

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Sustainable Design
Career Cluster: Architectural Construction

CCC	
CIP Number	0615010106
Program Type	College Credit Certificate (CCC)
Program Length	19 Credit Hours
CTSO	Skills USA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as construction planners, or to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Architectural Design and Construction Technology AS/AAS degree program (0615010100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architectural Construction 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 Architectural Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, assisting architects and architectural engineers in planning and designing structures, using construction materials, and dealing with contracts and specifications

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

Career and Technical Student Organization (CTSO)

Skills USA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select, apply, and maintain drafting and graphic materials and equipment.
- 03.0 Identify construction materials and their application.
- 04.0 Interpret drawings and documents.
- 05.0 Interpret and apply basic principles of architectural and engineering design.
- 06.0 Interpret and apply codes, regulations, and technical literature.
- 07.0 Produce architectural working drawings.
- 08.0 Prepare subcontractor shop drawings.
- 09.0 Estimate basic quantities.
- 10.0 Demonstrate appropriate communication skills.

- 11.0 Demonstrate appropriate math skills.
- 12.0 Explain sustainability issues related to the design, construction and maintenance of the built environment.

2012 – 2013

**Florida Department of Education
Student Performance Standards**

Program Title: Sustainable Design
CIP Number: 0615010106
Program Length: 19 Credit Hours
SOC Code(s): 17-3011

This certificate program is part of the Architectural Design and Construction Technology AS/AAS degree program (0615010106). At the completion of this program, the student will be able to:

- 01.0 Communicate effectively -- The student will be able to:
- 01.01 Identify communication channels in organizations.
 - 01.02 Develop and use effective means of communications.
 - 01.03 Develop an effective working relationship with others.
 - 01.04 Prepare business correspondence, memos, and reports.
 - 01.05 Compose clear and concise oral and written technical reports and presentations.
 - 01.06 Participate in technical discussion and meetings.
- 02.0 Identify, select, apply, and maintain drafting and graphic materials, and equipment -- The student will be able to:
- 02.01 Use architectural and engineering scales.
 - 02.02 Select, apply, and maintain basic drawing instruments including both table top tools (triangles, compass, etc.) and computer hardware devices and software programs.
 - 02.03 Identify and select leads, lead holders, sharpeners and erasers.
 - 02.04 Identify and select reproduction materials.
 - 02.05 Set up and maintain drafting machine, T square, and parallel rule.
 - 02.06 Identify, select, and apply color markers and pencils.
 - 02.07 Operate calculators.
 - 02.08 Identify, operate, and maintain photography equipment.
 - 02.09 Apply photographic techniques.
 - 02.10 Apply and develop lettering and drawing techniques.
- 03.0 Identify construction materials and their application -- The student will be able to:
- 03.01 Identify formwork materials and methods.
 - 03.02 Identify concrete materials and applications.
 - 03.03 Identify structural steel shapes and applications.
 - 03.04 Identify waterproofing materials and vapor barriers and applications.
 - 03.05 Identify wood construction materials and applications.
 - 03.06 Identify masonry materials and applications.
 - 03.07 Identify exterior finishes and applications.
 - 03.08 Identify insulation materials and applications.
 - 03.09 Identify glass and glazing materials and applications.
 - 03.10 Identify roofing materials and applications.
 - 03.11 Identify flashings and applications.

- 03.12 Identify adhesives and sealants and applications.
- 03.13 Identify floor finish materials and applications.
- 03.14 Identify wall finish materials and applications.
- 03.15 Identify ceiling finish materials and applications.
- 03.16 Identify plastic materials and applications.
- 03.17 Identify miscellaneous metals and applications.
- 03.18 Identify millwork and applications.
- 03.19 Identify finish hardware and applications.
- 03.20 Identify manufactured specialties and applications.
- 03.21 Identify basic electrical components.
- 03.22 Identify basic HVAC components.
- 03.23 Identify basic plumbing components.
- 03.24 Identify paving materials and applications.
- 03.25 Identify fire proofing materials and applications.

04.0 Interpret drawings and documents -- The student will be able to:

- 04.01 Interpret technical symbols.
- 04.02 Interpret topographical drawings.
- 04.03 Interpret aerial photographs and maps.
- 04.04 Interpret site drawings.
- 04.05 Interpret architectural drawings.
- 04.06 Interpret specifications.
- 04.07 Interpret addendums.
- 04.08 Interpret shop drawings.
- 04.09 Interpret mechanical drawings.
- 04.10 Interpret electrical drawings.
- 04.11 Interpret master and development plans and documents

05.0 Interpret and apply basic principles of architectural and engineering design -- The student will be able to:

- 05.01 Interpret soil analysis reports.
- 05.02 Interpret compaction test reports.
- 05.03 Interpret and apply fundamentals of site requirements.
- 05.04 Determine and apply space relationships.

06.0 Interpret and apply codes, regulations, and technical literature -- The student will be able to:

- 06.01 Interpret and apply graphic and time saver standards.
- 06.02 Interpret and apply local, state, national and international building codes including the Florida Building Codes, the Life Safety Code (NFPA 101), the National Electric Code (NFPA 70), the International Building Code (IBC), etc.
- 06.03 Interpret and apply municipal codes and regulations.
- 06.04 Interpret zoning bylaws and regulations.
- 06.05 Interpret zoning maps.
- 06.06 Interpret trade magazines and catalogs.
- 06.07 Interpret trade manuals.
- 06.08 Interpret yardstick costing manual.
- 06.09 Interpret and apply construction association regulations.

- 07.0 Produce architectural working drawings -- The student will be able to:
 - 07.01 Prepare floor plan drawings.
 - 07.02 Prepare elevation drawings.
 - 07.03 Prepare landscape layouts.
 - 07.04 Prepare schedules.
 - 07.05 Prepare sections.
 - 07.06 Build architectural models.
 - 07.07 Prepare plot plan drawings.

- 08.0 Prepare subcontractor shop drawings -- The student will be able to:
 - 08.01 Prepare plumbing plan drawings.
 - 08.02 Prepare climate control drawings.
 - 08.03 Prepare electrical plan drawings.

- 09.0 Estimate basic quantities -- The student will be able to:
 - 09.01 Compute area and volume of buildings.
 - 09.02 Estimate quantities of excavation and fill.
 - 09.03 Take off quantities of form work.
 - 09.04 Take off quantities of concrete.
 - 09.05 Take off quantities of lumber.
 - 09.06 Take off quantities of masonry.
 - 09.07 Interpret and complete standard estimator's form.
 - 09.08 Apply the use of computer estimating software.

- 10.0 Demonstrate appropriate communication skills -- The student will be able to:
 - 10.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
 - 10.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 10.03 Read and follow written and oral instructions.
 - 10.04 Answer and ask questions coherently and concisely.
 - 10.05 Read critically by recognizing assumptions and implications and by evaluating ideas.

- 11.0 Demonstrate appropriate math skills -- The student will be able to:
 - 11.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 11.02 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 11.03 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

- 12.0 Explain sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
 - 12.01 Describe the impact of the construction industry on the natural environment.

- 12.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
- 12.03 Identify and analyze sustainable alternatives to conventional construction practices.
- 12.04 Identify specific practices that can lessen adverse impacts on the environment.
- 12.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
- 12.06 Identify design features, construction activities and maintenance practices that contribute to a project's overall sustainability.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Air Conditioning, Refrigeration, and Heating Systems Technology
Career Cluster: Architecture and Construction

AAS	
CIP Number	0615050100
Program Type	College Credit
Standard Length	64 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as air conditioning and heating technician) or to provide supplemental training for persons previously or currently employed in these occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to safe and efficient work practices. The program prepares students to assist in engineering departments or work independently, capable of designing, installing, maintaining and operating small or medium air conditioning, heating or refrigerating systems

Program Structure

This program is a planned sequence of instruction consisting of 64 credit hours.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Air Conditioning, Refrigeration and Heating

Systems industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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

Career and Technical Student Organization (CTSO)

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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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AAS degree program includes the following College Credit Certificates:

Residential Air Conditioning, Refrigeration, and Heating Systems Assistant
(0615050101) – 12 Credit Hours
Residential Air Conditioning, Refrigeration, and Heating Systems Technician
(0615050102) – 24 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry.
- 03.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment.
- 04.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components.
- 05.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- 06.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 07.0 Troubleshoot and wire electrical motors and their components.
- 08.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems.
- 09.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems.
- 10.0 Explain the function of basic electronics.
- 11.0 Read construction documents.
- 12.0 Describe the history and concepts of heating, air-conditioning, and refrigeration,
- 13.0 Explain the properties of matter and heat behavior.
- 14.0 Analyze fluids, pressures, refrigerants, and related codes.
- 15.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 16.0 Select appropriate commercial compressors.
- 17.0 Test and adjust commercial evaporative condensers.
- 18.0 Maintain, test, and troubleshoot commercial evaporators.
- 19.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 20.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 21.0 Demonstrate employability skills.

- 22.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 23.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 24.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 25.0 Demonstrate a working knowledge of refrigerants and oils.
- 26.0 Interpret, use and modify construction drawings and specifications.
- 27.0 Conduct system startup and shutdown.
- 28.0 Design heating and cooling systems.
- 29.0 Use combustion-type heating servicing and testing equipment.
- 30.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 31.0 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 32.0 Maintain, troubleshoot, and repair commercial heating systems.
- 33.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems.
- 34.0 Demonstrate knowledge of retail refrigeration systems.
- 35.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 36.0 Develop an understanding of hydronic systems.
- 37.0 Develop an understanding of steam systems.
- 38.0 Determine the properties of air.
- 39.0 Use a pressure enthalpy chart to diagram refrigerant cycles.
- 40.0 Explain the standards for and ways to measure indoor-air quality.
- 41.0 Operate environmental control systems as used in commercial heating and air-conditioning systems.
- 42.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications.
- 43.0 Maintain and repair thermal storage systems.
- 44.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems.
- 45.0 Calculate commercial heating and air-conditioning loads.
- 46.0 Install air distribution systems.
- 47.0 Evaluate commercial airside systems.
- 48.0 Balance an air distribution system.
- 49.0 Select energy conservation equipment.
- 50.0 Analyze building management systems.
- 51.0 Recommend alternative heating and cooling systems for various case studies.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Air Conditioning, Refrigeration, and Heating Systems Technology
CIP Number: 0615050100
Program Length: 64 Credit Hours
SOC Code(s): 49-9021

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 02.01 Identify and use
 - a. Basic hand tools and tool accessories
 - b. Power tools (electric, mechanical, and pneumatic, if available)
 - c. Pipe and tube-working tools of the trade
 - d. Specialized tools of the trade

- 02.02 Apply appropriate care and maintenance procedures for tools and tool accessories, following the directions in the tool-equipment manufacturer's manual.
- 03.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment--The student will be able to:
 - 03.01 Explain the principles of electricity.
 - 03.02 Explain single- and three-phase power distribution.
 - 03.03 Define and explain watts, ohms, volts, and amps.
 - 03.04 Identify and explain electrical measuring tools and devices.
 - 03.05 Explain the standards for and ways to measure watts, resistance, voltage, and amperage, using appropriate instruments or devices.
 - 03.06 Identify and explain appropriate electrical wiring symbols.
 - 03.07 Draw and explain a wiring schematic diagram for a control system.
 - 03.08 Create a wiring schematic for each of the following, using all components and symbols for safe and effective operation and interpretation:
 - a. An air-conditioner
 - b. An electric furnace
 - c. A heat pump
 - d. An oil furnace (optional)
 - e. A gas furnace
 - 03.09 Explain codes and standards and safety requirements for working with the electrical components used in heating, air conditioning, and refrigeration.
 - 03.10 Troubleshoot protection devices, such as fuses and breakers.
 - 03.11 Interpret tables and charts from the National Electrical Codes (NEC).
- 04.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components--The student will be able to:
 - 04.01 Identify and explain the operations of electrical control systems and their components (zone damper motors, dual fuel lock out controls, outdoor thermostats/low ambient controls, defrost controls/timers, and auxiliary heating controls).
 - 04.02 Identify, install, and troubleshoot controls for heating, air-conditioning, and refrigeration systems.
 - 04.03 Explain the operation of different types of electromechanical thermostats.
 - 04.04 Wire basic heating, air-conditioning, and refrigeration systems.
 - 04.05 Troubleshoot operational problems for different types of electromechanical thermostats.
 - 04.06 Explain the electrical and mechanical operations of the basic heat pump.
- 05.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
 - 05.01 Determine wire sizes and voltage drops.
 - 05.02 Describe the operation of various types of transformers.
 - 05.03 Draw and identify various power-transformers.
 - 05.04 Test, size, and replace protection devices such as fuses and breakers, motor starters, and overloads.

- 06.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems--The student will be able to:
- 06.01 Explain how alternating current is developed and draw a sine wave.
 - 06.02 Identify single-phase and three-phase wiring arrangements.
 - 06.03 Explain how phase shift occurs in inductors and capacitors.
 - 06.04 Describe the types of capacitors and their applications.
 - 06.05 Explain the operation of single-phase and three-phase induction motors.
 - 06.06 Identify the various types of single-phase motors and their applications.
 - 06.07 State and demonstrate the safety precautions, such as lock out / tag out, which must be followed when working with electrical equipment.
 - 06.08 Explain how the electric company uses a demand meter.
 - 06.09 Identify and explain the operations and applications of various types of electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 06.10 Maintain, test, and troubleshoot various types of commercial electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 06.11 Demonstrate the proper use of motor testing equipment.
- 07.0 Troubleshoot and wire electrical motors and their components--The student will be able to:
- 07.01 Identify and explain the functions of various types of motors and their components.
 - 07.02 Troubleshoot, test, and analyze motors, using various methods.
 - 07.03 Identify, troubleshoot, and wire various types of electric motors.
 - 07.04 Reverse the rotation of a motor.
- 08.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems--The student will be able to:
- 08.01 Explain the basic principles and functions of Direct Digital Control (DDC).
 - 08.02 Explain basic solid-state circuits and boards.
 - 08.03 Identify, test, and replace circuits and boards.
 - 08.04 Identify and explain the functions of a building-management system.
 - 08.05 Program a programmable thermostat.
- 09.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems --The student will be able to:
- 09.01 Explain how the principles of designing an electrical system for residential heating and air-conditioning systems apply to commercial heating and air-conditioning systems.
 - 09.02 Define and compare single- and multiphase voltage and current related to commercial heating and air-conditioning systems.
 - 09.03 Calculate various circuit loads in commercial heating and air-conditioning applications using Ohm's law.
 - 09.04 Troubleshoot electrical circuits for commercial heating and air-conditioning systems

- 10.0 Explain the function of basic electronics--The student will be able to:
- 10.01 Explain the basic theory of electronics and semiconductors.
 - 10.02 Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.
 - 10.03 Identify different types of resistors and explain how their resistance values can be determined.
 - 10.04 Describe the operation and function of thermistors and cad cells.
 - 10.05 Test semiconductor components.
 - 10.06 Identify the connectors on a personal computer.
- 11.0 Read construction documents--The student will be able to:
- 11.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 11.02 Relate information on construction drawings to actual locations on the print.
 - 11.03 Recognize different classifications of construction drawings.
 - 11.04 Interpret and use drawing dimensions.
- 12.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:
- 12.01 Explain the basic principles of heating, ventilation and air-conditioning.
 - 12.02 Identify educational paths to career opportunities in the HVAC profession.
 - 12.03 Identify and explain the four major refrigeration components.
 - 12.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
 - 12.05 Differentiate between air-conditioning and refrigeration.
 - 12.06 Differentiate between split systems and package systems.
 - 12.07 Describe the benefits of conditioned air and environments.
 - 12.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
 - 12.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
 - 12.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
 - 12.11 Identify various professional organizations, associations, and societies, and explain their purposes.
- 13.0 Explain the properties of matter and heat behavior--The student will be able to:
- 13.01 Describe and explain freezing point, critical temperature, and absolute zero.
 - 13.02 Describe matter, heat, and heat transfer.
 - 13.03 Differentiate between heat and temperature.
 - 13.04 Explain and distinguish among the characteristics of the three states of matter.
 - 13.05 Explain the relationship between temperature and humidity.
 - 13.06 Differentiate between latent heat and sensible heat.
- 14.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:

- 14.01 Identify the refrigeration cycle.
 - 14.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
 - 14.03 Define and explain "pressure," "fluid," and "temperature."
 - 14.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
 - 14.05 Identify and explain the classifications, properties, and uses of different refrigerants.
 - 14.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
 - 14.07 Define and identify "color-coding" of refrigerant cylinders.
 - 14.08 Compare Pressure and Temperature (P/T) charts.
 - 14.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
 - 14.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 15.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 15.01 Explain the types, operation, use, and maintenance requirements of
 - a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
 - 15.02 Evaluate metering-device performance.
 - 15.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
 - 15.04 Analyze the operating condition of a compressor.
 - 15.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
 - 15.06 Identify the location and explain the uses of refrigerant flow accessories.
 - 15.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
 - 15.08 Evaluate system performance.
- 16.0 Select appropriate commercial compressors--The student will be able to:
- 16.01 Compare commercial-compressor requirements with those for residential and light commercial heating and air-conditioning systems.
 - 16.02 Select appropriate commercial compressors for cooling requirements.
 - 16.03 Describe the mechanical operation for each type of compressor.
 - 16.04 Explain compressor lubrication methods.
 - 16.05 Explain methods used to control compressor capacity.
 - 16.06 Describe how compressor protection devices operate.
 - 16.07 Perform the common procedures used when field servicing open and semi-hermetic compressors.
- 17.0 Test and adjust commercial evaporative condensers--The student will be able to:

- 17.01 Determine the proper air and fluid flow for commercial evaporative condensers.
 - 17.02 Test and adjust the airflow for proper temperature difference.
 - 17.03 Test and adjust the water flow for proper GPM and temperature difference.
 - 17.04 Check for proper water treatment.
- 18.0 Maintain, test, and troubleshoot commercial evaporators--The student will be able to:
- 18.01 Determine the operational requirements for evaporators used in commercial heating and air-conditioning applications.
 - 18.02 Select appropriate evaporators for commercial heating and air-conditioning systems.
 - 18.03 Maintain, test, and adjust various commercial heating and air-conditioning accessories.
- 19.0 Demonstrate employability skills--The student will be able to:
- 19.01 Conduct a job search.
 - 19.02 Secure information about a job.
 - 19.03 Identify documents which may be required when applying for a job interview.
 - 19.04 Complete a job application form correctly.
 - 19.05 Demonstrate competence in job interview techniques.
 - 19.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
 - 19.07 Identify acceptable work habits.
 - 19.08 Demonstrate knowledge of how to make appropriate job changes.
 - 19.09 Demonstrate acceptable employee health habits.
- 20.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 20.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 20.02 Bend tubing, using tube benders.
 - 20.03 Connect tubing, using
 - a. Flared fittings
 - b. Compression fittings
 - 20.04 Connect tubing, using solderless connectors.
 - 20.05 Connect tubing, using a swaged-joint connection.
 - 20.06 Identify and use various types of torches.
 - 20.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 20.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 20.09 Braze tubing.
 - 20.10 Silver-braze brass, steels, and copper.
 - 20.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 20.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 20.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 20.14 Maintain project time and materials lists.

- 20.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 21.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
 - 21.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
 - 21.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
 - 21.03 Explain pressure and temperature drops.
- 22.0 Utilize and operate mechanical refrigeration servicing and testing equipment--The student will be able to:
 - 22.01 Identify the effects of superheat and sub-cooling on a system.
 - 22.02 Identify and explain the functions of servicing and testing equipment (such as vacuum pumps, micron gauges, EPA-approved equipment, leak detectors, and charging systems).
 - 22.03 Operate a refrigerant recovery system.
 - 22.04 Explain the standards for and ways to measure, test, maintain, and evacuate a mechanical heating, air-conditioning, and refrigeration system.
 - 22.05 Evacuate the refrigerant system with various vacuum methods.
 - 22.06 Demonstrate compliance with Environmental Protection Agency (EPA) rules and regulations and, if possible, take the EPA test.
 - 22.07 Charge various air-conditioning and mechanical refrigeration systems by various methods.
 - 22.08 Demonstrate the effects of superheat and sub-cooling on a system utilizing test equipment (such as thermometers and gages)
- 23.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures--The student will be able to:
 - 23.01 Read and comply with dispatch orders.
 - 23.02 Explain local codes and ordinances.
 - 23.03 Select and use appropriate tools and safety practices to test equipment.
 - 23.04 Determine the electrical requirements of equipment.
 - 23.05 Assist in the installation of a heating and air-conditioning system to the manufacturer's installation and operation specifications, using a practical knowledge of duct fabrication methods.
 - 23.06 Determine the proper charge in a residential air-conditioning unit and adjust superheat.
 - 23.07 Determine the temperature drop across the evaporator.
 - 23.08 Determine the temperature rise across the condenser.
 - 23.09 Write a service report.
 - 23.10 Apply good customer-relations skills.
- 24.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:
 - 24.01 Identify and explain:

- a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
- 24.02 Determine the start-up and checkout procedures recommended by different manufacturers.
- 24.03 Determine the electrical requirements of equipment.
- 24.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
- 24.05 Determine the temperature drop across the outdoor coil on a heat pump.
- 24.06 Determine the temperature rise across the indoor coil on a heat pump.
- 24.07 Test for a proper refrigerant charge in a residential heat pump.
- 24.08 Apply good customer-relations skills.
- 25.0 Demonstrate a working knowledge of refrigerants and oils--The student will be able to:
- 25.01 Identify the refrigerants in common use and state the types of applications in which each is used.
 - 25.02 Explain the effects of releasing refrigerants into the atmosphere.
 - 25.03 Explain how refrigerants are classified by their chemical composition.
 - 25.04 Describe the color-coding scheme used to identify refrigerant cylinders.
 - 25.05 Describe how azeotropes and near-azeotropes differ from each other and from so-called pure refrigerants.
 - 25.06 Interpret a P-T chart for an azeotrope refrigerant.
 - 25.07 Calculate superheat and subcooling.
 - 25.08 Demonstrate refrigerant leak detecting methods.
 - 25.09 Identify the different types of oils used in refrigeration systems and explain their relationships to the various refrigerants.
 - 25.10 Explain how to add and remove oil from a system.
 - 25.11 Describe how to test oil for contamination.
- 26.0 Interpret, use and modify construction drawings and specifications--The student will be able to:
- 26.01 Read mechanical plans within a set of construction drawings explain their relationship.
 - 26.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
 - 26.03 Interpret specification documents and apply them to the plans.
 - 26.04 Interpret shop drawings and apply them to the plans and specifications.
 - 26.05 Develop a field set of as-built drawings.
 - 26.06 Identify the steps required for transferring design information to component production.
 - 26.07 List and classify materials most commonly used in HVAC systems.
- 27.0 Conduct system startup and shutdown--The student will be able to:
- 27.01 Start up and shut down an air handler and related forced-air distribution system.
 - 27.02 Test compressor oil for acid contamination.

- 27.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.
- 28.0 Design heating and cooling systems--The student will be able to:
- 28.01 Identify and describe the steps in the system design process.
 - 28.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
 - 28.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
 - 28.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
 - 28.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
 - 28.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
 - 28.07 Identify the various types of duct systems and explain why and where each type is used.
 - 28.08 Demonstrate the effect of fittings and transitions on duct system design.
 - 28.09 Use a friction loss chart and duct sizing table to size duct.
 - 28.10 Install insulation and vapor barriers used in duct systems.
 - 28.11 Following proper design principles select and install refrigerant and condensate piping.
- 29.0 Use combustion-type heating servicing and testing equipment--The student will be able to:
- 29.01 Explain combustion theory and the safety precautions for using combustion-type heating servicing and testing equipment.
 - 29.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
 - 29.03 Use the servicing and testing equipment.
 - 29.04 Test, analyze, and troubleshoot combustion-type-heating systems.
- 30.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems--The student will be able to:
- 30.01 Identify and discuss the safety and regulation issues and concerns.
 - 30.02 Explain the operations of various types of gas valves and regulators (such as low-voltage, line-voltage, pneumatic, solenoid, and gas and pressure regulators).
 - 30.03 Identify and size various types of gas valves and regulators.
 - 30.04 Determine the application of gas valves and regulators.
 - 30.05 Troubleshoot gas valves and regulators.
- 31.0 Maintain, test, and adjust commercial heating and air-conditioning accessories--The student will be able to
- 31.01 Compare commercial accessories with residential and light- commercial-heating and air-conditioning accessories.
 - 31.02 Select the heating and air-conditioning accessories appropriate for various commercial applications.

