08.03 Read and interpret schematics and diagrams.

CTE Standards and Benchmarks
08.04 Troubleshoot selector switches.
08.05 Remove and replace selector switches.
08.06 Troubleshoot the thermostats.
08.07 Remove and replace the thermostats.
08.08 Troubleshoot capacitors.
08.09 Remove and replace capacitors.
08.10 Troubleshoot the fan motor.
08.11 Remove and replace the fan motor.
08.12 Troubleshoot the heater.
08.13 Remove and replace the heater.
08.14 Troubleshoot the deicer.
08.15 Remove and replace the deicer.
08.16 Troubleshoot the reversing valve.
08.17 Remove and replace the reversing valve.
08.18 Troubleshoot the compressor.
08.19 Remove and replace the compressor.
08.20 Use test equipment to determine operating conditions of refrigeration systems.
08.21 Perform operational check.
08.22 Instruct consumer on use and care.

Additional Information

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