- 31.03 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 32.0 Maintain, troubleshoot, and repair commercial heating systems--The student will be able to:
 - 32.01 Identify the components of various commercial heating systems.
 - 32.02 Explain the operational principles of various commercial heating systems.
 - 32.03 Test and analyze heating air-distribution systems.
 - 32.04 Maintain, troubleshoot, and repair various commercial heating systems, such as:
 - a. A gas furnace and boiler
 - b. An oil furnace and boiler
 - c. An electric furnace
 - d. Electric heaters
 - e. A heat pump
 - f. Solar-heating systems
- 33.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems--The student will be able to:
 - 33.01 Follow safety precautions.
 - 33.02 Describe new technologies in heating, air-conditioning, and refrigeration installation, including
 - a. Variable-speed motors
 - b. Heat-pipe systems
 - c. Desiccant systems
 - d. Gas-driven heating systems
 - 33.03 Lay out, construct, and troubleshoot comfort systems.
 - 33.04 Test and analyze systems.
 - 33.05 Test and analyze heat-recovery systems.
- 34.0 Demonstrate knowledge of retail refrigeration systems--The student will be able to:
 - 34.01 Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
 - 34.02 Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
 - 34.03 Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.
 - 34.04 Identify and describe the supporting components and accessories used in retail refrigeration systems.
 - 34.05 Describe the various methods of defrost used in retail refrigeration systems.
 - 34.06 Identify and describe the applications for the various types of retail refrigeration systems.
 - 34.07 Describe the control system components used in retail refrigeration systems.
 - 34.08 Explain the operating sequence of a retail refrigeration system.
 - 34.09 Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.
- 35.0 Demonstrate knowledge of commercial and industrial refrigeration systems--The student will be able to:

- 35.01 Identify different types of refrigerated coolers and display cases and describe each one's common application.
 - 35.02 Compare the basic components used in commercial/industrial refrigeration systems with those used in retail refrigeration systems.
 - 35.03 Identify single, multiple, and satellite compressor systems. Describe the applications, installation considerations, and advantages and disadvantages of each type.
 - 35.04 Identify packaged condensing units and unit coolers. Describe their applications, operation, and installation considerations.
 - 35.05 Identify two-stage compressors and explain their operation and applications.
 - 35.06 Identify the various accessories used in commercial refrigeration systems. Explain why each is used and where it should be installed in the system.
 - 35.07 Identify the various refrigeration control devices. Explain the purpose of each type and how it works.
 - 35.08 Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.
- 36.0 Develop an understanding of hydronic systems--The student will be able to:
- 36.01 Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
 - 36.02 Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 36.03 Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 36.04 Describe the safety precautions used when working with hot-water/chilled-water systems.
 - 36.05 Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
 - 36.06 Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.
 - 36.07 Explain the principles involved, and describe the procedures used, in balancing hydronic systems.
 - 36.08 Select, calibrate, and properly use the tools and instruments needed to balance hydronic systems.
 - 36.09 Read the pressure across a water system circulating pump.
- 37.0 Develop an understanding of steam systems--The student will be able to:
- 37.01 Explain the terms and concepts used when working with steam-heating systems.
 - 37.02 Identify major components of steam heating systems and explain the purpose of each.
 - 37.03 Describe the basic steam-heating cycle.
 - 37.04 Safely perform selected operating procedures on low-pressure steam boilers and systems.
 - 37.05 Install and maintain selected steam traps.
 - 37.06 Identify the common piping configurations used with steam-heating systems.
- 38.0 Determine the properties of air--The student will be able to:
- 38.01 Explain the principles of psychrometrics.

- 38.02 Identify and explain the components and uses of a psychrometric meter.
- 38.03 Identify indoor-air-quality concerns as related to psychrometrics.
- 38.04 Determine the properties of air, using a psychrometric chart.
- 38.05 Follow safety precautions.
- 38.06 Identify and explain the different types and benefits of
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems
- 38.07 Fabricate, operate, maintain, and troubleshoot
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems

- 39.0 Use a pressure enthalpy chart to diagram refrigerant cycles--The student will be able to:
 - 39.01 Identify all components of the pressure enthalpy chart.
 - 39.02 Define "enthalpy" and "entropy."
 - 39.03 Diagram several refrigerant cycles, using the pressure enthalpy chart.

- 40.0 Explain the standards for and ways to measure indoor-air quality--The student will be able to:
 - 40.01 Define indoor-air quality.
 - 40.02 Identify and explain the codes and standards regarding indoor-air quality.
 - 40.03 Select and use indoor-air-quality measuring devices.
 - 40.04 Explain the standards for and ways to measure indoor-air quality, using various methods.

- 41.0 Operate environmental control systems as used in commercial heating and air-conditioning systems--The student will be able to:
 - 41.01 Identify and explain the various types of environmental control systems and their sequences of operation as used in commercial heating and air-conditioning systems.
 - 41.02 Maintain, test, and troubleshoot various types of environmental control systems as used in commercial heating and air-conditioning systems.

- 42.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications--The student will be able to:
 - 42.01 Identify pneumatic control systems.
 - 42.02 Demonstrate the ability to maintain and troubleshoot pneumatic control systems.

- 43.0 Maintain and repair thermal storage systems--The student will be able to:
 - 43.01 Apply appropriate codes, standards, and safety practices.
 - 43.02 Describe the benefits and limitations of each type.
 - 43.03 Explain the operational principles of a thermal storage system.
 - 43.04 Identify and explain various types of thermal storage systems.
 - 43.05 Maintain, troubleshoot, and test various types of thermal storage systems.

44.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems--The student will be able to:

- 44.01 Keep a record of the installation, maintenance, and repair of commercial heating and air-conditioning systems.
- 44.02 Apply local and national codes and safety practices.
- 44.03 Lay out a commercial heating and air-conditioning system.
- 44.04 Lay out a typical split commercial air-conditioning system.
- 44.05 Lay out a typical split commercial heating system.
- 44.06 Maintain, test, analyze, and repair various types of commercial heating and air-conditioning systems.
- 44.07 Maintain, troubleshoot, and repair water-cooled condensers

45.0 Calculate commercial heating and air-conditioning loads--The student will be able to:

- 45.01 Explain conduction as a heat-load source.
- 45.02 Describe the implications of conducting and the resistance values for different types of construction materials.
- 45.03 Define "U" value (BTU/hr/ft²°F).
- 45.04 Define "K" value (°Fft²hr/BTU).
- 45.05 Define "C" value (°Fft²hr/BTU).
- 45.06 Define "R" value (°Fft²hr/BTU).
- 45.07 Interpret heat-transfer tables ("U," "K," "C," and "R").
- 45.08 Locate the total heat-transfer value of any surface (R) - (U).
- 45.09 Explain infiltration and exfiltration/ventilation as a heat-load source.
- 45.10 Explain a product heat-load source.
- 45.11 Explain miscellaneous loads (people, motors, and equipment) as heat-load sources.
- 45.12 Explain the purpose of vapor barriers.
- 45.13 Interpret tables of specific heat values as applied to commercial heating and air-conditioning systems.
- 45.14 Calculate and design systems.
- 45.15 Calculate cooling and heating equipment sizes.
- 45.16 Design and identify methods of installing air-movement systems.

46.0 Install air distribution systems--The student will be able to:

- 46.01 Describe airflow and pressures in a basic forced-air distribution system.
- 46.02 Explain the differences between propeller and centrifugal fans and blowers.
- 46.03 Identify the various types of duct systems and explain why and where each type is used.
- 46.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.
- 46.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.
- 46.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
- 46.07 Demonstrate or explain the use and installation of dampers used in duct systems.
- 46.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.

- 46.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.
- 46.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.
- 47.0 Evaluate commercial airside systems--The student will be able to:
 - 47.01 Identify the differences in various types of commercial all-air systems.
 - 47.02 Identify the type of building in which a particular type of system is used.
 - 47.03 Explain the typical range of capacities for a commercial air system.
- 48.0 Balance an air distribution system--The student will be able to:
 - 48.01 Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.
 - 48.02 Explain the fan and pump laws.
 - 48.03 Use a psychrometric chart to evaluate air properties and changes in air properties.
 - 48.04 Explain the principles involved in the balancing of air and water distribution systems.
 - 48.05 Define common terms used by manufacturers when describing grilles, registers, and diffusers.
 - 48.06 Identify and use the tools and instruments needed to balance air distribution systems.
 - 48.07 Change the speed of an air distribution system supply fan.
- 49.0 Select energy conservation equipment--The student will be able to:
 - 49.01 Identify and explain the operation of energy conservation equipment.
 - 49.02 Operate selected energy conservation equipment.
- 50.0 Analyze building management systems--The student will be able to:
 - 50.01 Identify the major components of a building management system and describe how they fit together.
 - 50.02 Operate a basic direct digital controller.
- 51.0 Recommend alternative heating and cooling systems for various case studies--The student will be able to:
 - 51.01 Describe alternative technologies for heating such as in-floor, direct-fired makeup unit (DFMU), solar, air turnover, corn or wood pellet burners, waste oil/multi-fuel and fireplace inserts.
 - 51.02 Describe alternative technologies for heating such as ductless systems, computer rooms, chilled beams and multi-zone.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Residential Air Conditioning, Refrigeration, and Heating Systems Assistant
Career Cluster: Architecture and Construction

CCC	
CIP Number	0615050101
Program Type	College Credit Certificate (CCC)
Program Length	12 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as air conditioning and heating technicians or to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Air Conditioning, Refrigeration, and Heating Systems Technology AAS degree program (0615050100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, and safe and efficient work practices. The program prepares students to assist in engineering departments or work independently, capable of designing,

installing, maintaining and operating small or medium air conditioning, heating or refrigerating systems.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 01.0 Read construction documents.
- 02.0 Describe the history and concepts of heating, air-conditioning, and refrigeration.
- 03.0 Explain the properties of matter and heat behavior.
- 04.0 Analyze fluids, pressures, refrigerants, and related codes.

- 05.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 06.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 07.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 08.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 09.0 Interpret, use and modify construction drawings and specifications.
- 10.0 Conduct system startup and shutdown.
- 11.0 Install air distribution systems.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Residential Air Conditioning, Refrigeration, and Heating Systems Assistant
CIP Number: 0615050101
Program Length: 12 Credit Hours
SOC Code(s): 49-9021

This certificate program is part of the Air Conditioning, Refrigeration, and Heating Systems Technology AS/AAS degree program (1615050100/0615050100). At the completion of this program, the student will be able to:

- 01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan.
- 02.0 Read construction documents--The student will be able to:
- 02.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 02.02 Relate information on construction drawings to actual locations on the print.
 - 02.03 Recognize different classifications of construction drawings.
 - 02.04 Interpret and use drawing dimensions.

03.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:

- 03.01 Explain the basic principles of heating, ventilation and air-conditioning.
- 03.02 Identify educational paths to career opportunities in the HVAC profession.
- 03.03 Identify and explain the four major refrigeration components.
- 03.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
- 03.05 Differentiate between air-conditioning and refrigeration.
- 03.06 Differentiate between split systems and package systems.
- 03.07 Describe the benefits of conditioned air and environments.
- 03.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
- 03.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
- 03.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
- 03.11 Identify various professional organizations, associations, and societies, and explain their purposes.

04.0 Explain the properties of matter and heat behavior--The student will be able to:

- 04.01 Describe and explain freezing point, critical temperature, and absolute zero.
- 04.02 Describe matter, heat, and heat transfer.
- 04.03 Differentiate between heat and temperature.
- 04.04 Explain and distinguish among the characteristics of the three states of matter.
- 04.05 Explain the relationship between temperature and humidity.
- 04.06 Differentiate between latent heat and sensible heat.

05.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:

- 05.01 Identify the refrigeration cycle.
- 05.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
- 05.03 Define and explain "pressure," "fluid," and "temperature."
- 05.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
- 05.05 Identify and explain the classifications, properties, and uses of different refrigerants.
- 05.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
- 05.07 Define and identify "color-coding" of refrigerant cylinders.
- 05.08 Compare Pressure and Temperature (P/T) charts.
- 05.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
- 05.10 Explain the effects of an improper refrigerant and contaminants in a system.

06.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:

- 06.01 Explain the types, operation, use, and maintenance requirements of

- a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
- 06.02 Evaluate metering-device performance.
- 06.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
- 06.04 Analyze the operating condition of a compressor.
- 06.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
- 06.06 Identify the location and explain the uses of refrigerant flow accessories.
- 06.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
- 06.08 Evaluate system performance.
- 07.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 07.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 07.02 Bend tubing, using tube benders.
 - 07.03 Connect tubing, using
 - a. Flared fittings
 - b. Compression fittings
 - 07.04 Connect tubing, using solderless connectors.
 - 07.05 Connect tubing, using a swaged-joint connection.
 - 07.06 Identify and use various types of torches.
 - 07.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 07.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 07.09 Braze tubing.
 - 07.10 Silver-braze brass, steels, and copper.
 - 07.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 07.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 07.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 07.14 Maintain project time and materials lists.
 - 07.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 08.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
- 08.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.

- 08.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
- 08.03 Explain pressure and temperature drops.
- 09.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:
 - 09.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
 - 09.02 Determine the start-up and checkout procedures recommended by different manufacturers.
 - 09.03 Determine the electrical requirements of equipment.
 - 09.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
 - 09.05 Determine the temperature drop across the outdoor coil on a heat pump.
 - 09.06 Determine the temperature rise across the indoor coil on a heat pump.
 - 09.07 Test for a proper refrigerant charge in a residential heat pump.
 - 09.08 Apply good customer-relations skills.
- 10.0 Interpret, use and modify construction drawings and specifications--The student will be able to:
 - 10.01 Read mechanical plans within a set of construction drawings explain their relationship.
 - 10.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
 - 10.03 Interpret specification documents and apply them to the plans.
 - 10.04 Interpret shop drawings and apply them to the plans and specifications.
 - 10.05 Develop a field set of as-built drawings.
 - 10.06 Identify the steps required for transferring design information to component production.
 - 10.07 List and classify materials most commonly used in HVAC systems.
- 11.0 Conduct system startup and shutdown--The student will be able to:
 - 11.01 Start up and shut down an air handler and related forced-air distribution system.
 - 11.02 Test compressor oil for acid contamination.
 - 11.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.
- 12.0 Install air distribution systems--The student will be able to:
 - 12.01 Describe airflow and pressures in a basic forced-air distribution system.
 - 12.02 Explain the differences between propeller and centrifugal fans and blowers.
 - 12.03 Identify the various types of duct systems and explain why and where each type is used.
 - 12.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.

- 12.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.
- 12.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
- 12.07 Demonstrate or explain the use and installation of dampers used in duct systems.
- 12.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
- 12.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.
- 12.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.

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**Florida Department of Education
Curriculum Framework**

Program Title: Residential Air Conditioning, Refrigeration, and Heating Systems Technician

Career Cluster: Architecture and Construction

CCC	
CIP Number	0615050102
Program Type	College Credit Certificate (CCC)
Program Length	24 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as air conditioning and heating technicians or to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Air Conditioning, Refrigeration, and Heating Systems Technology AAS degree program (0615050100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, and safe and efficient work practices. The program prepares students to assist in engineering departments or work independently, capable of designing,

installing, maintaining and operating small or medium air conditioning, heating or refrigerating systems.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 01.0 Read construction documents.
- 02.0 Analyze fluids, pressures, refrigerants, and related codes.
- 03.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.

- 04.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 05.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 06.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 07.0 Interpret, use and modify construction drawings and specifications.
- 08.0 Design heating and cooling systems.
- 09.0 Conduct system startup and shutdown.
- 10.0 Design heating and cooling systems.
- 11.0 Use combustion-type heating servicing and testing equipment.
- 12.0 Explain the standards for and ways to measure indoor-air quality.
- 13.0 Operate environmental control systems as used in commercial heating and air-conditioning systems.
- 14.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications.
- 15.0 Maintain and repair thermal storage systems.
- 16.0 Install air distribution systems.
- 17.0 Evaluate commercial airside systems.
- 18.0 Balance an air distribution system.
- 19.0 Select energy conservation equipment.
- 20.0 Analyze building management systems.

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**Florida Department of Education
Student Performance Standards**

Program Title: Residential Air Conditioning, Refrigeration, and Heating Systems Technician
CIP Number: 0615050102
Program Length: 24 Credit Hours
SOC Code(s): 49-9021

This certificate program is part of the Air Conditioning, Refrigeration, and Heating Systems Technology AS/AAS degree program (1615050100/0615050100). At the completion of this program, the student will be able to:

- 01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan.
- 02.0 Read construction documents--The student will be able to:
- 02.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 02.02 Relate information on construction drawings to actual locations on the print.
 - 02.03 Recognize different classifications of construction drawings.
 - 02.04 Interpret and use drawing dimensions.
- 03.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:

- 03.01 Identify the refrigeration cycle.
 - 03.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
 - 03.03 Define and explain "pressure," "fluid," and "temperature."
 - 03.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
 - 03.05 Identify and explain the classifications, properties, and uses of different refrigerants.
 - 03.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
 - 03.07 Define and identify "color-coding" of refrigerant cylinders.
 - 03.08 Compare Pressure and Temperature (P/T) charts.
 - 03.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
 - 03.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 04.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 04.01 Explain the types, operation, use, and maintenance requirements of
 - a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
 - 04.02 Evaluate metering-device performance.
 - 04.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
 - 04.04 Analyze the operating condition of a compressor.
 - 04.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
 - 04.06 Identify the location and explain the uses of refrigerant flow accessories.
 - 04.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
 - 04.08 Evaluate system performance.
- 05.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 05.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 05.02 Bend tubing, using tube benders.
 - 05.03 Connect tubing, using
 - a. Flared fittings
 - b. Compression fittings
 - 05.04 Connect tubing, using solderless connectors.
 - 05.05 Connect tubing, using a swaged-joint connection.
 - 05.06 Identify and use various types of torches.

- 05.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 05.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 05.09 Braze tubing.
 - 05.10 Silver-braze brass, steels, and copper.
 - 05.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 05.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 05.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 05.14 Maintain project time and materials lists.
 - 05.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 06.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
- 06.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
 - 06.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
 - 06.03 Explain pressure and temperature drops.
- 07.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:
- 07.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
 - 07.02 Determine the start-up and checkout procedures recommended by different manufacturers.
 - 07.03 Determine the electrical requirements of equipment.
 - 07.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
 - 07.05 Determine the temperature drop across the outdoor coil on a heat pump.
 - 07.06 Determine the temperature rise across the indoor coil on a heat pump.
 - 07.07 Test for a proper refrigerant charge in a residential heat pump.
 - 07.08 Apply good customer-relations skills.
- 08.0 Interpret, use and modify construction drawings and specifications--The student will be able to:
- 08.01 Read mechanical plans within a set of construction drawings explain their relationship.
 - 08.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.

- 08.03 Interpret specification documents and apply them to the plans.
- 08.04 Interpret shop drawings and apply them to the plans and specifications.
- 08.05 Develop a field set of as-built drawings.
- 08.06 Identify the steps required for transferring design information to component production.
- 08.07 List and classify materials most commonly used in HVAC systems.

09.0 Design heating and cooling systems--The student will be able to:

- 09.01 Identify and describe the steps in the system design process.
- 09.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
- 09.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
- 09.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
- 09.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
- 09.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
- 09.07 Identify the various types of duct systems and explain why and where each type is used.
- 09.08 Demonstrate the effect of fittings and transitions on duct system design.
- 09.09 Use a friction loss chart and duct sizing table to size duct.
- 09.10 Install insulation and vapor barriers used in duct systems.
- 09.11 Following proper design principles select and install refrigerant and condensate piping.

10.0 Conduct system startup and shutdown--The student will be able to:

- 10.01 Start up and shut down an air handler and related forced-air distribution system.
- 10.02 Test compressor oil for acid contamination.
- 10.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.

11.0 Design heating and cooling systems--The student will be able to:

- 11.01 Identify and describe the steps in the system design process.
- 11.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
- 11.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
- 11.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
- 11.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
- 11.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
- 11.07 Identify the various types of duct systems and explain why and where each type is used.
- 11.08 Demonstrate the effect of fittings and transitions on duct system design.
- 11.09 Use a friction loss chart and duct sizing table to size duct.

- 11.10 Install insulation and vapor barriers used in duct systems.
- 11.11 Following proper design principles select and install refrigerant and condensate piping.
- 12.0 Use combustion-type heating servicing and testing equipment--The student will be able to:
 - 12.01 Explain combustion theory and the safety precautions for using combustion-type heating servicing and testing equipment.
 - 12.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
 - 12.03 Use the servicing and testing equipment.
 - 12.04 Test, analyze, and troubleshoot combustion-type-heating systems.
- 13.0 Explain the standards for and ways to measure indoor-air quality--The student will be able to:
 - 13.01 Define indoor-air quality.
 - 13.02 Identify and explain the codes and standards regarding indoor-air quality.
 - 13.03 Select and use indoor-air-quality measuring devices.
 - 13.04 Explain the standards for and ways to measure indoor-air quality, using various methods.
- 14.0 Operate environmental control systems as used in commercial heating and air-conditioning systems--The student will be able to:
 - 14.01 Identify and explain the various types of environmental control systems and their sequences of operation as used in commercial heating and air-conditioning systems.
 - 14.02 Maintain, test, and troubleshoot various types of environmental control systems as used in commercial heating and air-conditioning systems.
- 15.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications--The student will be able to:
 - 15.01 Identify pneumatic control systems.
 - 15.02 Demonstrate the ability to maintain and troubleshoot pneumatic control systems.
- 16.0 Maintain and repair thermal storage systems--The student will be able to:
 - 16.01 Apply appropriate codes, standards, and safety practices.
 - 16.02 Describe the benefits and limitations of each type.
 - 16.03 Explain the operational principles of a thermal storage system.
 - 16.04 Identify and explain various types of thermal storage systems.
 - 16.05 Maintain, troubleshoot, and test various types of thermal storage systems.
- 17.0 Install air distribution systems--The student will be able to:

- 17.01 Describe airflow and pressures in a basic forced-air distribution system.
- 17.02 Explain the differences between propeller and centrifugal fans and blowers.
- 17.03 Identify the various types of duct systems and explain why and where each type is used.
- 17.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.
- 17.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.
- 17.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
- 17.07 Demonstrate or explain the use and installation of dampers used in duct systems.
- 17.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
- 17.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.
- 17.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.
- 18.0 Evaluate commercial airside systems--The student will be able to:
 - 18.01 Identify the differences in various types of commercial all-air systems.
 - 18.02 Identify the type of building in which a particular type of system is used.
 - 18.03 Explain the typical range of capacities for a commercial air system.
- 19.0 Balance an air distribution system--The student will be able to:
 - 19.01 Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.
 - 19.02 Explain the fan and pump laws.
 - 19.03 Use a psychrometric chart to evaluate air properties and changes in air properties.
 - 19.04 Explain the principles involved in the balancing of air and water distribution systems.
 - 19.05 Define common terms used by manufacturers when describing grilles, registers, and diffusers.
 - 19.06 Identify and use the tools and instruments needed to balance air distribution systems.
 - 19.07 Change the speed of an air distribution system supply fan.
- 20.0 Select energy conservation equipment--The student will be able to:
 - 20.01 Identify and explain the operation of energy conservation equipment.
 - 20.02 Operate selected energy conservation equipment.
- 21.0 Analyze building management systems--The student will be able to:
 - 21.01 Identify the major components of a building management system and describe how they fit together.
 - 21.02 Operate a basic direct digital controller.

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**Florida Department of Education
Curriculum Framework**

Program Title: Building Construction Specialist
Career Cluster: Architecture and Construction

CCC	
CIP Number	0615100103
Program Type	College Credit Certificate (CCC)
Program Length	18 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	11-9021 - Construction Managers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as Construction Specialists, Construction Managers, Construction and Building Inspectors, Quality Control Assistant; Scheduler; Materials Tester in the areas of estimating, scheduling, and interpreting plans or to provide supplemental training for persons previously or currently employed in these occupations. It provides a foundation in pursuing a career in building inspection and quality control.

This certificate program is part of the Building Construction Technology AS degree program (1615100101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, math skills, human relations and employability skills, safe and efficient construction practices, building materials, interpreting plans, and estimating and planning of residential and commercial structures.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify and select the application of construction materials.
- 03.0 Draw, read and interpret drawings and specifications.
- 04.0 Take off quantities and estimate costs.
- 05.0 Plan, coordinate, schedule, and control projects.
- 06.0 Perform tests and inspections.
- 07.0 Demonstrate efficient office procedures.

- 08.0 Demonstrate appropriate math skills.
- 09.0 Demonstrate appropriate understanding of basic science.
- 10.0 Demonstrate employability skills.

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**Florida Department of Education
Student Performance Standards**

Program Title: Building Construction Specialist
CIP Number: 0615100103
Program Length: 18 Credit Hours
SOC Code(s): 11-9021

This certificate program is part of the Building Construction Technology AS/AAS degree program (1615100101/0615100101). At the completion of this program, the student will be able to:

01.0 Communicate effectively--The student will be able to:

- 01.01 Maintain a job diary.
- 01.02 Prepare inter-office memos.
- 01.03 Prepare business correspondence.
- 01.04 Prepare daily project report.
- 01.05 Prepare requisitions for equipment and materials.
- 01.06 Prepare minutes from job-site meetings.
- 01.07 Write logical and understandable statements, or phrases, to accurately complete forms/invoices commonly used in business and industry.
- 01.08 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 01.09 Read and follow written and oral instructions.
- 01.10 Answer and ask questions coherently and concisely.

02.0 Identify and select the application of construction materials--The student will be able to:

- 02.01 Select soils.
- 02.02 Identify soil types.
- 02.03 Select wood framing.
- 02.04 Select rough hardware.
- 02.05 Select waterproofing and protective coatings.
- 02.06 Select insulation and vapor barriers.
- 02.07 Select ceiling finishes and wall finishes.
- 02.08 Select form work materials.
- 02.09 Select concrete.
- 02.10 Select windows and doors.
- 02.11 Select adhesives and sealants.
- 02.12 Select roofing materials.
- 02.13 Select sheet metal materials.
- 02.14 Select mill work.
- 02.15 Select painting and decorating materials.
- 02.16 Select miscellaneous metals.
- 02.17 Select asphaltic materials.
- 02.18 Select masonry materials.
- 02.19 Select manufactured specialties.
- 02.20 Select reinforcing concrete materials.
- 02.21 Select structural steel.

- 02.22 Select finishing hardware.
- 02.23 Select foundation piling and casing materials.
- 02.24 Select precast concrete materials.

03.0 Draw, read and interpret drawings and specifications – The student will be able to:

- 03.01 Take site notes and measurements.
- 03.02 Interpret structural drawings and specifications.
- 03.03 Interpret reinforcing steel drawings and bar lists.
- 03.04 Interpret and apply ASTM standards.
- 03.05 Interpret and apply CSA standards.
- 03.06 Evaluate shop drawings.

04.0 Take off quantities and estimate costs--The student will be able to:

- 04.01 Make calculations.
- 04.02 Estimate quantities of concrete.
- 04.03 Compile lists of sub-trades for projects.
- 04.04 Take off quantities of paving.
- 04.05 Estimate quantities of rough carpentry.
- 04.06 Obtain and build up materials cost.
- 04.07 Estimate quantities of framework.
- 04.08 Estimate quantities of excavation and fill.
- 04.09 Call sub trade tenders.
- 04.10 Take off quantities of miscellaneous metals.
- 04.11 Take off quantities of millwork.
- 04.12 Take off quantities of structural steel.
- 04.13 Take off quantities of manufactured specialties.
- 04.14 Analyze and project general condition costs.
- 04.15 Analyze and project labor unit costs.
- 04.16 Estimate quantities of reinforcing steel.
- 04.17 Estimate quantities of masonry.
- 04.18 Analyze and project site overhead costs.
- 04.19 Evaluate sub trade bids.
- 04.20 Summarize project cost and complete tenders prices.
- 04.21 Interpret contract document.

05.0 Plan, coordinate, schedule, and control projects--The student will be able to:

- 05.01 Prepare daily time sheets.
- 05.02 Record and control materials received.
- 05.03 Allocate efficient use of site space.
- 05.04 Store materials and equipment.
- 05.05 Describe units of work measurement.
- 05.06 Coordinate and control use of construction tools and equipment.
- 05.07 Prepare progress billing.
- 05.08 Prepare work schedules.
- 05.09 Prepare material delivery schedules.
- 05.10 Expedite delivery of manufactured materials.
- 05.11 Prepare sub-trade schedules.
- 05.12 Prepare and code daily costs.

- 05.13 Record deficiencies as a result of project inspections.
- 05.14 Prepare coded cost break downs.
- 05.15 Prepare cash flow schedules.
- 05.16 Prepare schedules for computer input.
- 05.17 Develop and maintain coded cost systems.
- 05.18 Prepare critical path schedule.
- 05.19 Monitor schedule to control project.

06.0 Perform tests and inspections--The student will be able to:

- 06.01 Verify data from tests conducted by independent testing companies.
- 06.02 Check concrete placing and consolidation procedures.
- 06.03 Check form work.
- 06.04 Check reinforcing steel and placing.
- 06.05 Inspect placing of fill and compaction procedures.

07.0 Demonstrate efficient office procedures – The student will be able to:

- 07.01 Organize work area.
- 07.02 Select and use appropriate forms.
- 07.03 Develop and maintain filing system.
- 07.04 Maintain inventory of physical assets.
- 07.05 Set up and maintain technical reference library.
- 07.06 Maintain a system for field work authorizations.
- 07.07 Maintain a system for control and processing contract changes.
- 07.08 Maintain a system for back charges.
- 07.09 Interpret basic company accounting procedures.

08.0 Demonstrate appropriate math skills--The student will be able to:

- 08.01 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
- 08.02 Measure tolerance(s) of horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 08.03 Add, subtract, multiply, and divide using fractions, decimals, and whole numbers.
- 08.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

09.0 Demonstrate appropriate understanding of basic science--The student will be able to:

- 09.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 09.02 Draw conclusions or make inferences from data.
- 09.03 Understand pressure measurement in terms of PSI.

10.0 Demonstrate employability skills--The student will be able to:

- 10.01 Conduct a job search.
- 10.02 Secure information about job opportunities.
- 10.03 Complete a job application.
- 10.04 Demonstrate competency in job interview techniques.

- 10.05 Identify or demonstrate appropriate responses to criticism in the workplace.
- 10.06 Identify acceptable work habits.
- 10.07 Demonstrate knowledge of how to make job transitions.
- 10.08 Demonstrate acceptable employee health habits.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Green Building Construction Technology
Career Cluster: Architecture and Construction

CCC	
CIP Number	0615100104
Program Type	College Credit Certificate (CCC)
Program Length	24 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	11-9021 - Construction Managers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

This certificate program is part of the Building Construction Technology AS degree program (1615100101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, math skills, human relations and employability skills, safe and efficient construction practices, building materials, interpreting plans, and estimating and planning of residential and commercial structures.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select and supervise application of construction materials.
- 03.0 Produce, read and interpret drawings and specifications.
- 04.0 Interpret basic designs and apply sound construction principles.
- 05.0 Take off quantities and estimate costs.
- 06.0 Plan, coordinate, schedule and control projects.
- 07.0 Perform tests and inspections.
- 08.0 Demonstrate appropriate math skills.
- 09.0 Demonstrate appropriate understanding of basic science.
- 10.0 Demonstrate employability skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Green Building Construction Technology
CIP Number: 0615100104
Program Length: 24 Credit Hours
SOC Code(s): 11-9021

This certificate program is part of the Building Construction Technology AS/AAS degree program (0615.100101). At the completion of this program, the student will be able to:

- 01.0 Communicate effectively--The student will be able to:
- 01.01 Maintain job diary.
 - 01.02 Prepare inter-office memos.
 - 01.03 Prepare business correspondence.
 - 01.04 Set-up surveyors field book.
 - 01.05 Prepare daily project report.
 - 01.06 Prepare requisitions for equipment and materials.
 - 01.07 Write specifications for equipment purchase.
 - 01.08 Prepare minutes from job-site meetings.
 - 01.09 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
 - 01.10 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 01.11 Read and follow written and oral instructions.
 - 01.12 Answer and ask questions coherently and concisely.
 - 01.13 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 02.0 Identify, select, and supervise application of construction materials--The student will be able to:
- 02.01 Select cleaning materials.
 - 02.02 Identify soil types.
 - 02.03 Select wood framing.
 - 02.04 Select rough hardware.
 - 02.05 Select waterproofing and protective coatings.
 - 02.06 Select insulation and vapor barriers.
 - 02.07 Select ceiling finishes and wall finishes.
 - 02.08 Select form work materials.
 - 02.09 Select concrete.
 - 02.10 Select windows and doors.
 - 02.11 Select adhesives and sealants.
 - 02.12 Select roofing materials.
 - 02.13 Select sheet metal materials.
 - 02.14 Select mill work.
 - 02.15 Select painting and decorating materials.
 - 02.16 Select miscellaneous metals.
 - 02.17 Select asphaltic materials.

- 02.18 Select masonry materials.
- 02.19 Select manufactured specialties.
- 02.20 Select reinforcing concrete materials.
- 02.21 Select structural steel.
- 02.22 Select finishing hardware.
- 02.23 Select foundation piling and casing materials.
- 02.24 Select precast concrete materials.
- 02.25 Select plumbing and drainage material.
- 02.26 Select electrical components and equipment.
- 02.27 Identify mechanical components and equipment.

03.0 Produce, read, and interpret drawings and specifications--The student will be able to:

- 03.01 Identify, select and use drafting instruments.
- 03.02 Identify and use architectural symbols.
- 03.03 Use drafting reproduction equipment.
- 03.04 Take site notes and measurements.
- 03.05 Identify and use electrical symbols.
- 03.06 Prepare site sketches.
- 03.07 Identify and use mechanical symbols.
- 03.08 Identify and use topographical symbols.
- 03.09 Interpret land surveyor's notes.
- 03.10 Prepare working sketches and "as built" drawings.
- 03.11 Interpret architectural drawings and specifications.
- 03.12 Evaluate finishing hardware schedules.
- 03.13 Interpret structural drawings and specifications.
- 03.14 Evaluate shop drawings.
- 03.15 Interpret mechanical drawings and specifications.
- 03.16 Interpret electrical drawings and specifications.

04.0 Interpret basic designs and apply construction principles--The student will be able to:

- 04.01 Coordinate and supervise resilient flooring.
- 04.02 Coordinate and supervise painting and finishes.
- 04.03 Coordinate and supervise windows and doors.
- 04.04 Coordinate and supervise carpentry and millwork.
- 04.05 Coordinate and supervise concrete and formwork.
- 04.06 Coordinate and supervise miscellaneous roofing and sheet metal.
- 04.07 Coordinate and supervise miscellaneous metal.
- 04.08 Plan and coordinate excavation and foundation work.
- 04.09 Coordinate and supervise lath and plaster and dry wall.
- 04.10 Identify modular and prefabricated applications.
- 04.11 Coordinate and supervise masonry work.
- 04.12 Coordinate and supervise tile and terrazzo.
- 04.13 Coordinate and supervise structural steel work.
- 04.14 Coordinate and supervise mechanical work.
- 04.15 Coordinate and supervise electrical installation.

05.0 Take off quantities and estimate cost--The student will be able to:

- 05.01 Make calculations.

- 05.02 Estimate quantities of concrete.
- 05.03 Compile lists of sub-trades for project.
- 05.04 Take off quantities of paving.
- 05.05 Estimate quantities of rough carpentry.
- 05.06 Obtain and build up material costs.
- 05.07 Estimate quantities of framework.
- 05.08 Estimate quantities of excavation and fill.
- 05.09 Estimate quantities of landscaping.
- 05.10 Call sub trade tenders.
- 05.11 Take off quantities of miscellaneous metals.
- 05.12 Take off quantities of millwork.
- 05.13 Take off quantities of structural steel.
- 05.14 Take off quantities of manufactured specialties.
- 05.15 Analyze and project plant and equipment costs.
- 05.16 Analyze and project general condition costs.
- 05.17 Analyze and project labor unit costs.
- 05.18 Estimate quantities of reinforcing steel.
- 05.19 Estimate quantities of masonry.
- 05.20 Analyze and project site overhead costs.
- 05.21 Summarize project cost and complete tenders prices.

06.0 Plan, coordinate, schedule and control projects--The student will be able to:

- 06.01 Prepare daily time sheets.
- 06.02 Record and control materials received.
- 06.03 Allocate efficient use of site space.
- 06.04 Maintain clean and orderly construction site.
- 06.05 Store materials and equipment.
- 06.06 Describe units of work measurement.
- 06.07 Coordinate and control use of construction tools and equipment.
- 06.08 Prepare progress billing.
- 06.09 Store chemicals and paints.
- 06.10 Prepare work schedules.
- 06.11 Prepare material delivery schedules.
- 06.12 Record deficiencies as a result of project inspections.
- 06.13 Prepare coded cost break downs.
- 06.14 Take appropriate action to correct project deficiencies.
- 06.15 Interpret computer output.
- 06.16 Prepare schedules for computer input.
- 06.17 Develop and maintain coded cost systems.
- 06.18 Prepare critical path schedule.
- 06.19 Monitor schedule to control project.

07.0 Perform tests and inspections--The student will be able to:

- 07.01 Conduct soundness test.
- 07.02 Calculate air voids and VMA values.
- 07.03 Conduct permeability test.

08.0 Demonstrate appropriate math skills--The student will be able to:

- 08.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 08.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 08.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 08.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 08.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 09.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 09.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 09.02 Draw conclusions or make inferences from data.
 - 09.03 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.
 - 09.04 Understand pressure measurement in terms of PSI.
- 10.0 Demonstrate employability skills--The student will be able to:
- 10.01 Conduct a job search.
 - 10.02 Secure information about job opportunities.
 - 10.03 Complete a job application.
 - 10.04 Demonstrate competency in job interview techniques.
 - 10.05 Identify or demonstrate appropriate responses to criticism in the workplace.
 - 10.06 Identify acceptable work habits.
 - 10.07 Demonstrate knowledge of how to make job transitions.
 - 10.08 Demonstrate acceptable employee health habits.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Drafting Design
Career Cluster: Architecture and Construction

CCC	
CIP Number	0615130101
Program Type	College Credit Certificate (CCC)
Program Length	22 Credit Hours (Primary), 24 Credit Hours (Secondary)
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 – Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as construction planners, or to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Drafting and Design Technology AS degree program (1615020200).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, assisting architects and architectural engineers in planning and designing structures, using construction materials, and dealing with contracts and specifications

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Apply basic drafting skills.
- 08.0 Apply technical mathematics.
- 09.0 Prepare architectural drawings.
- 10.0 Prepare computer aided drawings.

2012 – 2013

**Florida Department of Education
Student Performance Standards**

Program Title: Drafting Design
CIP Number: 0615130101
Program Length: 22 Credit Hours
SOC Code(s): 17-3011

This certificate program is part of the Drafting and Design Technology AS/AAS degree program (1615020200/0615020200). At the completion of this program, the student will be able to:

01.0 Apply basic drafting skills--The student will be able to:

- 01.01 Apply safety practices.
- 01.02 Operate drafting instruments.
- 01.03 Perform lettering techniques.
- 01.04 Prepare multi-view drawings.
- 01.05 Prepare sectional views.
- 01.06 Prepare auxiliary views.
- 01.07 Prepare dimension drawings.
- 01.08 Prepare pictorial drawings.
- 01.09 Prepare sketches.
- 01.10 Prepare title blocks and other formats.
- 01.11 Compile a portfolio.

08.0 Apply technical mathematics--The student will be able to:

- 08.01 Solve arithmetic problems.
- 08.02 Solve algebra problems.
- 08.03 Solve geometry problems.

09.0 Prepare architectural drawings--The student will be able to:

- 09.01 Prepare floor plan drawings.
- 09.02 Prepare foundation plan and detail drawings.
- 09.03 Prepare elevation drawings.
- 09.04 Prepare landscape layouts.
- 09.05 Prepare schedules.
- 09.06 Prepare sections.
- 09.08 Prepare truss drawings.
- 09.09 Prepare stairway drawings.
- 09.10 Prepare fireplace drawings.
- 09.11 Prepare plot plan drawings.
- 09.12 Prepare plumbing plan drawings.
- 09.13 Prepare climate control drawings.
- 09.14 Prepare electrical plan drawings.

10.0 Prepare computer aided drawings--The student will a able to:

- 10.01 Use system commands.

- 10.02 Perform drafting procedures.
- 10.03 Operate peripheral equipment.
- 10.04 Apply specialized CAD functions.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: AutoCAD Foundations
Career Cluster: Architecture and Construction

CCC	
CIP Number	0615130204
Program Type	College Credit Certificate (CCC)
Program Length	14 Credit Hours (Primary), 15 Credit Hours (Secondary)
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 – Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as drafters or chief design drafters, or to provide supplemental training for persons previously or currently employed in these occupations. The training will be technologically advanced, thus meeting the current needs of the industry.

This certificate program is part of the Drafting and Design Technology AS/AAS degree program (1615130102/0615130102).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, drafting standards, math skills, and drafting office practices to assist mathematical, electrical and electronic, architectural,

chemical, civil, or other engineers in the design and drafting of electrical circuits, machines, structures, weldments, or architectural plans. It also includes instruction in the preparation of engineering plans, layouts, and detailed drawings according to conventional projection principles, preparation of charts, graphs or diagrams, and the use of handbook data germane to design and drafting in various fields.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Apply basic drafting skills.
- 08.0 Apply technical mathematics.
- 09.0 Prepare architectural drawings.
- 10.0 Prepare computer aided drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: AutoCAD Foundations
CIP Number: 0615130204
Program Length: 14 Credit Hours
SOC Code(s): 17-3011

This certificate program is part of the Drafting and Design Technology AS/AAS degree program (1615130102/0615130102). At the completion of this program, the student will be able to:

01.0 Apply basic drafting skills--The student will be able to:

- 01.01 Apply safety practices.
- 01.02 Operate drafting instruments.
- 01.03 Perform lettering techniques.
- 01.04 Prepare multi-view drawings.
- 01.05 Prepare sectional views.
- 01.06 Prepare auxiliary views.
- 01.07 Prepare dimension drawings.
- 01.08 Prepare pictorial drawings.
- 01.09 Prepare sketches.
- 01.10 Prepare title blocks and other formats.
- 01.11 Compile a portfolio.

08.0 Apply technical mathematics--The student will be able to:

- 08.01 Solve arithmetic problems.
- 08.02 Solve algebra problems.
- 08.03 Solve geometry problems.

09.0 Prepare architectural drawings--The student will be able to:

- 09.01 Prepare floor plan drawings.
- 09.02 Prepare foundation plan and detail drawings.
- 09.03 Prepare elevation drawings.
- 09.04 Prepare landscape layouts.
- 09.05 Prepare schedules.
- 09.06 Prepare sections.
- 09.07 Prepare truss drawings.
- 09.08 Prepare stairway drawings.
- 09.09 Prepare fireplace drawings.
- 09.10 Prepare plot plan drawings.
- 09.11 Prepare plumbing plan drawings.
- 09.12 Prepare climate control drawings.
- 09.13 Prepare electrical plan drawings.

10.0 Prepare computer aided drawings--The student will a able to:

- 10.01 Operate computer in networked environment.

- 10.02 Use system commands.
- 10.03 Perform drafting procedures.
- 10.04 Operate peripheral equipment.
- 10.05 Apply specialized CAD functions.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Sustainable Design
Career Cluster: Architectural Construction

CCC	
CIP Number	0630330106
Program Type	College Credit Certificate (CCC)
Program Length	19 Credit Hours
CTSO	Skills USA
SOC Codes (all applicable)	17-3011 – Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as construction planners, or to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Architectural Design and Construction Technology AS degree program (1604090100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architectural Construction 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 Architectural Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, assisting architects and architectural engineers in planning and designing structures, using construction materials, and dealing with contracts and specifications

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

Career and Technical Student Organization (CTSO)

Skills USA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select, apply, and maintain drafting and graphic materials and equipment.
- 03.0 Identify construction materials and their application.
- 04.0 Interpret drawings and documents.
- 05.0 Interpret and apply basic principles of architectural and engineering design.
- 06.0 Interpret and apply codes, regulations, and technical literature.
- 07.0 Produce architectural working drawings.
- 08.0 Prepare subcontractor shop drawings.
- 09.0 Estimate basic quantities.
- 10.0 Demonstrate appropriate communication skills.

- 11.0 Demonstrate appropriate math skills.
- 12.0 Explain sustainability issues related to the design, construction and maintenance of the built environment.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Sustainable Design
CIP Number: 0630330106
Program Length: 19 Credit Hours
SOC Code(s): 17-3011

This certificate program is part of the Architectural Design and Construction Technology AS/AAS degree program (1604090100/0615010106). At the completion of this program, the student will be able to:

01.0 Communicate effectively -- The student will be able to:

- 01.01 Identify communication channels in organizations.
- 01.02 Develop and use effective means of communications.
- 01.03 Develop an effective working relationship with others.
- 01.04 Prepare business correspondence, memos, and reports.
- 01.05 Compose clear and concise oral and written technical reports and presentations.
- 01.06 Participate in technical discussion and meetings.

02.0 Identify, select, apply, and maintain drafting and graphic materials, and equipment -- The student will be able to:

- 02.01 Use architectural and engineering scales.
- 02.02 Select, apply, and maintain basic drawing instruments including both table top tools (triangles, compass, etc.) and computer hardware devices and software programs.
- 02.03 Identify and select leads, lead holders, sharpeners and erasers.
- 02.04 Identify and select reproduction materials.
- 02.05 Set up and maintain drafting machine, T square, and parallel rule.
- 02.06 Identify, select, and apply color markers and pencils.
- 02.07 Operate calculators.
- 02.08 Identify, operate, and maintain photography equipment.
- 02.09 Apply photographic techniques.
- 02.10 Apply and develop lettering and drawing techniques.

03.0 Identify construction materials and their application -- The student will be able to:

- 03.01 Identify formwork materials and methods.
- 03.02 Identify concrete materials and applications.
- 03.03 Identify structural steel shapes and applications.
- 03.04 Identify waterproofing materials and vapor barriers and applications.
- 03.05 Identify wood construction materials and applications.
- 03.06 Identify masonry materials and applications.
- 03.07 Identify exterior finishes and applications.
- 03.08 Identify insulation materials and applications.
- 03.09 Identify glass and glazing materials and applications.
- 03.10 Identify roofing materials and applications.
- 03.11 Identify flashings and applications.

- 03.12 Identify adhesives and sealants and applications.
- 03.13 Identify floor finish materials and applications.
- 03.14 Identify wall finish materials and applications.
- 03.15 Identify ceiling finish materials and applications.
- 03.16 Identify plastic materials and applications.
- 03.17 Identify miscellaneous metals and applications.
- 03.18 Identify millwork and applications.
- 03.19 Identify finish hardware and applications.
- 03.20 Identify manufactured specialties and applications.
- 03.21 Identify basic electrical components.
- 03.22 Identify basic HVAC components.
- 03.23 Identify basic plumbing components.
- 03.24 Identify paving materials and applications.
- 03.25 Identify fire proofing materials and applications.

04.0 Interpret drawings and documents -- The student will be able to:

- 04.01 Interpret technical symbols.
- 04.02 Interpret topographical drawings.
- 04.03 Interpret aerial photographs and maps.
- 04.04 Interpret site drawings.
- 04.05 Interpret architectural drawings.
- 04.06 Interpret specifications.
- 04.07 Interpret addendums.
- 04.08 Interpret shop drawings.
- 04.09 Interpret mechanical drawings.
- 04.10 Interpret electrical drawings.
- 04.11 Interpret master and development plans and documents

05.0 Interpret and apply basic principles of architectural and engineering design -- The student will be able to:

- 05.01 Interpret soil analysis reports.
- 05.02 Interpret compaction test reports.
- 05.03 Interpret and apply fundamentals of site requirements.
- 05.04 Determine and apply space relationships.

06.0 Interpret and apply codes, regulations, and technical literature -- The student will be able to:

- 06.01 Interpret and apply graphic and time saver standards.
- 06.02 Interpret and apply local, state, national and international building codes including the Florida Building Codes, the Life Safety Code (NFPA 101), the National Electric Code (NFPA 70), the International Building Code (IBC), etc.
- 06.03 Interpret and apply municipal codes and regulations.
- 06.04 Interpret zoning bylaws and regulations.
- 06.05 Interpret zoning maps.
- 06.06 Interpret trade magazines and catalogs.
- 06.07 Interpret trade manuals.
- 06.08 Interpret yardstick costing manual.
- 06.09 Interpret and apply construction association regulations.

- 07.0 Produce architectural working drawings -- The student will be able to:
 - 07.01 Prepare floor plan drawings.
 - 07.02 Prepare elevation drawings.
 - 07.03 Prepare landscape layouts.
 - 07.04 Prepare schedules.
 - 07.05 Prepare sections.
 - 07.06 Build architectural models.
 - 07.07 Prepare plot plan drawings.

- 08.0 Prepare subcontractor shop drawings -- The student will be able to:
 - 08.01 Prepare plumbing plan drawings.
 - 08.02 Prepare climate control drawings.
 - 08.03 Prepare electrical plan drawings.

- 09.0 Estimate basic quantities -- The student will be able to:
 - 09.01 Compute area and volume of buildings.
 - 09.02 Estimate quantities of excavation and fill.
 - 09.03 Take off quantities of form work.
 - 09.04 Take off quantities of concrete.
 - 09.05 Take off quantities of lumber.
 - 09.06 Take off quantities of masonry.
 - 09.07 Interpret and complete standard estimator's form.
 - 09.08 Apply the use of computer estimating software.

- 10.0 Demonstrate appropriate communication skills -- The student will be able to:
 - 10.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
 - 10.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 10.03 Read and follow written and oral instructions.
 - 10.04 Answer and ask questions coherently and concisely.
 - 10.05 Read critically by recognizing assumptions and implications and by evaluating ideas.

- 11.0 Demonstrate appropriate math skills -- The student will be able to:
 - 11.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 11.02 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 11.03 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

- 12.0 Explain sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
 - 12.01 Describe the impact of the construction industry on the natural environment.

- 12.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
- 12.03 Identify and analyze sustainable alternatives to conventional construction practices.
- 12.04 Identify specific practices that can lessen adverse impacts on the environment.
- 12.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
- 12.06 Identify design features, construction activities and maintenance practices that contribute to a project's overall sustainability.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Carpentry Management
Career Cluster: Architecture and Construction

AAS	
CIP Number	0646020106
Program Type	College Credit
Standard Length	65 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2031 - Carpenters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in the carpentry industry

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, human relations and employability skills, safe and efficient work practices, carpentry practices, resource management skills, safety, blue print reading, and problem solving skills.

Program Structure

This program is a planned sequence of instruction consisting of 65 credit hours.

This program focuses on broad, transferable skills, stresses the understanding of the carpentry and cabinetmaking industry, and demonstrates elements of the industry. Such as planning, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 65 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AAS degree program includes the following College Credit Certificates:

Construction Carpentry Assistant (0646020107) – 12 Credit Hours
Construction Carpentry Technician (0646020108) – 24 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Follow safety practices.
- 02.0 Utilize manual and power tools.
- 03.0 Describe the importance of the construction industry in the American economy.
- 04.0 Identify the characteristics of building materials.
- 05.0 Identify fasteners and hardware.
- 06.0 Demonstrate appropriate math skills.
- 07.0 Communicate effectively.
- 08.0 Read basic blueprints.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate positive customer-relations skills.
- 11.0 Demonstrate an understanding of entrepreneurship.
- 12.0 Use blueprints and specifications for trim and finish carpentry.
- 13.0 Install exterior covering and trim.
- 14.0 Install an interior door (wood and/or metal).
- 15.0 Lay out and construct an interior-stair system.
- 16.0 Install an interior wall and ceiling covering.
- 17.0 Install cabinets and shelving.
- 18.0 Use blueprints and specifications for frame carpentry.
- 19.0 Set up and use a transit and a builder's level.
- 20.0 Perform site-preparation and layout activities.
- 21.0 Install finished roofing components.
- 22.0 Cut and install framing members for a floor (wood and/or metal).
- 23.0 Cut and install a wall and partition framing (wood and/or metal).
- 24.0 Frame a conventional roof (wood).
- 25.0 Identify roof trusses (wood and/or metal).
- 26.0 Install and dry-in sheathing.
- 27.0 Set up and install basic rigging and scaffolding.
- 28.0 Install an exterior door (wood and/or metal).
- 29.0 Install a window unit (wood and/or metal).
- 30.0 Lay out and construct an exterior-stair system.
- 31.0 Comply with hurricane codes.
- 32.0 Identify structural timber.
- 33.0 Demonstrate problem solving skills.
- 34.0 Use blueprints and specifications for form carpentry.
- 35.0 Explain or identify various forms.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Carpentry Management
CIP Number: 064020106
Program Length: 65 Credit Hours
SOC Code(s): 47-2031

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Follow safety practices--The student will be able to:

- 01.01 Maintain a clean, orderly, and safe work area.
- 01.02 Transport, handle, and store materials safely.
- 01.03 Operate a fire extinguisher.
- 01.04 Identify basic first-aid procedures.
- 01.05 Qualify in basic first-aid procedures.
- 01.06 Identify common safety hazards.
- 01.07 Identify and explain the proper use of common personal protective equipment (hard hats, safety glasses, safety shoes, etc.).
- 01.08 Describe "Federal" Right to Know Law CFR-1910.1200, including the Material Safety Data Sheets (MSDS).
- 01.09 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 01.10 Identify health-related problems that may result from exposure to hazardous materials.
- 01.11 Describe the proper precautions for handling hazardous materials.
- 01.12 Explain eligibility and the procedures for obtaining worker's compensation.
- 01.13 Explain the importance of complying with ADA requirements for handicapped accessibility.

02.0 Utilize manual and power tools--The student will be able to:

- 02.01 Identify various hand and power tools.
- 02.02 Select correct tools for specific jobs.
- 02.03 Clean and care for tools and equipment.
- 02.04 Demonstrate proficiency in the safe use of hand tools and of portable and stationary power tools.
- 02.05 Read and use carpenter's measuring tools.

03.0 Describe the importance of the construction industry in the American economy--The student will be able to:

- 03.01 Describe the role of the construction industry within the free-enterprise system.
- 03.02 Identify career-progression opportunities in the carpentry and cabinetmaking industry.

- 03.03 Describe current issues, topics, and materials in the building-construction industry.
- 04.0 Identify the characteristics of building materials--The student will be able to:
 - 04.01 Identify the grades and species of lumber.
 - 04.02 Identify the actual and nominal sizes of lumber.
 - 04.03 Identify the grades of plywood and wood products.
 - 04.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 04.05 Explain the effects of temperature extremes, chemical reaction, and moisture content on building materials.
- 05.0 Identify fasteners and hardware--The student will be able to:
 - 05.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 05.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 06.0 Demonstrate appropriate math skills--The student will be able to:
 - 06.01 Solve basic math problems related to carpentry and/or cabinetmaking, with and without a calculator; including basic geometry and algebra skills.
 - 06.02 Solve problems, using board, linear, foot, square-foot, and cubic-foot measurements.
 - 06.03 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 06.04 Measure horizontal and vertical surfaces using feet and inches.
- 07.0 Communicate effectively--The student will be able to:
 - 07.01 Write logical and understandable statements.
 - 07.02 Interpret the graphs, charts, diagrams, and tables commonly used in the carpentry or cabinetmaking industry.
 - 07.03 Read and follow written and oral instructions.
 - 07.04 Answer and ask questions coherently, directly, and concisely.
 - 07.05 Demonstrate appropriate telephone/communication skills.
- 08.0 Read basic blueprints--The student will be able to:
 - 08.01 Read an architect's scale.
 - 08.02 Identify architectural and engineering elevations, perspectives, and schedules.
 - 08.03 Identify lines and blueprint symbols.
- 09.0 Demonstrate employability skills--The student will be able to:
 - 09.01 Conduct a job search and identify advanced-training opportunities, including apprenticeship programs, if appropriate.
 - 09.02 Secure information about a job.
 - 09.03 Identify documents that may be required for a job application.
 - 09.04 Complete a job-application form correctly.
 - 09.05 Demonstrate competence in job-interview techniques.
 - 09.06 Demonstrate productive work habits and positive attitudes.

- 09.07 Demonstrate knowledge of how to make job changes appropriately.
 - 09.08 Identify ethical and responsible practices.
 - 09.09 Demonstrate acceptable hygiene practices and a professional appearance.
 - 09.10 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
 - 09.11 Explain the importance of taking pride in the quality of work performed.
 - 09.12 Describe the importance of a drug-free workplace and industry policy toward drug and alcohol use.
 - 09.13 Describe the ramifications of a poor-driving record on employability opportunities.
- 10.0 Demonstrate positive customer-relations skills--The student will be able to:
- 10.01 Exercise self-control.
 - 10.02 Identify and demonstrate appropriate responses to criticism.
 - 10.03 Recognize basic human relations as they relate to success in the industry.
 - 10.04 Respond to customer complaints in a positive, professional manner.
 - 10.05 Demonstrate respect for people and property.
- 11.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 11.01 Define "entrepreneurship."
 - 11.02 Describe the importance of entrepreneurship to the American economy and the role of small business in the free-enterprise system.
 - 11.03 List the advantages and disadvantages of business ownership.
- 12.0 Use blueprints and specifications for trim and finish carpentry--The student will be able to:
- 12.01 Read an architect's scale for a trim and finish carpentry job.
 - 12.02 Determine dimensions from a blueprint.
 - 12.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.
- 13.0 Install exterior covering and trim--The student will be able to:
- 13.01 Identify the styles of soffit and fascia.
 - 13.02 Identify the styles of sidings.
 - 13.03 Install siding and trim.
- 14.0 Install an interior door (wood and/or metal)--The student will be able to:
- 14.01 Identify the types and parts of interior-door systems.
 - 14.02 Install an interior-door jamb and hang a door.
 - 14.03 Identify and install interior-door hardware.
- 15.0 Lay out and construct an interior stair system--The student will be able to:
- 15.01 Identify the types and styles of interior stair systems.
 - 15.02 Identify the components of an interior-stair system.
 - 15.03 Calculate the number of risers and treads for an interior-stair system.
 - 15.04 Lay out, cut, and assemble an interior-stair system (rough and finish).

- 16.0 Install an interior wall and ceiling covering--The student will be able to:
- 16.01 Install furring strips.
 - 16.02 Install drywall.
 - 16.03 Identify and install paneling and trim.
 - 16.04 Identify and install ceiling materials and systems.
- 17.0 Install cabinets and shelving--The student will be able to:
- 17.01 Identify the types and parts of cabinets.
 - 17.02 Identify the types of cabinet doors.
 - 17.03 Identify the types of cabinet hardware.
 - 17.04 Install cabinet hardware.
 - 17.05 Install a custom-built cabinet.
 - 17.06 Install shelving.
 - 17.07 Construct and laminate a countertop.
- 18.0 Use blueprints and specifications for frame carpentry--The student will be able to:
- 18.01 Read an architect's scale for a frame carpentry job.
 - 18.02 Determine dimensions from a blueprint.
 - 18.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.
- 19.0 Set up and use a transit and a builder's level--The student will be able to:
- 19.01 Set up and adjust a transit and a builder's level over a point and establish lines over two points.
 - 19.02 Read a measuring rod.
 - 19.03 Perform differential leveling.
- 20.0 Perform site-preparation and layout activities--The student will be able to:
- 20.01 Identify building layout using math skills.
 - 20.02 Erect batter boards and locate building lines.
 - 20.03 Locate building line points on batter boards using a builder's level.
 - 20.04 Locate building lines on a plot plan.
 - 20.05 Square a building using the 3-4-5 triangle method and the diagonal method.
- 21.0 Install finished roofing components--The student will be able to:
- 21.01 Install composition shingles in a valley.
 - 21.02 Install roof-flashing components and accessories.
 - 21.03 Install ridge vent.
 - 21.04 Frame, sheath, and flash a cricket.
- 22.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:
- 22.01 Identify and describe floor-framing members including subfloor.

- 22.02 Lay out, cut, and install supports for structures (e.g.: sills, columns, beams, and girders).
 - 22.03 Lay out and install various types of joists and openings including joists for a cantilevered floor.
 - 22.04 Install various types of bridging.
 - 22.05 Install various types of subfloors, applying fastening techniques.
- 23.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
- 23.01 Identify framing members used in wall and partition construction.
 - 23.02 Lay out wall lines and partition locations on a floor.
 - 23.03 Lay out walls for studs, doors, and windows.
 - 23.04 Cut studs, trimmers, cripples, headers, and firestops to length.
 - 23.05 Build T's, corners, and headers.
 - 23.06 Lay out and assemble wall sections.
 - 23.07 Install wall sheathing and/or diagonal bracing.
 - 23.08 Install insulation material and a vapor barrier.
- 24.0 Frame a conventional roof (wood)--The student will be able to:
- 24.01 Identify roof members, styles, and framing units.
 - 24.02 Compute the length of common, hip, and jack rafters.
 - 24.03 Lay out rafter and ceiling joist locations on plate and ridge on center.
 - 24.04 Select and install nails and fasteners according to specifications.
 - 24.05 Lay out, cut, and erect rafters.
 - 24.06 Install roof sheathing.
- 25.0 Identify roof trusses (wood and/or metal)--The student will be able to:
- 25.01 Identify the main parts of roof trusses.
 - 25.02 Identify the hardware used in roof truss construction.
 - 25.03 Describe the advantages of roof trusses.
 - 25.04 Describe the installation and bracing (temporary and permanent) of roof trusses.
- 26.0 Install and dry-in sheathing--The student will be able to:
- 26.01 Install sheathing.
 - 26.02 Select and install nails and fasteners according to the specifications.
 - 26.03 Dry-in a roof.
- 27.0 Set up and install basic rigging and scaffolding--The student will be able to:
- 27.01 Identify and explain rigging equipment.
 - 27.02 Tie knots.
 - 27.03 Set up and install scaffolds following safety precautions.
 - 27.04 Inspect various types of ladders and scaffolds following safety precautions.
- 28.0 Install an exterior door (wood and/or metal)--The student will be able to:
- 28.01 Identify the parts of exterior door systems.

- 28.02 Install exterior door jambs and hang door.
- 28.03 Install exterior door hardware.
- 29.0 Install a window unit (wood and/or metal)--The student will be able to:
 - 29.01 Identify the types of windows.
 - 29.02 Identify the parts of a window unit.
 - 29.03 Install a window unit.
- 30.0 Lay out and construct an exterior stair system--The student will be able to:
 - 30.01 Identify types of exterior stair systems.
 - 30.02 Identify parts of an exterior stair system.
 - 30.03 Calculate the number of treads and risers for an exterior stair system.
 - 30.04 Lay out, cut, and assemble an exterior stair system.
- 31.0 Comply with hurricane codes--the student will be able to:
 - 31.01 Install hurricane strapping according to state and local codes
 - 31.02 Explain the need for hurricane strapping.
 - 31.03 Identify the different strapping and use in the correct application.
- 32.0 Identify structural timber--The student will be able to:
 - 32.01 Identify structural-timber components and heavy structural timber.
- 33.0 Demonstrate problem-solving skills--The student will be able to:
 - 33.01 Organize and plan multiple tasks, utilizing various resources such as time, personnel, and materials.
 - 33.02 Analyze problems, identify the causes, and devise plans of action.
 - 33.03 Identify obstacles, generate alternatives, and choose the best alternatives.
 - 33.04 Identify styles of footings.
 - 33.05 Explain setting a pier footing form.
 - 33.06 Explain how to strip a form for reuse.
 - 33.07 Explain edge forms for a floor with or without foundation walls and for a stoop.
 - 33.08 Explain various types of curb and gutter forms.
 - 33.09 Identify various types of beams, columns, and slabs with various form systems (Burke, Symons, plywood, and 2'x 4').
 - 33.10 Identify and explain the different types and uses of flying forms for decks and shear walls.
 - 33.11 Explain concrete pressure and its implications for form work routines.
 - 33.12 Identify form work accessories such as snap-ties, wedges, pigs-feet, whalers, and stiffbacks for forming walls, beams, and columns with plywood and 2'x 4' material.
- 34.0 Use blueprints and specifications for form carpentry--The student will be able to:
 - 34.01 Read an architect's scale for form carpentry job.
 - 34.02 Determine dimensions from a blueprint.
 - 34.03 Relate information on blueprints and specifications to real parts, locations,

hardware, and fasteners.

35.0 Explain or identify various forms--The student will be able to:

- 35.01 Identify styles of footings.
- 35.02 Explain setting a pier footing form.
- 35.03 Explain how to strip a form for reuse.
- 35.04 Explain edge forms for a floor with or without foundation walls and for a stoop.
- 35.05 Explain various types of curb and gutter forms.
- 35.06 Identify various types of beams, columns, and slabs with various form systems (Burke, Symons, plywood, and 2'x4').
- 35.07 Identify and explain the different types and uses of flying forms for decks and shear walls.
- 35.08 Explain concrete pressure and its implications for form work routines.
- 35.09 Identify form work accessories such as snap-ties, wedges, pigs-feet, whalers, and stiffbacks for forming walls, beams, and columns with plywood and 2'x4' material.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Construction Carpentry Assistant
Career Cluster: Architecture and Construction

CCC	
CIP Number	0646020107
Program Type	College Credit Certificate (CCC)
Program Length	12 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2031 - Carpenters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in the carpentry industry.

This certificate program is part of the Carpentry Management AAS degree program (064020106).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries or to supplement training for persons previously or currently employed in these occupations.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Follow safety practices.
- 02.0 Utilize manual and power tools.
- 03.0 Describe the importance of the construction industry in the American economy.
- 04.0 Identify the characteristics of building materials.
- 05.0 Identify fasteners and hardware.
- 06.0 Demonstrate appropriate math skills.
- 07.0 Communicate effectively.
- 08.0 Read basic blueprints.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate positive customer-relations skills.
- 11.0 Demonstrate an understanding of entrepreneurship.

- 12.0 Use blueprints and specifications for trim and finish carpentry.
- 13.0 Install exterior covering and trim.
- 14.0 Install an interior door (wood and/or metal).
- 15.0 Lay out and construct an interior-stair system.
- 16.0 Install an interior wall and ceiling covering.
- 17.0 Install cabinets and shelving.
- 18.0 Use blueprints and specifications for frame carpentry.
- 19.0 Set up and use a transit and a builder's level.
- 20.0 Perform site-preparation and layout activities.
- 21.0 Install finished roofing components.
- 22.0 Cut and install framing members for a floor (wood and/or metal).
- 23.0 Cut and install a wall and partition framing (wood and/or metal).

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Construction Carpentry Assistant
CIP Number: 0646020107
Program Length: 12 Credit Hours
SOC Code(s): 472031

This certificate program is part of the Carpentry Management AS/AAS degree program (164020106/064020106). At the completion of this program, the student will be able to:

- 01.0 Follow safety practices-- The student will be able to:
- 01.01 Maintain a clean, orderly, and safe work area.
 - 01.02 Transport, handle, and store materials safely.
 - 01.03 Operate a fire extinguisher.
 - 01.04 Identify basic first-aid procedures.
 - 01.05 Qualify in basic first-aid procedures.
 - 01.06 Identify common safety hazards.
 - 01.07 Identify and explain the proper use of common personal protective equipment (hard hats, safety glasses, safety shoes, etc.).
 - 01.08 Describe "Federal" Right to Know Law CFR-1910.1200, including the Material Safety Data Sheets (MSDS).
 - 01.09 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
 - 01.10 Identify health-related problems that may result from exposure to hazardous materials.
 - 01.11 Describe the proper precautions for handling hazardous materials.
 - 01.12 Explain eligibility and the procedures for obtaining worker's compensation.
 - 01.13 Explain the importance of complying with ADA requirements for handicapped accessibility.
- 02.0 Utilize manual and power tools-- The student will be able to:
- 02.01 Identify various hand and power tools.
 - 02.02 Select correct tools for specific jobs.
 - 02.03 Clean and care for tools and equipment.
 - 02.04 Demonstrate proficiency in the safe use of hand tools and of portable and stationary power tools.
 - 02.05 Read and use carpenter's measuring tools.
- 03.0 Describe the importance of the construction industry in the American economy-- The student will be able to:
- 03.01 Describe the role of the construction industry within the free-enterprise system.
 - 03.02 Identify career-progression opportunities in the carpentry and cabinetmaking industry.
 - 03.03 Describe current issues, topics, and materials in the building-construction industry.

- 04.0 Identify the characteristics of building materials-- The student will be able to:
- 04.01 Identify the grades and species of lumber.
 - 04.02 Identify the actual and nominal sizes of lumber.
 - 04.03 Identify the grades of plywood and wood products.
 - 04.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 04.05 Explain the effects of temperature extremes, chemical reaction, and moisture content on building materials.
- 05.0 Identify fasteners and hardware-- The student will be able to:
- 05.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 05.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 06.0 Demonstrate appropriate math skills--The student will be able to:
- 06.01 Solve basic math problems related to carpentry and/or cabinetmaking, with and without a calculator; including basic geometry and algebra skills.
 - 06.02 Solve problems, using board, linear, foot, square-foot, and cubic-foot measurements.
 - 06.03 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 06.04 Measure horizontal and vertical surfaces using feet and inches.
- 07.0 Communicate effectively-- The student will be able to:
- 07.01 Write logical and understandable statements.
 - 07.02 Interpret the graphs, charts, diagrams, and tables commonly used in the carpentry or cabinetmaking industry.
 - 07.03 Read and follow written and oral instructions.
 - 07.04 Answer and ask questions coherently, directly, and concisely.
 - 07.05 Demonstrate appropriate telephone/communication skills.
- 08.0 Read basic blueprints-- The student will be able to:
- 08.01 Read an architect's scale.
 - 08.02 Identify architectural and engineering elevations, perspectives, and schedules.
 - 08.03 Identify lines and blueprint symbols.
- 09.0 Demonstrate employability skills-- The student will be able to:
- 09.01 Conduct a job search and identify advanced-training opportunities, including apprenticeship programs, if appropriate.
 - 09.02 Secure information about a job.
 - 09.03 Identify documents that may be required for a job application.
 - 09.04 Complete a job-application form correctly.
 - 09.05 Demonstrate competence in job-interview techniques.
 - 09.06 Demonstrate productive work habits and positive attitudes.
 - 09.07 Demonstrate knowledge of how to make job changes appropriately.
 - 09.08 Identify ethical and responsible practices.
 - 09.09 Demonstrate acceptable hygiene practices and a professional appearance.

- 09.10 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
 - 09.11 Explain the importance of taking pride in the quality of work performed.
 - 09.12 Describe the importance of a drug-free workplace and industry policy toward drug and alcohol use.
 - 09.13 Describe the ramifications of a poor-driving record on employability opportunities.
- 10.0 Demonstrate positive customer-relations skills-- The student will be able to:
- 10.01 Exercise self-control.
 - 10.02 Identify and demonstrate appropriate responses to criticism.
 - 10.03 Recognize basic human relations as they relate to success in the industry.
 - 10.04 Respond to customer complaints in a positive, professional manner.
 - 10.05 Demonstrate respect for people and property.
- 11.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 11.01 Define "entrepreneurship."
 - 11.02 Describe the importance of entrepreneurship to the American economy and the role of small business in the free-enterprise system.
 - 11.03 List the advantages and disadvantages of business ownership.
- 12.0 Use blueprints and specifications for trim and finish carpentry--The student will be able to:
- 12.01 Read an architect's scale for a trim and finish carpentry job.
 - 12.02 Determine dimensions from a blueprint.
 - 12.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.
- 13.0 Install exterior covering and trim-- The student will be able to:
- 13.01 Identify the styles of soffit and fascia.
 - 13.02 Identify the styles of sidings.
 - 13.03 Install siding and trim.
- 14.0 Install an interior door (wood and/or metal)-- The student will be able to:
- 14.01 Identify the types and parts of interior-door systems.
 - 14.02 Install an interior-door jamb and hang a door.
 - 14.03 Identify and install interior-door hardware.
- 15.0 Lay out and construct an interior stair system-- The student will be able to:
- 15.01 Identify the types and styles of interior stair systems.
 - 15.02 Identify the components of an interior-stair system.
 - 15.03 Calculate the number of risers and treads for an interior-stair system.
 - 15.04 Lay out, cut, and assemble an interior-stair system (rough and finish).
- 16.0 Install an interior wall and ceiling covering-- The student will be able to:

- 16.01 Install furring strips.
- 16.02 Install drywall.
- 16.03 Identify and install paneling and trim.
- 16.04 Identify and install ceiling materials and systems.

17.0 Install cabinets and shelving-- The student will be able to:

- 17.01 Identify the types and parts of cabinets.
- 17.02 Identify the types of cabinet doors.
- 17.03 Identify the types of cabinet hardware.
- 17.04 Install cabinet hardware.
- 17.05 Install a custom-built cabinet.
- 17.06 Install shelving.
- 17.07 Construct and laminate a countertop.

18.0 Use blueprints and specifications for frame carpentry-- The student will be able to:

- 18.01 Read an architect's scale for a frame carpentry job.
- 18.02 Determine dimensions from a blueprint.
- 18.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.

19.0 Set up and use a transit and a builder's level-- The student will be able to:

- 19.01 Set up and adjust a transit and a builder's level over a point and establish lines over two points.
- 19.02 Read a measuring rod.
- 19.03 Perform differential leveling.

20.0 Perform site-preparation and layout activities-- The student will be able to:

- 20.01 Identify building layout using math skills.
- 20.02 Erect batter boards and locate building lines.
- 20.03 Locate building line points on batter boards using a builder's level.
- 20.04 Locate building lines on a plot plan.
- 20.05 Square a building using the 3-4-5 triangle method and the diagonal method.

21.0 Install finished roofing components-- The student will be able to:

- 21.01 Install composition shingles in a valley.
- 21.02 Install roof-flashing components and accessories.
- 21.03 Install ridge vent.
- 21.04 Frame, sheath, and flash a cricket.

22.0 Cut and install framing members for a floor (wood and/or metal)-- The student will be able to:

- 22.01 Identify and describe floor-framing members including subfloor.
- 22.02 Lay out, cut, and install supports for structures (e.g.: sills, columns, beams, and girders).
- 22.03 Lay out and install various types of joists and openings including joists for a

cantilevered floor.

22.04 Install various types of bridging.

22.05 Install various types of subfloors, applying fastening techniques.

23.0 Cut and install a wall and partition framing (wood and/or metal)-- The student will be able to:

23.01 Identify framing members used in wall and partition construction.

23.02 Lay out wall lines and partition locations on a floor.

23.03 Lay out walls for studs, doors, and windows.

23.04 Cut studs, trimmers, cripples, headers, and firestops to length.

23.05 Build T's, corners, and headers.

23.06 Lay out and assemble wall sections.

23.07 Install wall sheathing and/or diagonal bracing.

23.08 Install insulation material and a vapor barrier.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Construction Carpentry Technician
Career Cluster: Architecture and Construction

CCC	
CIP Number	0646020108
Program Type	College Credit Certificate (CCC)
Program Length	24 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2031 - Carpenters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in the Carpentry Industry.

This certificate program is part of the Carpentry Management AAS degree program (064020106).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, human relations and employability skills, safe and efficient work practices, carpentry practices, resource management skills, safety, blue print reading, and problem solving skills.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Follow safety practices.
- 02.0 Utilize manual and power tools.
- 03.0 Describe the importance of the construction industry in the American economy.
- 04.0 Identify the characteristics of building materials.
- 05.0 Identify fasteners and hardware.
- 06.0 Demonstrate appropriate math skills.
- 07.0 Communicate effectively.
- 08.0 Read basic blueprints.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate positive customer-relations skills.
- 11.0 Demonstrate an understanding of entrepreneurship.

- 12.0 Use blueprints and specifications for trim and finish carpentry.
- 13.0 Install exterior covering and trim.
- 14.0 Install an interior door (wood and/or metal).
- 15.0 Lay out and construct an interior stair system.
- 16.0 Install an interior wall and ceiling covering.
- 17.0 Install cabinets and shelving.
- 18.0 Use blueprints and specifications for frame carpentry.
- 19.0 Set up and use a transit and a builder's level.
- 20.0 Perform site-preparation and layout activities.
- 21.0 Install finished roofing components.
- 22.0 Cut and install framing members for a floor (wood and/or metal).
- 23.0 Cut and install a wall and partition framing (wood and/or metal).
- 24.0 Frame a conventional roof (wood).
- 25.0 Identify roof trusses (wood and/or metal).
- 26.0 Install and dry-in sheathing.
- 27.0 Set up and install basic rigging and scaffolding.
- 28.0 Install an exterior door (wood and/or metal).
- 29.0 Install a window unit (wood and/or metal).
- 30.0 Lay out and construct an exterior stair system.
- 31.0 Comply with hurricane codes.
- 32.0 Identify structural timber.
- 33.0 Demonstrate problem-solving skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Construction Carpentry Technician
CIP Number: 0646020108
Program Length: 24 Credit Hours
SOC Code(s): 47-2031

This certificate program is part of the Construction Management AS/AAS degree program (164020106/064020106). At the completion of this program, the student will be able to:

01.0 Follow safety practices--The student will be able to:

- 01.01 Maintain a clean, orderly, and safe work area.
- 01.02 Transport, handle, and store materials safely.
- 01.03 Operate a fire extinguisher.
- 01.04 Identify basic first-aid procedures.
- 01.05 Qualify in basic first-aid procedures.
- 01.06 Identify common safety hazards.
- 01.07 Identify and explain the proper use of common personal protective equipment (hard hats, safety glasses, safety shoes, etc.).
- 01.08 Describe "Federal" Right to Know Law CFR-1910.1200, including the Material Safety Data Sheets (MSDS).
- 01.09 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 01.10 Identify health-related problems that may result from exposure to hazardous materials.
- 01.11 Describe the proper precautions for handling hazardous materials.
- 01.12 Explain eligibility and the procedures for obtaining worker's compensation.
- 01.13 Explain the importance of complying with ADA requirements for handicapped accessibility.

02.0 Utilize manual and power tools--The student will be able to:

- 02.01 Identify various hand and power tools.
- 02.02 Select correct tools for specific jobs.
- 02.03 Clean and care for tools and equipment.
- 02.04 Demonstrate proficiency in the safe use of hand tools and of portable and stationary power tools.
- 02.05 Read and use carpenter's measuring tools.

03.0 Describe the importance of the construction industry in the American economy--The student will be able to:

- 03.01 Describe the role of the construction industry within the free-enterprise system.
- 03.02 Identify career-progression opportunities in the carpentry and cabinetmaking industry.
- 03.03 Describe current issues, topics, and materials in the building-construction industry.

- 04.0 Identify the characteristics of building materials--The student will be able to:
- 04.01 Identify the grades and species of lumber.
 - 04.02 Identify the actual and nominal sizes of lumber.
 - 04.03 Identify the grades of plywood and wood products.
 - 04.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 04.05 Explain the effects of temperature extremes, chemical reaction, and moisture content on building materials.
- 05.0 Identify fasteners and hardware--The student will be able to:
- 05.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 05.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 06.0 Demonstrate appropriate math skills--The student will be able to:
- 06.01 Solve basic math problems related to carpentry and/or cabinetmaking, with and without a calculator; including basic geometry and algebra skills.
 - 06.02 Solve problems, using board, linear, foot, square-foot, and cubic-foot measurements.
 - 06.03 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 06.04 Measure horizontal and vertical surfaces using feet and inches.
- 07.0 Communicate effectively--The student will be able to:
- 07.01 Write logical and understandable statements.
 - 07.02 Interpret the graphs, charts, diagrams, and tables commonly used in the carpentry or cabinetmaking industry.
 - 07.03 Read and follow written and oral instructions.
 - 07.04 Answer and ask questions coherently, directly, and concisely.
 - 07.05 Demonstrate appropriate telephone/communication skills.
- 08.0 Read basic blueprints--The student will be able to:
- 08.01 Read an architect's scale.
 - 08.02 Identify architectural and engineering elevations, perspectives, and schedules.
 - 08.03 Identify lines and blueprint symbols.
- 09.0 Demonstrate employability skills--The student will be able to:
- 09.01 Conduct a job search and identify advanced-training opportunities, including apprenticeship programs, if appropriate.
 - 09.02 Secure information about a job.
 - 09.03 Identify documents that may be required for a job application.
 - 09.04 Complete a job-application form correctly.
 - 09.05 Demonstrate competence in job-interview techniques.
 - 09.06 Demonstrate productive work habits and positive attitudes.
 - 09.07 Demonstrate knowledge of how to make job changes appropriately.
 - 09.08 Identify ethical and responsible practices.
 - 09.09 Demonstrate acceptable hygiene practices and a professional appearance.

- 09.10 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
 - 09.11 Explain the importance of taking pride in the quality of work performed.
 - 09.12 Describe the importance of a drug-free workplace and industry policy toward drug and alcohol use.
 - 09.13 Describe the ramifications of a poor-driving record on employability opportunities.
- 10.0 Demonstrate positive customer-relations skills--The student will be able to:
- 10.01 Exercise self-control.
 - 10.02 Identify and demonstrate appropriate responses to criticism.
 - 10.03 Recognize basic human relations as they relate to success in the industry.
 - 10.04 Respond to customer complaints in a positive, professional manner.
 - 10.05 Demonstrate respect for people and property.
- 11.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 11.01 Define "entrepreneurship."
 - 11.02 Describe the importance of entrepreneurship to the American economy and the role of small business in the free-enterprise system.
 - 11.03 List the advantages and disadvantages of business ownership.
- 12.0 Use blueprints and specifications for trim and finish carpentry--The student will be able to:
- 12.01 Read an architect's scale for a trim and finish carpentry job.
 - 12.02 Determine dimensions from a blueprint.
 - 12.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.
- 13.0 Install exterior covering and trim--The student will be able to:
- 13.01 Identify the styles of soffit and fascia.
 - 13.02 Identify the styles of sidings.
 - 13.03 Install siding and trim.
- 14.0 Install an interior door (wood and/or metal)--The student will be able to:
- 14.01 Identify the types and parts of interior-door systems.
 - 14.02 Install an interior-door jamb and hang a door.
 - 14.03 Identify and install interior-door hardware.
- 15.0 Lay out and construct an interior stair system--The student will be able to:
- 15.01 Identify the types and styles of interior stair systems.
 - 15.02 Identify the components of an interior-stair system.
 - 15.03 Calculate the number of risers and treads for an interior-stair system.
 - 15.04 Lay out, cut, and assemble an interior-stair system (rough and finish).
- 16.0 Install an interior wall and ceiling covering--The student will be able to:

- 16.01 Install furring strips.
 - 16.02 Install drywall.
 - 16.03 Identify and install paneling and trim.
 - 16.04 Identify and install ceiling materials and systems.
- 17.0 Install cabinets and shelving--The student will be able to:
- 17.01 Identify the types and parts of cabinets.
 - 17.02 Identify the types of cabinet doors.
 - 17.03 Identify the types of cabinet hardware.
 - 17.04 Install cabinet hardware.
 - 17.05 Install a custom-built cabinet.
 - 17.06 Install shelving.
 - 17.07 Construct and laminate a countertop.
- 18.0 Use blueprints and specifications for frame carpentry--The student will be able to:
- 18.01 Read an architect's scale for a frame carpentry job.
 - 18.02 Determine dimensions from a blueprint.
 - 18.03 Relate information on blueprints and specifications to real parts, locations, hardware, and fasteners.
- 19.0 Set up and use a transit and a builder's level--The student will be able to:
- 19.01 Set up and adjust a transit and a builder's level over a point and establish lines over two points.
 - 19.02 Read a measuring rod.
 - 19.03 Perform differential leveling.
- 20.0 Perform site-preparation and layout activities--The student will be able to:
- 20.01 Identify building layout using math skills.
 - 20.02 Erect batter boards and locate building lines.
 - 20.03 Locate building line points on batter boards using a builder's level.
 - 20.04 Locate building lines on a plot plan.
 - 20.05 Square a building using the 3-4-5 triangle method and the diagonal method.
- 21.0 Install finished roofing components--The student will be able to:
- 21.01 Install composition shingles in a valley.
 - 21.02 Install roof-flashing components and accessories.
 - 21.03 Install ridge vent.
 - 21.04 Frame, sheath, and flash a cricket.
- 22.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:
- 22.01 Identify and describe floor-framing members including subfloor.
 - 22.02 Lay out, cut, and install supports for structures (e.g.: sills, columns, beams, and girders).
 - 22.03 Lay out and install various types of joists and openings including joists for a

cantilevered floor.

22.04 Install various types of bridging.

22.05 Install various types of subfloors, applying fastening techniques.

23.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:

23.01 Identify framing members used in wall and partition construction.

23.02 Lay out wall lines and partition locations on a floor.

23.03 Lay out walls for studs, doors, and windows.

23.04 Cut studs, trimmers, cripples, headers, and firestops to length.

23.05 Build T's, corners, and headers.

23.06 Lay out and assemble wall sections.

23.07 Install wall sheathing and/or diagonal bracing.

23.08 Install insulation material and a vapor barrier.

24.0 Frame a conventional roof (wood)--The student will be able to:

24.01 Identify roof members, styles, and framing units.

24.02 Compute the length of common, hip, and jack rafters.

24.03 Lay out rafter and ceiling joist locations on plate and ridge on center.

24.04 Select and install nails and fasteners according to specifications.

24.05 Lay out, cut, and erect rafters.

24.06 Install roof sheathing.

25.0 Identify roof trusses (wood and/or metal)--The student will be able to:

25.01 Identify the main parts of roof trusses.

25.02 Identify the hardware used in roof truss construction.

25.03 Describe the advantages of roof trusses.

25.04 Describe the installation and bracing (temporary and permanent) of roof trusses.

26.0 Install and dry-in sheathing--The student will be able to:

26.01 Install sheathing.

26.02 Select and install nails and fasteners according to the specifications.

26.03 Dry-in a roof.

27.0 Set up and install basic rigging and scaffolding--The student will be able to:

27.01 Identify and explain rigging equipment.

27.02 Tie knots.

27.03 Set up and install scaffolds following safety precautions.

27.04 Inspect various types of ladders and scaffolds following safety precautions.

28.0 Install an exterior door (wood and/or metal)--The student will be able to:

28.01 Identify the parts of exterior door systems.

28.02 Install exterior door jambs and hang door.

28.03 Install exterior door hardware.

- 29.0 Install a window unit (wood and/or metal)--The student will be able to:
 - 29.01 Identify the types of windows.
 - 29.02 Identify the parts of a window unit.
 - 29.03 Install a window unit.

- 30.0 Lay out and construct an exterior stair system--The student will be able to:
 - 30.01 Identify types of exterior stair systems.
 - 30.02 Identify parts of an exterior stair system.
 - 30.03 Calculate the number of treads and risers for an exterior stair system.
 - 30.04 Lay out, cut, and assemble an exterior stair system.

- 31.0 Comply with hurricane codes--The student will be able to:
 - 31.01 Install hurricane strapping according to state and local codes
 - 31.02 Explain the need for hurricane strapping.
 - 31.03 Identify the different strapping and use in the correct application.

- 32.0 Identify structural timber--The student will be able to:
 - 32.01 Identify structural-timber components and heavy structural timber.

- 33.0 Demonstrate problem-solving skills--The student will be able to:
 - 33.01 Organize and plan multiple tasks, utilizing various resources such as time, personnel, and materials.
 - 33.02 Analyze problems, identify the causes, and devise plans of action.
 - 33.03 Identify obstacles, generate alternatives, and choose the best alternatives.
 - 33.04 Identify styles of footings.
 - 33.05 Explain setting a pier footing form.
 - 33.06 Explain how to strip a form for reuse.
 - 33.07 Explain edge forms for a floor with or without foundation walls and for a stoop.
 - 33.08 Explain various types of curb and gutter forms.
 - 33.09 Identify various types of beams, columns, and slabs with various form systems (Burke, Symons, plywood, and 2'x 4').
 - 33.10 Identify and explain the different types and uses of flying forms for decks and shear walls.
 - 33.11 Explain concrete pressure and its implications for form work routines.
 - 33.12 Identify form work accessories such as snap-ties, wedges, pigs-feet, whalers, and stiffbacks for forming walls, beams, and columns with plywood and 2'x 4' material.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Construction Electricity Management
Career Cluster: Architecture and Construction

AAS	
CIP Number	0646030205
Program Type	College Credit
Standard Length	65 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2111 - Electricians
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries or to supplement training for persons previously or currently employed in these occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to a general education component including communication and quantitative skills, human relations and employability skills, an exposure to the natural sciences and humanities as well as business management practices, safe and efficient work practices, electrical practices, resource management skills, workplace safety, blueprint reading and critical thinking and problem solving skills.

Program Structure

This program is a planned sequence of instruction consisting of 65 credit hours.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 65 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for

entry into employment (Rule 6A-14.030, F.A.C.). This AAS degree program includes the following College Credit Certificates:

Construction Electricity Assistant (0646030206) – 12 Credit Hours
Construction Electricity Technician (0646030207) – 24 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions.
- 02.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 03.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 04.0 Communicate effectively.
- 05.0 Apply electricity-related basic math.
- 06.0 Demonstrate an understanding of basic electricity.
- 07.0 Demonstrate employability skills.
- 08.0 Read and interpret basic electric codes.
- 09.0 Demonstrate Alternating-Current (AC) circuit skills.
- 10.0 Install residential wiring.
- 11.0 Demonstrate proficiency in commercial wiring.
- 12.0 Demonstrate specialized electrical skills.
- 13.0 Demonstrate competency in industrial wiring.
- 14.0 Demonstrate competency in transformers.
- 15.0 Demonstrate competency in AC and DC motors.
- 16.0 Demonstrate competency in electrical and electronic control circuits and equipment.

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**Florida Department of Education
Student Performance Standards**

Program Title: Construction Electricity Management
CIP Number: 0646030205
Program Length: 65 Credit Hours
SOC Code(s): 47-2111

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Apply lab policies and procedures for safety, including fire safety.
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Demonstrate the proper use and care of hand and power tools and equipment.
 - 01.06 Demonstrate a knowledge of CPR (Cardiopulmonary Resuscitation) and first aid.
 - 01.07 Troubleshoot residential electric circuits.
 - 01.08 Drill holes in metal, wood, and concrete for electrical wiring.
 - 01.09 Identify and select tools, equipment, materials, and wires to complete a job.
 - 01.10 Lay out electrical devices, complying with regulations.
 - 01.11 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. conductors and cable
 - b. standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 02.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 02.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 02.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 02.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 02.04 Draw each type of circuit and calculate the circuit values.
 - 02.05 Explain and apply Ohm's Law.
 - 02.06 Compute conductance and resistance of conductors and insulators.
 - 02.07 Read and interpret color codes using a color chart to identify resistors.
 - 02.08 Explain voltage dividers (loaded and unloaded).

03.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:

03.01 Identify and select tools, equipment, materials, and wires to complete a job.

03.02 Drill holes in metal, wood, and concrete for electrical wiring.

03.03 Lay out electrical devices, complying with regulations.

03.04 Install the following, complying with the appropriate local, state, or national electric codes:

a. Conductors and cable

b. Standard outlets and switch boxes

c. Explain cord connections on major appliances

d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.

04.0 Communicate effectively--The student will be able to:

04.01 Ask and answer questions coherently and concisely.

04.02 Read and follow written instructions and listen to and follow oral instructions.

04.03 Give reports orally and in writing.

05.0 Apply electricity-related basic math--The student will be able to:

05.01 Solve math problems related to electrical work.

05.02 Convert units of measurement between the English system and the metric system.

05.03 Use scientific notation.

05.04 Demonstrate proficiency with a calculator.

05.05 Solve basic algebraic formulas related to electricity.

05.06 Solve basic trigonometric functions related to electrical theory.

06.0 Demonstrate an understanding of basic electricity--The student will be able to:

06.01 Explain the principles of electromagnetism.

06.02 Explain the magnetic properties of circuits and devices.

06.03 Relate electricity to the nature of matter.

06.04 Describe various ways that electricity is produced.

06.05 Explain how voltage is produced by chemical means, mechanical means, thermal means, and photoelectric means, piezoelectric means.

06.06 Identify blueprint symbols.

07.0 Demonstrate employability skills--The student will be able to:

07.01 Demonstrate productive work habits and positive attitudes.

07.02 Demonstrate knowledge of how to make job changes appropriately.

07.03 Identify ethical practices and responsibilities.

07.04 Demonstrate acceptable personal and professional hygiene.

07.05 Explain the importance of taking pride in the quality of work performed.

07.06 Describe the importance of a drug-free workplace and the industry's policies toward drug use.

07.07 Identify licensure requirements for electrical occupations.

08.0 Read and interpret basic electric codes--The student will be able to:

- 08.01 Describe the importance of following the local, state and national electric codes.
- 08.02 Read and interpret basic electric codes, wiring plans and specifications.
- 08.03 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.

09.0 Demonstrate Alternating-Current (AC) circuit skills--The student will be able to:

- 09.01 Identify the physical and electrical characteristics of capacitors and inductors.
- 09.02 Demonstrate proficiency in measuring, testing and connecting a transformer.
- 09.03 Apply the principles of transformers to AC circuits.
- 09.04 Identify the properties of an AC signal.
- 09.05 Identify AC sources.
- 09.06 Analyze and apply the principles of transformers to AC circuits.
- 09.07 Analyze polyphase circuits.
- 09.08 Install a simple polyphase circuit.

10.0 Install residential wiring--The student will be able to:

- 10.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
- 10.02 Draw a residential wiring plan, using electrical-wiring symbols.
- 10.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
- 10.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.
- 10.05 Install and wire a low-voltage signal system.
- 10.06 Install conduit systems.
- 10.07 Provide power for heating, ventilation, and air-conditioning equipment.
- 10.08 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. service-entrance main panel
 - b. service-entrance meter base
 - c. alarm system/smoke detectors
- 10.09 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
- 10.10 Explain how to connect single-phase and three-phase transformers.

11.0 Demonstrate proficiency in commercial wiring--The student will be able to:

- 11.01 Read and interpret a commercial wiring plan and specifications.
- 11.02 Draw a commercial electrical-wiring plan.
- 11.03 Select tools, equipment, materials, and wires to complete a job.
- 11.04 Install the following according to the plan and specifications, complying with appropriate electric codes:
 - a. wire mold

- b. conduit, duct, and raceway systems
 - c. conductors in a conduit
 - 11.05 Describe the difference between a residential and a commercial lighting circuit.
 - 11.06 Construct control circuits from schematics.
 - 11.07 Demonstrate knowledge of installing wiring in hazardous areas.
 - 11.08 Explain a commercial three-phase receptacle circuit, and an emergency-lighting system.
 - 11.09 Explain commercial-service-entrance requirements.
- 12.0 Demonstrate specialized electrical skills--The student will be able to:
- 12.01 Explain solid-state control devices.
 - 12.02 Explain data cable installation according to the plan and specifications.
- 13.0 Demonstrate competency in industrial wiring--The student will be able to:
- 13.01 Draw an industrial one-line power diagram.
 - 13.02 Test insulation resistance using a megohmmeter.
 - 13.03 Install a motor branch circuit.
 - 13.04 Using the National Electrical Code (NEC), make the following required calculations:
 - a. Conductor size
 - b. Overcurrent protection
 - c. Overload protection
 - d. Short circuit protection
 - 13.05 Install a 277 V lighting branch circuit.
 - 13.06 Describe a bus duct power distribution system.
 - 13.07 Describe fiber-optic installation requirements.
 - 13.08 Demonstrate the use of industrial test equipment.
 - 13.09 Install the following:
 - a. Disconnect switch - fused and unfused
 - b. Raceways
 - c. Emergency stop switch
 - d. Circuit breaker
 - e. Panelboard
- 14.0 Demonstrate competency in transformers--The student will be able to:
- 14.01 Explain the basic principles of mutual induction and transformer action.
 - 14.02 Explain the operation and use of a current transformer.
 - 14.03 Explain the operation and use of a potential transformer.
 - 14.04 Explain the operation and use of a buck-boost transformer and when it is used.
 - 14.05 Explain and connect 3 phase transformers in both delta and wye configuration.
 - 14.06 Calculate the over current protection requirements for the primary and secondary.
 - 14.07 Explain what transformer impedance is and its importance.
- 15.0 Demonstrate competency in AC and DC motors--The student will be able to:
- 15.01 Install and connect the following types of DC motors:
 - a. Series

- b. Shunt
 - c. Compound
 - 15.02 Install and connect the following types of single phase AC motors:
 - a. Capacitor-start
 - b. Capacitor-start and run
 - c. Split-phase inductor
 - d. Universal
 - e. Repulsion-start, induction-run
 - 15.03 Install and connect the following types of three phase AC motors:
 - a. Squirrel-cage induction
 - b. Wound-rotor
 - c. Synchronous
 - 15.04 Demonstrate the ability to select and connect a three-phase induction motor for either high or low voltage requirements.
- 16.0 Demonstrate competency in electrical and electronic control circuits and equipment--The student will be able to:
- 16.01 Draw an elementary motor control ladder diagram.
 - 16.02 Interpret symbols, read and troubleshoot from schematics and ladder diagrams.
 - 16.03 Describe the operation of the following overload relays:
 - a. Thermal
 - b. Magnetic
 - c. Thermal-magnetic
 - 16.04 Install a manual single phase and three phase control station.
 - 16.05 Install a three-phase magnetic starter.
 - 16.06 Install the following control devices:
 - a. Start/stop station
 - b. Forward/reverse/stop station
 - c. Hands/off/auto station
 - d. Start/jog/stop station
 - e. Limit switches
 - f. Pressure, temperature, level, and float switches
 - g. Pilot, run, and stop indicator lights
 - h. Control relay, and timing relays
 - i. Multi-motor push-button station
 - 16.07 Install, operate, and troubleshoot the following relay control circuits:
 - a. Start/stop
 - b. Forward/reverse
 - c. Hands-off-auto
 - d. Start/jog
 - e. Automatic timed sequence, "ON" and "OFF" delays
 - f. Manually timed sequence, "ON" and "OFF" delays
 - g. Plugging
 - h. DC injection braking
 - 16.08 Install, operate and troubleshoot the following electronic control equipment and circuits:
 - a. Variable Frequency Drive (VFD)
 - b. DC drive
 - 16.09 Explain the alternatives to relay logic control.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Construction Electricity Assistant
Career Cluster: Architecture and Construction

CCC	
CIP Number	0646030206
Program Type	College Credit Certificate (CCC)
Program Length	12 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2111 - Electricians
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries or to supplement training for persons previously or currently employed in these occupations.

This certificate program is part of the Construction Electricity Management AAS degree program (0646030205).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to safe working conditions, understanding electricity, demonstrate problem solving methods encountered outside the classroom as listed in the standards.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions.
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 03.0 Communicate effectively.
- 04.0 Apply electricity-related basic math.
- 05.0 Demonstrate an understanding of basic electricity.
- 06.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 07.0 Demonstrate an understanding of basic electricity.
- 08.0 Read and interpret basic electric codes.
- 09.0 Install residential wiring.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Construction Electricity Assistant
CIP Number: 0646030206
Program Length: 12 Credit Hours
SOC Code(s): 47-2111

This certificate program is part of the Construction Electricity Management AS/AAS degree program (1646030205/0646030205). At the completion of this program, the student will be able to:

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Apply lab policies and procedures for safety, including fire safety.
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Demonstrate the proper use and care of hand and power tools and equipment.
 - 01.06 Demonstrate a knowledge of CPR (Cardiopulmonary Resuscitation) and first aid.
 - 01.07 Troubleshoot residential electric circuits.
 - 01.08 Drill holes in metal, wood, and concrete for electrical wiring.
 - 01.09 Identify and select tools, equipment, materials, and wires to complete a job.
 - 01.10 Lay out electrical devices, complying with regulations.
 - 01.11 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. conductors and cable
 - b. standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:
- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
 - 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
 - 02.03 Lay out electrical devices, complying with regulations.
 - 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.

- 03.0 Communicate effectively--The student will be able to:
 - 03.01 Ask and answer questions coherently and concisely.
 - 03.02 Read and follow written instructions and listen to and follow oral instructions.
 - 03.03 Give reports orally and in writing.

- 04.0 Apply electricity-related basic math--The student will be able to:
 - 04.01 Solve math problems related to electrical work.
 - 04.02 Convert units of measurement between the English system and the metric system.
 - 04.03 Use scientific notation.
 - 04.04 Demonstrate proficiency with a calculator.
 - 04.05 Solve basic algebraic formulas related to electricity.
 - 04.06 Solve basic trigonometric functions related to electrical theory.

- 05.0 Demonstrate an understanding of basic electricity--The student will be able to:
 - 05.01 Explain the principles of electromagnetism.
 - 05.02 Explain the magnetic properties of circuits and devices.
 - 05.03 Relate electricity to the nature of matter.
 - 05.04 Describe various ways that electricity is produced.
 - 05.05 Explain how voltage is produced by chemical means, mechanical means, thermal means, and photoelectric means, piezoelectric means.
 - 05.06 Identify blueprint symbols.

- 06.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
 - 06.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 06.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 06.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 06.04 Draw each type of circuit and calculate the circuit values.
 - 06.05 Explain and apply Ohm's Law.
 - 06.06 Compute conductance and resistance of conductors and insulators.
 - 06.07 Read and interpret color codes using a color chart to identify resistors.
 - 06.08 Explain voltage dividers (loaded and unloaded).

- 07.0 Demonstrate an understanding of basic electricity--The student will be able to:
 - 07.01 Explain the principles of electromagnetism.
 - 07.02 Explain the magnetic properties of circuits and devices.
 - 07.03 Relate electricity to the nature of matter.
 - 07.04 Describe various ways that electricity is produced.
 - 07.05 Explain how voltage is produced by chemical means, mechanical means, thermal means, and photoelectric means, piezoelectric means.
 - 07.06 Identify blueprint symbols.

- 08.0 Read and interpret basic electric codes--The student will be able to:

- 08.01 Describe the importance of following the local, state and national electric codes.
- 08.02 Read and interpret basic electric codes, wiring plans and specifications.
- 08.03 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.

09.0 Install residential wiring--The student will be able to:

- 09.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
- 09.02 Draw a residential wiring plan, using electrical-wiring symbols.
- 09.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
- 09.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.
- 09.05 Install and wire a low-voltage signal system.
- 09.06 Install conduit systems.
- 09.07 Provide power for heating, ventilation, and air-conditioning equipment.
- 09.08 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. service-entrance main panel
 - b. service-entrance meter base
 - c. alarm system/smoke detectors
- 09.09 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
- 09.10 Connect single-phase and three-phase transformers.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Construction Electricity Technician
Career Cluster: Architecture and Construction

CCC	
CIP Number	0646030207
Program Type	College Credit Certificate (CCC)
Program Length	24 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2111 - Electricians
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries or to supplement training for persons previously or currently employed in these occupations.

This certificate program is part of the Construction Electricity Management AAS degree program (0646030205).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to safe working conditions, understanding electricity, installing residential wiring, demonstrate specialized electrical skills, demonstrate problem solving methods encountered outside the classroom as listed in the standards.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

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

Standards

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

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions.
- 02.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 03.0 Communicate effectively.
- 04.0 Apply electricity-related basic math.
- 05.0 Demonstrate an understanding of basic electricity.
- 06.0 Read and interpret basic electric codes.
- 07.0 Demonstrate positive customer-relations skills.
- 08.0 Demonstrate proficiency in electrical math problems.
- 09.0 Demonstrate Alternating-Current (AC) circuit skills.
- 10.0 Install residential wiring.

- 11.0 Demonstrate proficiency in commercial wiring.
- 12.0 Demonstrate specialized electrical skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Construction Electricity Technician
CIP Number: 0646030207
Program Length: 24 Credit Hours
SOC Code(s): 47-2111

This certificate program is part of the Construction Electricity Management AS/AAS degree program (1646030205/0646030205). At the completion of this program, the student will be able to:

- 01.0 Identify safe working conditions at the laboratory and workplace, and observe safety precautions--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Apply lab policies and procedures for safety, including fire safety.
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Demonstrate the proper use and care of hand and power tools and equipment.
 - 01.06 Demonstrate a knowledge of CPR (Cardiopulmonary Resuscitation) and first aid.
 - 01.07 Troubleshoot residential electric circuits.
 - 01.08 Drill holes in metal, wood, and concrete for electrical wiring.
 - 01.09 Identify and select tools, equipment, materials, and wires to complete a job.
 - 01.10 Lay out electrical devices, complying with regulations.
 - 01.11 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. conductors and cable
 - b. standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 02.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 02.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 02.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 02.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 02.04 Draw each type of circuit and calculate the circuit values.
 - 02.05 Explain and apply Ohm's Law.
 - 02.06 Compute conductance and resistance of conductors and insulators.
 - 02.07 Read and interpret color codes using a color chart to identify resistors.
 - 02.08 Explain voltage dividers (loaded and unloaded).
- 03.0 Communicate effectively--The student will be able to:

- 03.01 Ask and answer questions coherently and concisely.
- 03.02 Read and follow written instructions and listen to and follow oral instructions.
- 03.03 Give reports orally and in writing.

- 04.0 Apply electricity-related basic math--The student will be able to:
 - 04.01 Solve basic-math problems related to electrical work.
 - 04.02 Convert units of measurement between the English system and the metric system.
 - 04.03 Use scientific notation.
 - 04.04 Demonstrate proficiency with a calculator.
 - 04.05 Solve basic algebraic formulas related to electricity.
 - 04.06 Solve basic trigonometric functions related to electrical theory.

- 05.0 Demonstrate an understanding of basic electricity--The student will be able to:
 - 05.01 Explain the principles of electromagnetism.
 - 05.02 Explain the magnetic properties of circuits and devices.
 - 05.03 Relate electricity to the nature of matter.
 - 05.04 Describe various ways that electricity is produced.
 - 05.05 Explain how voltage is produced by chemical means, mechanical means, thermal means, and photoelectric means, piezoelectric means.
 - 05.06 Identify blueprint symbols.

- 06.0 Read and interpret basic electric codes--The student will be able to:
 - 06.01 Describe the importance of following the local, state and national electric codes.
 - 06.02 Read and interpret basic electric codes, wiring plans and specifications.
 - 06.03 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.

- 07.0 Apply electricity-related basic math--The student will be able to:
 - 07.01 Solve math problems related to electrical work.
 - 07.02 Convert units of measurement between the English system and the metric system.
 - 07.03 Use scientific notation.
 - 07.04 Demonstrate proficiency with a calculator.
 - 07.05 Solve basic algebraic formulas related to electricity.
 - 07.06 Solve basic trigonometric functions related to electrical theory.

- 08.0 Demonstrate Alternating-Current (AC) circuit skills--The student will be able to:
 - 08.01 Identify the physical and electrical characteristics of capacitors and inductors.
 - 08.02 Demonstrate proficiency in measuring, testing and connecting a transformer.
 - 08.03 Apply the principles of transformers to AC circuits.
 - 08.04 Identify the properties of an AC signal.
 - 08.05 Identify AC sources.
 - 08.06 Analyze and apply the principles of transformers to AC circuits.
 - 08.07 Analyze polyphase circuits.

08.08 Install a simple polyphase circuit.

09.0 Install residential wiring--The student will be able to:

- 09.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
- 09.02 Draw a residential wiring plan, using electrical-wiring symbols.
- 09.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
- 09.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.
- 09.05 Install and wire a low-voltage signal system.
- 09.06 Install conduit systems.
- 09.07 Provide power for heating, ventilation, and air-conditioning equipment.
- 09.08 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. service-entrance main panel
 - b. service-entrance meter base
 - c. alarm system/smoke detectors
- 09.09 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
- 09.10 Connect single-phase and three-phase transformers.

10.0 Demonstrate proficiency in commercial wiring--The student will be able to:

- 10.01 Read and interpret a commercial wiring plan and specifications.
- 10.02 Draw a commercial electrical-wiring plan.
- 10.03 Select tools, equipment, materials, and wires to complete a job.
- 10.04 Install the following according to the plan and specifications, complying with appropriate electric codes:
 - a. wire mold
 - b. conduit, duct, and raceway systems
 - c. conductors in a conduit
- 10.05 Describe the difference between a residential and a commercial lighting circuit.
- 10.06 Construct control circuits from schematics.
- 10.07 Demonstrate knowledge of installing wiring in hazardous areas.
- 10.08 Explain a commercial three-phase receptacle circuit, and an emergency-lighting system.
- 10.09 Explain commercial-service-entrance requirements.

11.0 Demonstrate specialized electrical skills--The student will be able to:

- 11.01 Explain solid-state control devices.
- 11.02 Explain data cable installation according to the plan and specifications.

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**Florida Department of Education
Curriculum Framework**

Program Title: Architectural Design and Construction Technology
Career Cluster: Architecture and Construction

AS	
CIP Number	1604090100
Program Type	College Credit
Standard Length	66 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 – Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as construction planners, or to provide supplemental training for persons previously or currently employed in these occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to , communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, assisting architects and architectural engineers in planning and designing structures, using construction materials, and dealing with contracts and specifications.

Program Structure

This program is a planned sequence of instruction consisting of 66 credit hours.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Architectural Design and Construction industry;

planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 66 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Sustainable Design (0630330106) – 19 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select, apply, and maintain drafting and graphic materials and equipment.
- 03.0 Identify construction materials and their application.
- 04.0 Interpret drawings and documents.
- 05.0 Interpret and apply basic principles of architectural and engineering design.
- 06.0 Interpret and apply codes, regulations, and technical literature.
- 07.0 Produce architectural working drawings.
- 08.0 Produce structural drawings in steel and concrete.
- 09.0 Prepare subcontractor shop drawings.
- 10.0 Survey and assess construction sites.
- 11.0 Estimate basic quantities.
- 12.0 Perform office and administrative procedures.
- 13.0 Demonstrate appropriate communication skills.
- 14.0 Demonstrate appropriate math skills.
- 15.0 Demonstrate appropriate understanding of basic science.
- 16.0 Demonstrate employability skills.
- 17.0 Demonstrate an understanding of entrepreneurship.
- 18.0 Explain sustainability issues related to the design, construction and maintenance of the built environment.

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**Florida Department of Education
Student Performance Standards**

Program Title: Architectural Design and Construction Technology
CIP Number: 1604090100
Program Length: 66 Credit Hours
SOC Code(s): 17-3011

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Communicate effectively--The student will be able to:

- 01.01 Identify communication channels in organizations.
- 01.02 Develop and use effective means of communications.
- 01.03 Develop an effective working relationship with others.
- 01.04 Prepare business correspondence, memos, and reports.
- 01.05 Use electronic communication technologies such as email, text messaging and social networking appropriately.
- 01.06 Compose clear and concise oral and written technical reports and presentations.
- 01.07 Participate in technical discussion and meetings.

02.0 Identify, select, apply, and maintain drafting and graphic materials, and equipment--The student will be able to:

- 02.01 Apply functions of light table.
- 02.02 Use architectural and engineering scales.
- 02.03 Identify and select drawing materials.
- 02.04 Select, apply, and maintain basic drawing instruments including both table top tools (triangles, compass, etc.) and computer hardware devices and software programs.
- 02.05 Identify, apply, and maintain lettering instruments.
- 02.06 Identify and select leads, lead holders, sharpeners and erasers.
- 02.07 Identify and select reproduction materials.
- 02.08 Identify, operate, and maintain reproduction equipment.
- 02.09 Select and apply architectural and engineering curves and templates.
- 02.10 Set up and maintain drafting machine, T square, and parallel rule.
- 02.11 Identify, select, and apply commercial press on graphic materials.
- 02.12 Operate and maintain inking equipment and materials.
- 02.13 Identify, select, and apply color markers and pencils.
- 02.14 Identify, select, and apply water base colors.
- 02.15 Select and apply scribing materials and instruments.
- 02.16 Operate calculators.
- 02.17 Measure area using planimeter.
- 02.18 Identify and apply metric system.
- 02.19 Identify, operate, and maintain photography equipment.
- 02.20 Apply photographic techniques.
- 02.21 Apply and develop lettering and drawing techniques.

03.0 Identify construction materials and their application--The student will be able to:

- 03.01 Identify formwork materials and methods.
- 03.02 Identify concrete materials and applications.
- 03.03 Identify reinforcing steel and applications.
- 03.04 Identify structural steel shapes and applications.
- 03.05 Identify waterproofing materials and vapor barriers and applications.
- 03.06 Identify wood construction materials and applications.
- 03.07 Identify masonry materials and applications.
- 03.08 Identify exterior finishes and applications.
- 03.09 Identify insulation materials and applications.
- 03.10 Identify glass and glazing materials and applications.
- 03.11 Identify roofing materials and applications.
- 03.12 Identify flashings and applications.
- 03.13 Identify adhesives and sealants and applications.
- 03.14 Identify floor finish materials and applications.
- 03.15 Identify wall finish materials and applications.
- 03.16 Identify ceiling finish materials and applications.
- 03.17 Identify plastic materials and applications.
- 03.18 Identify miscellaneous metals and applications.
- 03.19 Identify millwork and applications.
- 03.20 Identify finish hardware and applications.
- 03.21 Identify manufactured specialties and applications.
- 03.22 Identify basic electrical components.
- 03.23 Identify basic HVAC components.
- 03.24 Identify basic plumbing components.
- 03.25 Identify paving materials and applications.
- 03.26 Identify fire proofing materials and applications.
- 03.27 Identify applications of pre-engineered and prefabricated structures.

04.0 Interpret drawings and documents--The student will be able to:

- 04.01 Interpret technical symbols.
- 04.02 Interpret topographical drawings.
- 04.03 Interpret aerial photographs and maps.
- 04.04 Interpret site drawings.
- 04.05 Interpret architectural drawings.
- 04.06 Interpret specifications.
- 04.07 Interpret addendums.
- 04.08 Interpret notice of change and change orders.
- 04.09 Interpret shop drawings.
- 04.10 Interpret structural drawings.
- 04.11 Interpret mechanical drawings.
- 04.12 Interpret electrical drawings.
- 04.13 Interpret modular approach to buildings.
- 04.14 Identify and interpret contracts.
- 04.15 Identify and interpret liens.
- 04.16 Interpret deeds.
- 04.17 Interpret master and development plans and documents

05.0 Interpret and apply basic principles of architectural and engineering design--The student will be able to:

- 05.01 Conduct and interpret concrete slump test.
- 05.02 Take test cylinder and interpret results.
- 05.03 Interpret soil analysis reports.
- 05.04 Interpret compaction test reports.
- 05.05 Interpret theory of loads.
- 05.06 Determine effect of loads on materials.
- 05.07 Interpret principles of expansion and contraction and control
- 05.08 Interpret and apply fundamentals of site requirements.
- 05.09 Determine and apply space relationships.

06.0 Interpret and apply codes, regulations, and technical literature--The student will be able to:

- 06.01 Interpret and apply graphic and time saver standards.
- 06.02 Interpret and apply local, state, national and international building codes including the Florida Building Codes, the Life Safety Code (NFPA 101), the National Electric Code (NFPA 70), the International Building Code (IBC), etc.
- 06.03 Interpret and apply municipal codes and regulations.
- 06.04 Interpret zoning bylaws and regulations.
- 06.05 Interpret zoning maps.
- 06.06 Interpret trade magazines and catalogs.
- 06.07 Interpret trade manuals.
- 06.08 Interpret yardstick costing manual.
- 06.09 Interpret and apply construction association regulations.

07.0 Produce architectural working drawings--The student will be able to:

- 07.01 Prepare floor plan drawings.
- 07.02 Prepare foundation plan and detail drawings.
- 07.03 Prepare elevation drawings.
- 07.04 Prepare landscape layouts.
- 07.05 Prepare schedules.
- 07.06 Prepare sections.
- 07.07 Build architectural models.
- 07.08 Prepare truss drawings.
- 07.09 Prepare stairway drawings.
- 07.10 Prepare fireplace drawings.
- 07.11 Prepare plot plan drawings.

08.0 Produce structural drawings in steel and concrete--The student will be able to:

- 08.01 Draw beam connections.
- 08.02 Draw structural assemblies.
- 08.03 Prepare erection plans.
- 08.04 Prepare structural drawings.
- 08.05 Make take-offs from reinforced concrete engineering drawings.
- 08.06 Prepare footing and foundation drawings.
- 08.07 Prepare column detail drawings.

- 08.08 Prepare floor and roof detail drawings.
 - 08.09 Prepare special structure detail drawings.
 - 08.10 Prepare framed beam connection drawings.
 - 08.11 Prepare stiffened seat connection drawings.
 - 08.12 Prepare bolted column detail drawings.
 - 08.13 Prepare gusset plate drawings.
- 09.0 Prepare subcontractor shop drawings--The student will be able to:
- 09.01 Prepare plumbing plan drawings.
 - 09.02 Prepare climate control drawings.
 - 09.03 Prepare electrical plan drawings.
- 10.0 Survey and assess construction sites--The student will be able to:
- 10.01 Select and apply measuring tapes and chains.
 - 10.02 Prepare site sketches.
 - 10.03 Apply methods of on-site measuring including traditional chains and tapes, and current satellite Global Positioning Systems (GPS).
 - 10.04 Interpret survey books, logs and electronic records including County Tax Assessor, American Land Title Association (ALTA), the United States Geological Survey (USGS), Terra Server, etc.
 - 10.05 Identify and apply basic principles of levels and rods.
 - 10.06 Identify and apply basic principles of transits.
 - 10.07 Interpret angular and distance measurements to bearings and azimuth.
 - 10.08 Outline basics of site meetings and inspection.
- 11.0 Estimate basic quantities--The student will be able to:
- 11.01 Compute area and volume of buildings.
 - 11.02 Estimate quantities of excavation and fill.
 - 11.03 Take off quantities of form work.
 - 11.04 Take off quantities of concrete.
 - 11.05 Take off quantities of lumber.
 - 11.06 Take off quantities of masonry.
 - 11.07 Interpret and complete standard estimator's form.
 - 11.08 Apply the use of computer estimating software.
- 12.0 Perform office and administrative procedures--The student will be able to:
- 12.01 Organize and maintain personal work area.
 - 12.02 Operate office equipment.
 - 12.03 Estimate, order, and maintain drafting supplies.
 - 12.04 Maintain file drawing systems.
 - 12.05 Maintain record of building costs.
 - 12.06 Develop and maintain technical reference library.
 - 12.07 Identify basic project management systems.
 - 12.08 Use scheduling software.
- 13.0 Demonstrate appropriate communication skills--The student will be able to:

- 13.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
 - 13.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 13.03 Read and follow written and oral instructions.
 - 13.04 Answer and ask questions coherently and concisely.
 - 13.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
 - 13.06 Demonstrate appropriate telephone/communication skills.
- 14.0 Demonstrate appropriate math skills--The student will be able to:
- 14.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 14.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 14.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 14.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 14.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 15.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 15.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 15.02 Draw conclusions or make inferences from data.
 - 15.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
 - 15.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 16.0 Demonstrate employability skills--The student will be able to:
- 16.01 Conduct a job search.
 - 16.02 Secure information about a job.
 - 16.03 Identify documents which may be required when applying for a job interview.
 - 16.04 Write a resume, cover letter and fill out a typical job application form.
 - 16.05 Demonstrate competence in job interview techniques.
 - 16.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
 - 16.07 Identify acceptable work habits.
 - 16.08 Demonstrate knowledge of how to make job changes appropriately.
 - 16.09 Demonstrate acceptable employee health habits.
- 17.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 17.01 Define entrepreneurship.
 - 17.02 Describe the importance of entrepreneurship to the American economy.
 - 17.03 List the advantages and disadvantages of business ownership.
 - 17.04 Identify the risks involved in ownership of a business.

- 17.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 17.06 Identify the business skills needed to operate a small business efficiently and effectively.

- 18.0 Explain sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
 - 18.01 Describe the impact of the construction industry on the natural environment.
 - 18.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 18.03 Identify and analyze sustainable alternatives to conventional construction practices.
 - 18.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 18.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 18.06 Identify design features, construction activities and maintenance practices that contribute to a project's overall sustainability.

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**Florida Department of Education
Curriculum Framework**

Program Title: Building Construction Technology
Career Cluster: Architecture and Construction

AS	
CIP Number	1615100101
Program Type	College Credit
Standard Length	64 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	11-9021 - Construction Managers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as a construction manager, or to provide supplemental training for persons previously or currently employed in these occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, construction practices, building codes, blueprint reading, personnel and resource management skills, safety, site selection and planning and building residential and commercial structures.

Program Structure

This program is a planned sequence of instruction consisting of 64 credit hours.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Construction industry; planning, management,

finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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..

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Carpentry (I460202 / 0646020105) – 3 credits
Carpentry (C510100 / 0646020111) – 3 credits
Carpentry (C510200 / 0646020112) – 3 credits

Plumbing (I460513 / 0646050302) – 3 credits
Brick and Block (I463112 / 0646010203) – 3 credits
Building Construction Technologies (I460401 / 0646040102) – 3 credits

Electrician (I460314 / 064603020) – 3 credits

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

NCCER Construction Technology (NCCER008) – 3 credits

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Building Construction Specialist (0615100103) – 18 Credit Hours

Green Building Construction Technology (0615100104) – 24 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select and supervise application of construction materials.
- 03.0 Draw, read and interpret drawings and specifications.
- 04.0 Interpret and apply codes, regulations, and contract documents.
- 05.0 Survey and investigate construction sites.
- 06.0 Select and maintain construction site tools and equipment.
- 07.0 Interpret basic designs and apply sound construction principles.
- 08.0 Take off quantities and estimate costs.
- 09.0 Plan, coordinate, schedule and control projects.
- 10.0 Perform tests and inspections.
- 11.0 Select, train and supervise personnel.
- 12.0 Demonstrate efficient office and administrative procedures.
- 13.0 Demonstrate appropriate math skills.
- 14.0 Demonstrate appropriate understanding of basic science.
- 15.0 Demonstrate employability skills.
- 16.0 Demonstrate an understanding of entrepreneurship.

- 17.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.

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**Florida Department of Education
Student Performance Standards**

Program Title: Building Construction Technology
CIP Number: 1615100101
Program Length: 64 Credit Hours
SOC Code(s): 11-9021

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Communicate effectively--The student will be able to:

- 01.01 Maintain notice board.
- 01.02 Maintain job diary.
- 01.03 Prepare inter-office memos.
- 01.04 Prepare business correspondence.
- 01.05 Set-up surveyors field book.
- 01.06 Prepare daily project report.
- 01.07 Prepare requisitions for equipment and materials.
- 01.08 Write specifications for equipment purchase.
- 01.09 Prepare minutes from job-site meetings.
- 01.10 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
- 01.11 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 01.12 Read and follow written and oral instructions.
- 01.13 Answer and ask questions coherently and concisely.
- 01.14 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 01.15 Demonstrate appropriate telephone/communication skills.

02.0 Identify, select, and supervise application of construction materials--The student will be able to:

- 02.01 Select cleaning materials.
- 02.02 Select soils.
- 02.03 Identify soil types.
- 02.04 Select wood framing.
- 02.05 Select rough hardware.
- 02.06 Select waterproofing and protective coatings.
- 02.07 Select insulation and vapor barriers.
- 02.08 Select ceiling finishes and wall finishes.
- 02.09 Select form work materials.
- 02.10 Select concrete.
- 02.11 Select windows and doors.
- 02.12 Select adhesives and sealants.
- 02.13 Select roofing materials.

- 02.14 Select sheet metal materials.
- 02.15 Select mill work.
- 02.16 Select painting and decorating materials.
- 02.17 Select miscellaneous metals.
- 02.18 Select asphaltic materials.
- 02.19 Select masonry materials.
- 02.20 Select manufactured specialties.
- 02.21 Select reinforcing concrete materials.
- 02.22 Select structural steel.
- 02.23 Select finishing hardware.
- 02.24 Select foundation piling and casing materials.
- 02.25 Select precast concrete materials.
- 02.26 Select plumbing and drainage material.
- 02.27 Select electrical components and equipment.
- 02.28 Identify mechanical components and equipment.

03.0 Draw, read and interpret drawings and specifications--The student will be able to:

- 03.01 Identify, select and use drafting instruments.
- 03.02 Use technical lettering.
- 03.03 Identify and use architectural symbols.
- 03.04 Use drafting reproduction equipment.
- 03.05 Take site notes and measurements.
- 03.06 Identify and use electrical symbols.
- 03.07 Prepare site sketches.
- 03.08 Identify and use mechanical symbols.
- 03.09 Identify and use topographical symbols.
- 03.10 Interpret land surveyor's notes.
- 03.11 Prepare topographic drawings.
- 03.12 Prepare working sketches and "as built" drawings.
- 03.13 Prepare architectural drawings.
- 03.14 Interpret architectural drawings and specifications.
- 03.15 Evaluate finishing hardware schedules.
- 03.16 Prepare structural drawings.
- 03.17 Interpret structural drawings and specifications.
- 03.18 Interpret reinforcing steel drawings and bar list.
- 03.19 Interpret and apply ASTM standards.
- 03.20 Interpret and apply CSA standards.
- 03.21 Prepare presentation drawings.
- 03.22 Evaluate shop drawings.
- 03.23 Prepare mechanical drawings.
- 03.24 Interpret mechanical drawings and specifications.
- 03.25 Prepare electrical drawings.
- 03.26 Interpret electrical drawings and specifications.

04.0 Interpret and apply laws, codes, regulations, and contract documents--The student will be able to:

- 04.01 Interpret federal and state safety codes.
- 04.02 Interpret pre-qualification documents.
- 04.03 Interpret, apply, and control addenda.

- 04.04 Interpret bonding insurance procedures.
- 04.05 Interpret, apply, and control change orders.
- 04.06 Interpret and apply state standard building code.
- 04.07 Interpret and apply workmen's compensation requirements.
- 04.08 Interpret and apply standard form of tender.
- 04.09 Compile a complete set of contract documents.
- 04.10 Interpret and apply contracts and mechanics lien act.

05.0 Survey and investigate construction sites--The student will be able to:

- 05.01 Lay out and measure site.
- 05.02 Use surveying rods.
- 05.03 Make measurements utilizing surveying rods and levels.
- 05.04 Make measurement using transit.
- 05.05 Survey construction sites.
- 05.06 Evaluate site and existing services for services required.
- 05.07 Survey and lay out building lines and levels.
- 05.08 Use digital and electronic survey equipment.
- 05.09 Identify types of sub surface investigations.
- 05.10 Determine sample requirements.
- 05.11 Conduct soil test.
- 05.12 Interpret soil reports.
- 05.13 Conduct vane shear test.
- 05.14 Compile boring log.

06.0 Select and maintain construction site tools and equipment—The student will be able to:

- 06.01 Select fire equipment.
- 06.02 Select and maintain safety equipment.
- 06.03 Select cleaning equipment.
- 06.04 Select miscellaneous small tools.
- 06.05 Select and maintain shop and power tools.
- 06.06 Select surveying equipment.
- 06.07 Select concrete finishing equipment.
- 06.08 Select plaster and mortar mixing equipment.
- 06.09 Select and maintain temporary site offices, storage, and restroom facilities.
- 06.10 Select temporary building enclosures.
- 06.11 Select concrete placing equipment.
- 06.12 Prepare equipment service schedules.
- 06.13 Evaluate type and size of earth moving equipment needed for the project.
- 06.14 Select and maintain construction site communication equipment.
- 06.15 Select concrete batching and mixing equipment.
- 06.16 Select compaction equipment.
- 06.17 Identify pile driving and earth boring equipment.
- 06.18 Select and maintain temporary power and lighting equipment.
- 06.19 Select and maintain temporary water services.
- 06.20 Select demolition equipment.
- 06.21 Select balance of power and plant equipment.

07.0 Interpret basic designs and apply construction principles--The student will be able to:

- 07.01 Design, erect and maintain staging, scaffolding and falsework.
- 07.02 Coordinate and supervise resilient flooring.
- 07.03 Coordinate and supervise painting and finishes.
- 07.04 Coordinate and supervise windows and doors.
- 07.05 Coordinate and supervise carpentry and millwork.
- 07.06 Coordinate and supervise concrete and formwork.
- 07.07 Coordinate and supervise miscellaneous roofing and sheet metal.
- 07.08 Coordinate and supervise miscellaneous metal.
- 07.09 Plan and coordinate excavation and foundation work.
- 07.10 Coordinate and supervise lath and plaster and dry wall.
- 07.11 Identify modular and prefabricated applications.
- 07.12 Coordinate and supervise masonry work.
- 07.13 Coordinate and supervise tile and terrazzo.
- 07.14 Design concrete mix.
- 07.15 Determine strength of concrete.
- 07.16 Calculate temporary electrical power requirements.
- 07.17 Design asphaltic hot mix.
- 07.18 Design pavement structure.
- 07.19 Calculate modules of electricity.
- 07.20 Determine moments of inertia.
- 07.21 Calculate shears and bending moments.
- 07.22 Calculate deflection.
- 07.23 Calculate columns.
- 07.24 Determine strength of lumber.
- 07.25 Determine strength of steel.
- 07.26 Design forms and supports.
- 07.27 Coordinate and supervise structural steel work.
- 07.28 Coordinate and supervise mechanical work.
- 07.29 Coordinate and supervise elevator installation.
- 07.30 Coordinate and supervise electrical installation.

08.0 Take off quantities and estimate cost--The student will be able to:

- 08.01 Make calculations.
- 08.02 Estimate quantities of concrete.
- 08.03 Compile lists of sub-trades for project.
- 08.04 Take off quantities of paving.
- 08.05 Estimate quantities of rough carpentry.
- 08.06 Obtain and build up material costs.
- 08.07 Interpret contract document.
- 08.08 Estimate quantities of framework.
- 08.09 Estimate quantities of excavation and fill.
- 08.10 Estimate quantities of landscaping.
- 08.11 Call sub trade tenders.
- 08.12 Take off quantities of miscellaneous metals.
- 08.13 Take off quantities of millwork.
- 08.14 Take off quantities of structural steel.
- 08.15 Take off quantities of manufactured specialties.
- 08.16 Analyze and project plant and equipment costs.
- 08.17 Analyze and project general condition costs.
- 08.18 Analyze and project labor unit costs.

- 08.19 Estimate quantities of reinforcing steel.
- 08.20 Estimate quantities of masonry.
- 08.21 Analyze and project site overhead costs.
- 08.22 Evaluate sub trade bids.
- 08.23 Summarize project cost and complete tenders prices.

09.0 Plan, coordinate, schedule and control projects--The student will be able to:

- 09.01 Prepare daily time sheets.
- 09.02 Record and control materials received.
- 09.03 Allocate efficient use of site space.
- 09.04 Maintain clean and orderly construction site.
- 09.05 Store materials and equipment.
- 09.06 Describe units of work measurement.
- 09.07 Coordinate and control use of construction tools and equipment.
- 09.08 Prepare progress billing.
- 09.09 Store chemicals and paints.
- 09.10 Prepare work schedules.
- 09.11 Prepare material delivery schedules.
- 09.12 Expedite delivery of manufactured materials.
- 09.13 Analyze productivity.
- 09.14 Prepare sub-trades schedules.
- 09.15 Prepare and code daily costs.
- 09.16 Record deficiencies as a result of project inspections.
- 09.17 Prepare coded cost break downs.
- 09.18 Take appropriate action to correct project deficiencies.
- 09.19 Interpret computer output.
- 09.20 Prepare cash flow schedules.
- 09.21 Prepare schedules for computer input.
- 09.22 Develop and maintain coded cost systems.
- 09.23 Prepare critical path schedule.
- 09.24 Monitor schedule to control project.

10.0 Perform tests and inspections--The student will be able to:

- 10.01 Conduct concrete impact hammer test.
- 10.02 Conduct concrete slump test.
- 10.03 Conduct concrete air content test.
- 10.04 Conduct sieve and hydrometer analysis test.
- 10.05 Conduct concrete unit weight test.
- 10.06 Conduct unit weight of aggregate test.
- 10.07 Calculate fineness modules.
- 10.08 Conduct lumber moisture content test.
- 10.09 Conduct liquid and plastics limits tests.
- 10.10 Check concrete placing and consolidation procedures.
- 10.11 Conduct moisture content test on soil.
- 10.12 Check form work.
- 10.13 Conduct moisture density test.
- 10.14 Calculate percentage of compaction.
- 10.15 Conduct density of material in place tests.
- 10.16 Sample, make, cure and test concrete compressive strength specimen.

- 10.17 Conduct chemical analysis of water.
- 10.18 Check reinforcing steel and placing.
- 10.19 Inspect placing of fill and compaction procedures.
- 10.20 Conduct compressive strength test on concrete blocks.
- 10.21 Conduct roofing test.
- 10.22 Make mortar cubes and perform compressive strength test.
- 10.23 Conduct soundness test.
- 10.24 Conduct specific gravity tests.
- 10.25 Sample, make, cure and test flexural strength specimen.
- 10.26 Prepare Marshall Test specimens.
- 10.27 Conduct unconfined compression test.
- 10.28 Conduct density test of Marshall Test specimens.
- 10.29 Calculate air voids and VMA values.
- 10.30 Calculate bitumen extraction test.
- 10.31 Conduct CBR test.
- 10.32 Conduct California sand equivalent test.
- 10.33 Conduct Rice specific gravity tests.
- 10.34 Conduct Marshall Stability and Flow tests.
- 10.35 Check asphalt mixing plant.
- 10.36 Conduct abrasion test.
- 10.37 Conduct permeability test.
- 10.38 Conduct triaxial compression test.
- 10.39 Verify data from tests conducted by independent testing companies.

11.0 Select, train, and supervise personnel--The student will be able to:

- 11.01 Apply first aid.
- 11.02 Instruct new employee on company safety regulations.
- 11.03 Interpret basic company policies.
- 11.04 Select and hire employees.
- 11.05 Interview and evaluate perspective employees.
- 11.06 Evaluate employees' performance.
- 11.07 Write job description.
- 11.08 Evaluate employee grievance.
- 11.09 Interpret labor contracts.

12.0 Demonstrate efficient office procedures--The student will be able to:

- 12.01 Organize work area.
- 12.02 Select and use appropriate forms.
- 12.03 Develop and maintain filing system.
- 12.04 Maintain inventory of physical assets.
- 12.05 Set up and maintain technical reference library.
- 12.06 Maintain a system for field work authorizations.
- 12.07 Maintain a system for control and processing contract changes.
- 12.08 Maintain a system for back charges.
- 12.09 Interpret basic company accounting procedures.

13.0 Demonstrate appropriate math skills--The student will be able to:

- 13.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 13.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 13.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 13.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 13.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 14.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 14.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 14.02 Draw conclusions or make inferences from data.
 - 14.03 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.
 - 14.04 Understand pressure measurement in terms of PSI.
- 15.0 Demonstrate employability skills--The student will be able to:
- 15.01 Conduct a job search.
 - 15.02 Secure information about a job.
 - 15.03 Identify documents which may be required when applying for a job interview.
 - 15.04 Complete a job application.
 - 15.05 Demonstrate competence in job interview techniques.
 - 15.06 Identify or demonstrate responses to criticism in the workplace.
 - 15.07 Identify acceptable work habits.
 - 15.08 Demonstrate knowledge of how to make job transitions.
 - 15.09 Demonstrate acceptable employee health habits.
- 16.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 16.01 Define entrepreneurship.
 - 16.02 Describe the importance of entrepreneurship to the American economy.
 - 16.03 List the advantages and disadvantages of business ownership.
 - 16.04 Identify the risks involved in ownership of a business.
 - 16.05 Identify the necessary personal characteristics of a successful entrepreneur.
 - 16.06 Identify the business skills needed to operate a small business efficiently and effectively.
- 17.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 17.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
 - 17.02 Identify and locate the Material Safety Data Sheets (MSDS) and follow the procedures as necessary.
 - 17.03 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)

- 17.04 Identify and use safety equipment.
- 17.05 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
- 17.06 Explain emergency procedures to follow in response to workplace accidents.
- 17.07 Create a disaster and/or emergency response plan.

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**Florida Department of Education
Curriculum Framework**

Program Title: Drafting and Design Technology
Career Cluster: Architecture and Construction

AS	
CIP Number	1615130102
Program Type	College Credit
Standard Length	62 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 – Architectural and Civil Drafters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as drafters or chief design drafters, or to provide supplemental training for persons previously or currently employed in these occupations. The training will be technologically advanced, thus meeting the current needs of the industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, drafting standards, math skills, and drafting office practices to assist mathematical, electrical and electronic, architectural, chemical, civil, or other engineers in the design and drafting of electrical circuits, machines, structures, weldments, or architectural plans. It also includes instruction in the preparation of engineering plans, layouts, and detailed drawings according to conventional projection principles, preparation of charts, graphs or diagrams, and the use of handbook data germane to design and drafting in various fields.

Program Structure

This program is a planned sequence of instruction consisting of 62 credit hours.

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

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Architectural Drafting (I480112 / 0615020200) – 12 credits
Mechanical Drafting (I480116 / 0615020200) – 12 credits
Structural Drafting (I480113 / 0615020200) – 12 credits

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 62 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

AutoCAD Foundations (0615130204) – 14 Credit Hours
Drafting Design (0615130101) -- 22 Credit Hours
Fire Sprinkler Design Technology (0615130105) -- 18 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Apply basic drafting skills.
- 02.0 Prepare mechanical drawings.
- 03.0 Prepare electrical/electronic drawings.
- 04.0 Prepare civil drafting drawings.
- 05.0 Prepare advanced civil drafting drawings.
- 06.0 Demonstrate understanding of Geographic Information System (GIS).
- 07.0 Prepare pneumatic/hydraulic drawings (optional).
- 08.0 Apply technical mathematics.
- 09.0 Prepare architectural drawings.
- 10.0 Prepare computer-aided drawings.
- 11.0 Demonstrate appropriate communication skills.
- 12.0 Demonstrate appropriate understanding of basic science.
- 13.0 Demonstrate employability skills.
- 14.0 Demonstrate an understanding of entrepreneurship (optional).
- 15.0 Convert CAD drawings to web format (optional).

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**Florida Department of Education
Student Performance Standards**

Program Title: Drafting and Design Technology
CIP Number: 1615130102
Program Length: 62 Credit Hours
SOC Code(s): 17-3011

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Apply basic drafting skills -- The student should be able to:

- 01.01 Apply safety practices.
- 01.02 Operate drafting instruments.
- 01.03 Perform lettering techniques.
- 01.04 Prepare multi-view drawings.
- 01.05 Prepare advanced civil drawings.
- 01.06 Prepare sectional views.
- 01.07 Prepare auxiliary views.
- 01.07 Prepare dimension drawings.
- 01.08 Prepare pictorial drawings.
- 01.09 Prepare sketches.
- 01.10 Prepare title blocks and other formats.
- 01.11 Compile a portfolio.
- 01.12 Read and understand fire sprinkler system blueprints (optional).
- 01.13 Demonstrate an understanding of basic fire sprinkler design (optional).

02.0 Prepare mechanical drawings -- The student should be able to:

- 02.01 Prepare fastener drawings.
- 02.02 Prepare cam drawings (optional).
- 02.03 Prepare gear drawings (optional).
- 02.04 Prepare assembly drawings.
- 02.05 Prepare detail drawings.
- 02.06 Prepare surface developments.
- 02.07 Prepare technical drawings.
- 02.08 Prepare welding drawings.
- 02.09 Prepare bearing drawings (optional).
- 02.10 Prepare spring drawings.
- 02.11 Prepare casting drawings.
- 02.12 Prepare forging drawings (optional).
- 02.13 Prepare tool drawings (optional).
- 02.14 Prepare molding diagrams (optional).
- 02.15 Prepare stamping drawings (optional).
- 02.16 Prepare numerical-control drawings (optional).
- 02.17 Prepare computer-aided drawings.
- 02.18 Modify drawings to include material specifications and parts list.

- 02.19 Identify geometric tolerances and dimensioning of specific machined surfaces.
- 03.0 Prepare electrical/electronic drawings -- The student should be able to:
 - 03.01 Prepare schematic drawings.
 - 03.02 Prepare printed circuit board assembly drawing packages.
 - 03.03 Prepare connection drawings.
 - 03.04 Prepare interconnection drawings.
 - 03.05 Prepare wiring drawings.
 - 03.06 Prepare cable drawings and/ or harness drawings.
 - 03.07 Prepare component drawings.
 - 03.08 Prepare logic diagrams.
- 04.0 Prepare civil drafting drawings - The student should be able to:
 - 04.01 Demonstrate an understanding of civil drafting.
 - 04.02 Demonstrate knowledge of surveying fundamentals.
 - 04.03 Demonstrate an understanding of mapping scales.
 - 04.04 Demonstrate knowledge of legal descriptions and plot plans.
 - 04.05 Demonstrate an understanding of contour lines.
 - 04.06 Demonstrate knowledge of profiles.
 - 04.07 Demonstrate knowledge of highway layouts.
 - 04.08 Demonstrate an understanding of Earth Work.
- 05.0 Prepare advanced civil drafting drawings -- The student should be able to:
 - 05.01 Demonstrate an understanding of Curve Data.
 - 05.02 Demonstrate an understanding of Parcels.
 - 05.03 Demonstrate an understanding of Surfaces.
 - 05.04 Demonstrate an understanding of basic structural drawings and detailing conventions.
 - 05.05 Demonstrate an understanding of basic fastening systems used with common materials and manufacturing (metals and wood).
- 06.0 Demonstrate understanding of Geographic Information System (GIS) -- The student should be able to:
 - 06.01 Demonstrate a basic knowledge of GIS.
 - 06.02 Demonstrate an understanding of Global Positioning Systems.
 - 06.03 Demonstrate an understanding of Remote Sensing.
- 07.0 Prepare pneumatic/hydraulic drawings (optional) -- The student should be able to:
 - 07.01 Prepare piping drawings.
 - 07.02 Prepare pump and motor drawings.
 - 07.03 Prepare cylinder and piston diagrams.
 - 07.04 Prepare valve drawings.
 - 07.05 Prepare pump section drawings.
 - 07.06 Prepare pulley and chain-drive drawings.
 - 07.07 Understand the requirements of spacing, location and position of sprinkler heads (optional).

- 07.08 Design a fire sprinkler system in high-rise building (optional).
- 07.09 Design a fire sprinkler system for water tanks, aircraft hangers and standpipe systems (optional).
- 07.10 Design a fire sprinkler system for a high-pile storage area and a rack storage area (optional).
- 07.11 Design a fire sprinkler system for a fire pump and identify its use (optional).

08.0 Apply technical mathematics -- The student should be able to:

- 08.01 Solve arithmetic problems.
- 08.02 Solve algebra problems.
- 08.03 Solve trigonometry problems.
- 08.04 Solve geometry problems.
- 08.05 Solve surveying problems.
- 08.06 Read and understand hydraulic calculations as applied to fire sprinkler systems (optional).
- 08.07 Learn the basic principles of hydraulics (optional).
- 08.08 Calculate the required GPM required for fire sprinkler systems (optional).
- 08.09 Incorporate hydraulic calculations into the design of a sprinkler system (optional).
- 08.10 Understand different pipe size and connection points (optional).

09.0 Prepare architectural drawings -- The student should be able to:

- 09.01 Prepare floor plan drawings.
- 09.02 Prepare foundation plan and detail drawings.
- 09.03 Prepare elevation drawings.
- 09.04 Prepare landscape layouts (optional).
- 09.05 Prepare schedules.
- 09.06 Prepare sections.
- 09.07 Build architectural models (optional).
- 09.08 Prepare truss drawings (optional).
- 09.09 Prepare stairway drawings (optional).
- 09.10 Prepare fireplace drawings (optional).
- 09.11 Prepare plot plan drawings.
- 09.12 Prepare plumbing plan drawings (optional).
- 09.13 Prepare climate-control drawings (optional).
- 09.14 Prepare electrical plan drawings (optional).
- 09.15 Prepare perspective and isometric drawings (optional).

10.0 Prepare computer-aided drawings -- The student should be able to:

- 10.01 Use system commands.
- 10.02 Perform drafting procedures.
- 10.03 Operate peripheral equipment.
- 10.05 Apply specialized CAD functions.
- 10.06 Apply CAD drawing standards as established and updated by the industry.
- 10.07 Construct geometric figures of lines, splines, circles, and arcs.
- 10.08 Create and edit text using appropriate style and size to annotate drawings.
- 10.09 Use and control accuracy-enhancement tools for entity-positioning methods, such as snap and XYZ.
- 10.10 Identify, create, store, and use standard part symbols and libraries.

- 10.11 Use editing commands.
 - 10.12 Control entity properties by layer, color, and line type.
 - 10.13 Use viewing commands to perform zooming and panning.
 - 10.14 Plot drawings on media using layout and scale.
 - 10.15 Minimize file size.
 - 10.16 Use query commands to interrogate database for entity characteristics, distance, area, and status.
 - 10.17 Apply standard dimensioning rules.
 - 10.18 Export CAD drawings to Web format.
 - 10.19 Demonstrate an understanding of point sources in 3-D.
- 11.0 Demonstrate appropriate communication skills -- The student should be able to:
- 11.01 Write logical and understandable statements or phrases to accurately fill out forms/invoices commonly used in business and industry.
 - 11.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
 - 11.03 Read and follow written and oral instructions.
 - 11.04 Answer and ask questions coherently and concisely.
 - 11.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
 - 11.06 Demonstrate appropriate telephone/communication skills.
- 12.0 Demonstrate appropriate understanding of basic science -- The student should be able to:
- 12.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 12.02 Draw conclusions or make inferences from data.
 - 12.03 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.
 - 12.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA (optional).
- 13.0 Demonstrate employability skills -- The student should be able to:
- 13.01 Conduct a job search.
 - 13.02 Secure information about a job.
 - 13.03 Identify documents that may be required when applying for a job interview.
 - 13.04 Complete a job application form correctly.
 - 13.05 Demonstrate competence in job interview techniques.
 - 13.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other employees.
 - 13.07 Identify acceptable work habits.
 - 13.08 Demonstrate knowledge of how to make job changes appropriately.
 - 13.09 Demonstrate acceptable employee health habits.
 - 13.10 Demonstrate an ability to prepare a work portfolio.
- 14.0 Demonstrate an understanding of entrepreneurship (optional) -- The student should be able to:

- 14.01 Define entrepreneurship.
- 14.02 Describe the importance of entrepreneurship to the American economy.
- 14.03 List the advantages and disadvantages of business ownership.
- 14.04 Identify the risks involved in ownership of a business.
- 15.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 15.06 Identify the business skills needed to operate a small business
- 15.07 Efficiently in a professional manner.

15.0 Convert CAD drawings to web format (optional) -- The student should be able to:

- 15.01 Export CAD drawings to Photoshop or other Web Painter.
- 15.02 Demonstrate an understanding of image retouching of portraits by producing digital images to incorporate those features.
- 15.03 Demonstrate knowledge of photo-masked type by producing digital images to incorporate those features.
- 15.04 Illustrate Web page design procedures.
- 15.05 Explain Web page building procedures.

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**Florida Department of Education
Curriculum Framework**

Program Title: Construction Management Technology
Career Cluster: Architecture and Construction

AS	
CIP Number	1646041200
Program Type	College Credit
Standard Length	67 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	11-9021 – Construction Managers
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as Construction Project Manager/Engineer, Estimator, Superintendent, Scheduler or Purchasing Agent

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations, employability skills, safe and efficient work practices, project planning and design, using construction materials, dealing with contracts and specifications.

Program Structure

This program is a planned sequence of instruction consisting of 67 credit hours.

This program focuses on broad transferable skills and stresses understanding and demonstration of the following elements of the Construction industry; planning, management, finance, basic principles of business, technical aspects of the construction industry, materials

and methods of construction, reading blueprints, estimating quantities of materials, procuring materials scheduling, and working in a general construction environment.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 67 credit hours according to Rule 6A-14.030, F.A.C.

Standards

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

- 01.0 Communicate effectively.
- 02.0 Identify, select, apply and maintain drafting and graphic materials and equipment.
- 03.0 Identify construction materials and their application.
- 04.0 Interpret drawings and documents.
- 05.0 Interpret and apply basic principles of Architectural Engineering and Design.
- 06.0 Interpret and apply codes, regulations and technical literature.
- 07.0 Survey and assess construction sites.
- 08.0 Estimate basic quantities.
- 09.0 Perform office and administrative procedures.
- 10.0 Demonstrate appropriate communication skills.
- 11.0 Demonstrate appropriate math skills.
- 12.0 Demonstrate appropriate understanding of basic science.
- 13.0 Demonstrate employability skills.
- 14.0 Demonstrate an understanding of entrepreneurship.
- 15.0 Schedule and coordinate work sequence.
- 16.0 Learn to effectively manage a workforce.
- 17.0 Learn to manage subcontract and material supplier contracts.
- 18.0 Learn to effectively “buy out” a project as required.
- 19.0 Demonstrate knowledge of materials and methods of construction.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Construction Management Technology
CIP Numbers: 1646041200
Program Length: 67 Credit Hours
SOC Code(s): 11-9021

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Communicate effectively--The student will be able to:
- 01.01 Identify communication channels in organizations.
 - 01.02 Develop and use effective means of communication.
 - 01.03 Develop an effective working relationship with others.
 - 01.04 Prepare business correspondence, memos and reports.
 - 01.05 Compose clear and concise oral and written technical reports and presentations.
 - 01.06 Participate in technical discussions and meetings.
- 02.0 Identify, select, apply and maintain drafting and graphic materials and equipment--The student will be able to:
- 02.01 Apply functions of a light table.
 - 02.02 Use architectural and engineering scales.
 - 02.03 Identify and select drawing materials.
 - 02.04 Select, apply and maintain basic drawing instruments.
 - 02.05 Identify, apply and maintain lettering instruments.
 - 02.06 Identify and select leads, lead holders, sharpeners and erasers.
 - 02.07 Identify and select reproduction materials.
 - 02.08 Identify, select and apply color markers and pencils.
 - 02.09 Identify, select and apply water base colors.
- 03.0 Identify construction materials and their application--The student will be able to:
- 03.01 Identify formwork materials and methods
 - 03.02 Identify concrete materials and applications.
 - 03.03 Identify reinforcing steel and applications.
 - 03.04 Identify structural steel shapes and applications.
 - 03.05 Identify waterproofing materials and vapor barriers and applications.
 - 03.06 Identify wood construction materials and applications.
 - 03.07 Identify masonry materials and applications.
 - 03.08 Identify exterior finishes and applications.
 - 03.09 Identify insulation materials and applications.
 - 03.10 Identify glass and glazing materials and applications.
 - 03.11 Identify roofing materials and applications.
 - 03.12 Identify flashings and applications.
 - 03.13 Identify adhesives, sealants and applications.

- 03.14 Identify floor finish materials and applications.
- 03.15 Identify wall finish materials and applications.
- 03.16 Identify ceiling finish materials and applications.
- 03.17 Identify plastic materials and applications.
- 03.18 Identify miscellaneous metals and applications.
- 03.19 Identify millwork and applications.
- 03.20 Identify finish hardware and applications.
- 03.21 Identify manufactures specialties and applications.
- 03.22 Identify basic electrical components.
- 03.23 Identify basic HVAC components.
- 03.24 Identify basic plumbing components.
- 03.25 Identify paving materials and applications.
- 03.26 Identify fire proofing materials and applications.
- 03.27 Identify applications of pre-engineered and pre-fabricated structures.

04.0 Interpret drawings and documents--The student will be able to:

- 04.01 Interpret technical symbols.
- 04.02 Interpret topographical drawings.
- 04.03 Interpret aerial photographs and maps.
- 04.04 Interpret site drawings.
- 04.05 Interpret architectural drawings.
- 04.06 Interpret specifications.
- 04.07 Interpret addendums.
- 04.08 Interpret notice of change and change orders.
- 04.09 Interpret shop drawings.
- 04.10 Interpret structural drawings.
- 04.11 Interpret mechanical drawings.
- 04.12 Interpret electrical drawings.
- 04.13 Interpret modular approach to buildings.
- 04.14 Identify and interpret contracts.
- 04.15 Identify and interpret liens.
- 04.16 Interpret deeds.
- 04.17 Interpret master and development plans and documents.

05.0 Interpret and apply basic principles of Architectural Engineering and Design--The student will be able to:

- 05.01 Conduct and interpret concrete slump test.
- 05.02 Take test cylinder and interpret results.
- 05.03 Interpret soil analysis reports.
- 05.04 Interpret compaction test reports.
- 05.05 Interpret theory of loads.
- 05.06 Determine effect of loads on materials.
- 05.07 Interpret principles of expansion and contraction and control.
- 05.08 Interpret and apply fundamentals of site requirements.
- 05.09 Determine and apply space relationships.

06.0 Interpret and apply codes, regulations and technical literature--The student will be able to:

- 06.01 Interpret and apply graphic and time saver standards.
- 06.02 Interpret and apply national building codes.
- 06.03 Interpret and apply municipal codes and regulations.
- 06.04 Interpret zoning bylaws and regulations.
- 06.05 Interpret zoning maps.
- 06.06 Interpret trade magazines and catalogs.
- 06.07 Interpret trade manuals.
- 06.08 Interpret and apply construction association regulations.

07.0 Survey and assess construction sites--The student will be able to:

- 07.01 Select and apply measuring tapes and chains.
- 07.02 Prepare site sketches.
- 07.03 Apply methods of site measuring.
- 07.04 Interpret survey books and logs.
- 07.05 Identify and apply basic principles of levels and rods.
- 07.06 Identify and apply basic principles of transits.
- 07.07 Interpret angular and distance measurements to bearings and azimuth.
- 07.08 Outline basics of site meetings and inspection.

08.0 Estimate basic quantities--The student will be able to:

- 08.01 Compute area and volume of buildings.
- 08.02 Estimate quantities of excavation and fill.
- 08.03 Take off quantities of form work.
- 08.04 Take off quantities of concrete.
- 08.05 Take off quantities of lumber.
- 08.06 Take off quantities of masonry.
- 08.07 Interpret and complete standard estimator forms.

09.0 Perform office and administrative procedures--The student will be able to:

- 09.01 Organize and maintain personal work area.
- 09.02 Operate office equipment.
- 09.03 Estimate, order and maintain drafting supplies.
- 09.04 Maintain file drawing systems.
- 09.05 Maintain record of building costs.
- 09.06 Develop and maintain technical reference library.
- 09.07 Identify basic project management systems.

10.0 Demonstrate appropriate communication skills--The student will be able to:

- 10.01 Write logical and understandable statements, or phrases to accurately fill out forms/invoices commonly used in business and industry.
- 10.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 10.03 Read and follow written and oral instructions.
- 10.04 Answer and ask questions coherently and concisely.
- 10.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 10.06 Demonstrate appropriate telephone/communication skills.

- 11.0 Demonstrate appropriate math skills--The student will be able to:
- 11.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
 - 11.02 Measure tolerance (s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 11.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 11.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 11.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 12.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 12.01 Understand molecular action as a result of temperature extremes, chemical reaction and moisture content.
 - 12.02 Draw conclusions or make inferences from data.
 - 12.03 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.
 - 12.04 Understand pressure measurement in terms of PSI, inches of mercury and KPA.
- 13.0 Demonstrate employability skills--The student will be able to:
- 13.01 Conduct a job search.
 - 13.02 Secure information about a job.
 - 13.03 Identify documents which may be required when applying for a job interview.
 - 13.04 Complete a job application correctly.
 - 13.05 Demonstrate competence in job interview techniques.
 - 13.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
 - 13.07 Identify acceptable work habits.
 - 13.08 Demonstrate knowledge of how to make job changes appropriately.
- 14.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 14.01 Define entrepreneurship.
 - 14.02 Describe the importance of entrepreneurship to the American economy.
 - 14.03 List the advantages and disadvantages of business ownership.
 - 14.04 Identify the risks involved in ownership of a business
 - 14.05 Identify the necessary personal characteristics of a successful entrepreneur.
 - 14.06 Identify the business skills needed to operate a small business efficiently and effectively.
- 15.0 Schedule and coordinate work sequence--The student will be able to:
- 15.01 Identify the work activities associated with a construction schedule.
 - 15.02 Identify the critical time required for each activity of work.
 - 15.03 Identify the logical sequence required to perform the work.
 - 15.04 Input the appropriate Schedule information into a computer program.

- 15.05 Incorporate estimated activity cost into the proposed CPM schedule.
- 16.0 Learn to effectively manage a workforce--The student will be able to:
 - 16.01 Interpret blueprints and determine the required staffing to perform the work.
 - 16.02 Identify the equipment required for a specific work force.
 - 16.03 Understand and guide the workforce in proper and safe methods of construction.
 - 16.04 Effectively track and document time associated with each task so that actual costs can be assigned against budgeted costs to determine profit or loss.
- 17.0 Learn to manage subcontract and material supplier contracts--The student will be able to:
 - 17.01 Identify the different types of contracts that might be involved on a particular project (AIA General Contract, Subcontracts, Material Purchase Order, Field Purchase Order, etc.)
 - 17.02 Interpret blueprints and identify scope of work within the contract format.
 - 17.03 Interpret blueprints and identify contract cost within the contract format.
 - 17.04 Interpret blueprints and identify contract schedule within contract format.
- 18.0 Learn to effectively "buy out" a project as required--The student will be able to:
 - 18.01 Interpret drawings and identify the different categories of work specified within the CSI specification format.
 - 18.02 Identify the specific areas of work and contract the scope of work accordingly.
 - 18.03 Effectively package the scope of work within a contract format.
 - 18.04 Identify the cost of each scope of work and compare to budget.
- 19.0 Demonstrate knowledge of materials and methods of construction--The student will be able to:
 - 19.01 Understand the materials and methods of construction identified with the Construction Specification Institute 16 division format: Bidding Documents; General Conditions; Site Work; Concrete; Masonry; Metals; Wood; Thermal and Moisture; Doors and Hardware; Finishes; Specialties; Equipment; Furnishings; Special Construction; Conveying System; Mechanical; and Electrical.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Plumbing Management
Career Cluster: Architecture and Construction

AS	
CIP Number	1646050304
Program Type	College Credit
Standard Length	65 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2152 - Plumbers, Pipefitters, and Steamfitters
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of pipe occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to includes communication skills, human relations and employability skills, safe and efficient work practices, building codes, blueprint reading, resource management skills, and safety.

Program Structure

This program is a planned sequence of instruction consisting of 65 credit hours

This program focuses on broad, transferable skills, stresses understanding of all aspects of the pipe industry, and demonstrates elements of the Pipe Trades industry; such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 65 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

- Plumber Assistant (0646050305) - 12 Credit Hours
- Plumbing Technician (0646050306) - 24 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Standards

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

- 01.0 Describe career and training opportunities in the pipe-trade industry.
- 02.0 Demonstrate a basic knowledge of the pipe-trade industry.
- 03.0 Identify the use and care of basic tools in the pipe-trade industry.
- 04.0 Identify safe working conditions and observe safety precautions.
- 05.0 Apply pipe-trade-related basic math.
- 06.0 Demonstrate an understanding of basic science.
- 07.0 Read and interpret blueprints and specifications.
- 08.0 Read and interpret basic pipe-trade codes.
- 09.0 Demonstrate employability skills.
- 10.0 Communicate effectively.
- 11.0 Demonstrate an understanding of entrepreneurship.
- 12.0 Demonstrate positive human relations skills.
- 13.0 Demonstrate knowledge of basic plumbing skills.
- 14.0 Cut and join pipes.
- 15.0 Demonstrate knowledge of plumbing codes.
- 16.0 Read and interpret blueprints and specifications.
- 17.0 Lay out and coordinate a job.
- 18.0 Install first rough (underground).
- 19.0 Install second rough (first floor and above).
- 20.0 Trim out plumbing.
- 21.0 Demonstrate positive customer-relations skills.
- 22.0 Demonstrate knowledge of installing hot-water-heating and circulating-systems.
- 23.0 Demonstrate knowledge of installing interceptors and separators.
- 24.0 Demonstrate knowledge of installing a storm drainage system.
- 25.0 Demonstrate an understanding of the principles of backflow cross and connection control.
- 26.0 Demonstrate knowledge of the process of installing a medical gas system.
- 27.0 Install a Liquid Propane Gas (LPG) system.
- 28.0 Repair, service, and maintain plumbing systems.
- 29.0 Demonstrate an understanding of how to connect residential plumbing to a municipal sewer line.
- 30.0 Explain and apply major concepts in physical sciences including mechanics, electricity and magnetism, periodicity and atomic structure and nuclear phenomena.
- 31.0 Demonstrate knowledge of the scientific method.
- 32.0 Communicate scientific ideas through oral or written assignments.

- 33.0 Interpret scientific models such as formulas, graphs, tables and schematics, draw inferences from them and recognize their limitations.
- 34.0 Demonstrate problem solving methods in situations that are encountered outside of the classroom.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Plumbing Management
CIP Numbers: A.S. 1646050304; A.A.S. 0646050304
Program Length: 65 Credit Hours
SOC Code(s): 47-2152

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Describe career and training opportunities in the pipe-trade industry--The student will be able to:
- 01.01 Obtain information on current and future job opportunities in the pipe-trade industry, and discuss its trends.
 - 01.02 Describe career ladders (entry-, intermediate-, and technical-level careers) in each of the pipe-trade-industry programs and preparation requirements.
 - 01.03 Describe advanced-training opportunities, including apprenticeship programs in each of the pipe-trade-industry programs.
 - 01.04 Discuss the history of pipe trades.
- 02.0 Demonstrate basic knowledge of the pipe-trade industry--The student will be able to:
- 02.01 Discuss the history of pipe trades.
 - 02.02 Identify pipes, fittings, materials, and equipment related to the pipe trades.
 - 02.03 Identify fixtures and appliances for plumbing, fire-sprinkler fitting, pipe fitting, and gas fitting jobs.
 - 02.04 Define the terms used in the pipe-trade industry.
- 03.0 Identify the use and care of basic tools in the pipe-trade industry--The student will be able to:
- 03.01 Identify and use the basic tools, equipment, and materials of the pipe-trade industry.
 - 03.02 Demonstrate the procedures/techniques for the selection, use, care and storage of tools and equipment.
 - 03.03 Compare the various tools used for plumbing, and pipe fitting.
 - 03.04 Identify tools and equipment and the safety hazards associated with them.
- 04.0 Identify safe working conditions and observe safety precautions--The student will be able to:
- 04.01 Explain the importance of following safety precautions when working in the pipe-trade industry.
 - 04.02 Observe safety precautions.

- 04.03 Identify safe working practices and safe working conditions in the pipe-trade industry.
- 04.04 Demonstrate Cardiopulmonary Resuscitation (CPR) techniques.
- 04.05 Demonstrate an understanding of when and how to use first aid.

- 05.0 Apply pipe-trade-related basic math--The student will be able to:
 - 05.01 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 05.02 Measure tolerances on horizontal and vertical surfaces, using millimeters, centimeters, feet, and inches.
 - 05.03 Solve pipe-trade-related basic math problems, such as piping offset and metric conversion.
 - 05.04 Calculate material length and bend pipe by hand or with a pipe-bending machine and tools.

- 06.0 Demonstrate an understanding of basic science--The student will be able to:
 - 06.01 Understand molecular action as a result of temperature and pressure extremes, chemical reaction, and moisture content.
 - 06.02 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and describe the proper precautions for handling such materials.
 - 06.03 Discuss environmental concerns related to hazardous waste and chemical disposal.
 - 06.04 Explain pressure measurement in terms of Pounds Per Square Inch (PSI) and inches of mercury.
 - 06.05 Understand pressure measurement in terms of Pounds Per Square Inch (PSI), inches of mercury, and KPA.
 - 06.06 Explain how to use alternating-current meters and instruments in the pipe trades.

- 07.0 Read and interpret blueprints and job specifications--The student will be able to:
 - 07.01 Read and interpret measuring devices.
 - 07.02 Draw and interpret basic isometric sketches.
 - 07.03 Identify the basic symbols used in the pipe trades.
 - 07.04 Read and interpret manufacturers' schematics and specifications.

- 08.0 Read and interpret basic pipe-trade codes--The student will be able to:
 - 08.01 Describe the importance of following the local, state, and national codes for plumbing, gas fitting, and/or pipe fitting.
 - 08.02 Read and interpret current standards and codes for plumbing, gas fitting, and/or pipe fitting.
 - 08.03 Read and interpret basic building codes in the pipe-trade industry.

- 09.0 Demonstrate employability skills--The student will be able to:
 - 09.01 Demonstrate productive work habits and positive attitudes.
 - 09.02 Identify the ethical and responsible practices expected of pipe-trade industry employees.

- 09.03 Demonstrate acceptable personal-hygiene habits and a professional appearance.
 - 09.04 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
 - 09.05 Explain the importance of taking pride in the quality of work performed.
 - 09.06 Describe the importance of a drug-free workplace and the industry's policies toward drug use.
 - 09.07 Describe the importance of maintaining a good driver's record and the ramifications of a poor driving record on employment opportunities.
 - 09.08 Describe "Federal Right-to-Know" Law as recorded in 29 CFR-1910.1200.
 - 09.09 Conduct a job search and identify advanced-training opportunities, including an apprenticeship program.
 - 09.10 Secure information about a job.
 - 09.11 Identify documents that may be required for an application for a job or an apprenticeship program.
 - 09.12 Complete a job-application form correctly.
 - 09.13 Demonstrate competence in job-interview techniques.
 - 09.14 Demonstrate a knowledge of how to make appropriate job changes.
- 10.0 Communicate effectively--The student will be able to:
- 10.01 Answer and Ask questions coherently and concisely.
 - 10.02 Read and follow written and oral instructions.
 - 10.03 Give reports orally and in writing.
 - 10.04 Read and interpret reading materials related to the pipe-trade industry.
 - 10.05 Find information in technical literature such as a manufacturer's manual.
 - 10.06 Read and interpret graphs, charts, diagrams, and tables commonly used in the pipe-trade industry/occupation area.
 - 10.07 Write logical and understandable statements or phrases, and accurately fill out the forms/invoices commonly used in the pipe-trade industry.
 - 10.08 Communicate job-related information and coordinate with other trades.
 - 10.09 Demonstrate appropriate telephone/communication skills.
 - 10.10 Demonstrate trade-related computer skills.
- 11.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
- 11.01 Define "entrepreneurship."
 - 11.02 Describe the importance of entrepreneurship to the American economy and the role of small business in the free-enterprise system.
 - 11.03 List the advantages and disadvantages of business ownership.
 - 11.04 List the risks involved in the ownership of a business.
 - 11.05 Identify the personal characteristics of a successful entrepreneur.
 - 11.06 Identify the business skills, including computer skills, needed to operate a business efficiently and effectively.
- 12.0 Demonstrate positive human-relations skills--The student will be able to:
- 12.01 Exercise self-control.
 - 12.02 Identify and demonstrate appropriate responses to criticism.
 - 12.03 Recognize basic human-relations skills as they relate to success in the pipe-trade industry.

- 12.04 Resolve conflicts in a positive, professional manner.
- 13.0 Demonstrate knowledge of basic plumbing skills--The student will be able to:
 - 13.01 Explain the basic theory and principles of plumbing.
 - 13.02 Identify:
 - a. Pipe and fitting
 - b. Pipe-joining methods
 - c. Plumbing fixtures, appliances, materials, and equipment
 - d. Valves by type, size, materials, and application
- 14.0 Cut and join pipes--The student will be able to:
 - 14.01 Join different types of pipes (including: PVC, galvanized, steel, plastic, copper, and cast-iron pipes) according to plumbing codes and specifications, using various methods, including:
 - a. brazing
 - b. clamping
 - c. compression
 - d. threading
 - e. flange
 - f. flaring
 - g. gasket joint
 - h. gluing
 - i. lead-oakum joint
 - j. soldering
 - k. welding
 - 14.02 Measure, mark, and cut different types of pipes, using various pipe cutters, such as:
 - a. one-wheel steel-pipe cutter
 - b. four-wheel steel-pipe cutter
 - c. hack saw
 - d. tubing cutter
 - e. cutting torch
 - 14.03 Thread a steel pipe with a power-driven vise stand or a pipe-threading machine.
 - 14.04 Demonstrate proficiency in using the tools, following safety practices and procedures.
- 15.0 Demonstrate knowledge of plumbing codes--The student will be able to:
 - 15.01 Describe and explain the purpose of plumbing codes.
 - 15.02 Apply the basic theory and principles of plumbing in relation to the codes.
 - 15.03 Read and locate information in the applicable plumbing codes.
 - 15.04 Define and explain the terms used in the plumbing codes.
 - 15.05 Explain why the code may supersede the manufacturer's specifications.
- 16.0 Read and interpret blueprints and specifications--The student will be able to:
 - 16.01 Recognize and identify plumbing symbols.
 - 16.02 Identify basic plumbing systems from the blueprint.

- 16.03 From the blueprints and specifications, identify the plumbing fixtures and materials required for the plumbing job.
 - 16.04 Relate the blueprint to all applicable (local, state, and federal) plumbing codes.
 - 16.05 Cross-reference all working drawings to determine the location and elevation of the piping system and duct work.
 - 16.06 Demonstrate trade-related computer skills for blueprints and specifications.
- 17.0 Lay out and coordinate a job--The student will be able to:
- 17.01 Identify specifications.
 - 17.02 Make a list of materials required to lay out a job.
 - 17.03 Determine the work aids required and the sequence of installations, according to building plans, specifications, and working drawings.
- 18.0 Install the first rough (underground)--The student will be able to:
- 18.01 Lay out a job on site underground and establish a starting point according to codes and specifications, coordinating with other crafts.
 - 18.02 Install building drain, waste, vent, storm drainage, and water-heating-and-circulating systems.
 - 18.03 Install distribution systems.
 - 18.04 Install a temporary water service with backflow prevention.
 - 18.05 Test and inspect the first rough.
- 19.0 Install the second rough (first floor and above)--The student will be able to:
- 19.01 Lay out a job on site for the first floor and above according to codes and specifications, coordinating with other crafts.
 - 19.02 Cut openings in walls and floors to accommodate the pipe and fittings.
 - 19.03 Install hangers and supports.
 - 19.04 Install building-drain, waste, vent, storm-drainage, and water-heating-and-circulating systems, including both tubs and spas.
 - 19.05 Install distribution systems.
 - 19.06 Test and inspect the second rough.
- 20.0 Trim out plumbing--The student will be able to:
- 20.01 Distribute and place fixtures, appliances, and equipment, including safety devices and control.
 - 20.02 Trim out and install job-site fixtures, appliances, and equipment, which include:
 - a. closet flanges
 - b. supply stops on water pipes
 - c. lavatory
 - d. water closets
 - e. showers
 - f. kitchen sinks
 - g. garbage disposal
 - h. ice makers
 - i. dishwashers
 - j. water heaters
 - 20.03 Install backflow assemblies as required.

- 20.04 Test and inspect the final installation.
- 21.0 Demonstrate positive customer-relations skills--The student will be able to:
- 21.01 Organize and plan multiple tasks, utilizing various resources such as time, personnel, and materials.
 - 21.02 Analyze problems, identify the causes, and devise plans of action.
 - 21.03 Identify obstacles, generate alternatives, and choose the best alternatives.
 - 21.04 Create new and better ways to perform tasks, applying the latest ideas to putting work in place.
 - 21.05 Explain the nature of the problem(s) and the remedial action(s) needed and advise the customer on preventive maintenance in a professional manner.
 - 21.06 Resolve customer complaints in a positive, professional manner.
 - 21.07 Prepare a job ticket.
- 22.0 Demonstrate knowledge of the process of installing hot-water-heating--The student will be able to:
- 22.01 Explain the basic theory of domestic hot-water-heating.
 - 22.02 Design, size, and lay out a system.
 - 22.03 Identify the equipment and materials needed for the job in accordance with job specifications and plumbing codes.
 - 22.04 Test and inspect the system.
- 23.0 Demonstrate a knowledge of the process of installing interceptors and separators--The student will be able to:
- 23.01 Identify various types of interceptors and separators.
 - 23.02 Explain the theory and function of various interceptors and separators.
 - 23.03 Describe and/or demonstrate procedures for installing and maintaining:
 - a. lint traps and grease traps
 - b. gas and oil separators
 - c. sand and sediment interceptors
- 24.0 Demonstrate a knowledge of the process of installing a storm-drainage system--The student will be able to:
- 24.01 Explain the theory of roof drains, leaders, and the storm-drainage system.
 - 24.02 Size and lay out a storm-drainage system.
 - 24.03 Identify the materials needed to install a storm-drainage system in accordance with job specifications and plumbing codes.
 - 24.04 Lay out a job on site according to job specifications and plumbing codes, coordinating with other trades.
 - 24.05 Illustrate roof drains, leaders, and drainage systems.
 - 24.06 Test, and inspect the systems.
- 25.0 Demonstrate an understanding of the principles of backflow and cross-connection control--The student will be able to:
- 25.01 Define backflow and cross-connection control.

- 25.02 Describe the importance of backflow and cross-connection control to the health of the public.
 - 25.03 Identify the proper devices and assemblies for individual applications.
 - 25.04 Explain the "degree of hazard" principle and how it relates to the installation of devices and assemblies.
- 26.0 Demonstrate knowledge of the process of installing a medical gas system (optional)--
The student will be able to:
- 26.01 Describe and/or demonstrate procedures for:
 - a. installing a medical gas system in a health-care facility according to applicable plumbing codes
 - b. connecting medical equipment, safety devices, and controls
 - c. testing and inspecting medical gas systems to make sure there is no cross connection and the system is pure
- 27.0 Design a Liquid Propane Gas (LPG) system--The student will be able to:
- 27.01 Identify materials required for LPG installation.
 - 27.02 Design, size, and lay out a job on site according to plumbing codes and specifications codes, coordinating with other trades.
 - 27.03 Install distribution systems, including equipment, safety devices, and controls.
 - 27.04 Test and inspect the systems.
- 28.0 Repair, service, and maintain plumbing systems--The student will be able to:
- 28.01 Troubleshoot and diagnose plumbing systems.
 - 28.02 Repair and replace water service and sanitary lines.
 - 28.03 Repair and replace water closets, ball cocks, flush valves, floats, lift rods, ball stoppers, and trip levers.
 - 28.04 Repair leaks in traps and faucets.
 - 28.05 Repair and replace sink strainers.
 - 28.06 Repair and replace water heaters.
 - 28.07 Replace and repair fixture water-supply pipes.
 - 28.08 Reseal water closets to flanges.
 - 28.09 Test and inspect repaired systems.
 - 28.10 Clear obstructions from kitchen sink, water closet, bathtub, lavatory, and sewer lines, using chemicals and tools.
- 29.0 Demonstrate an understanding of how to connect residential plumbing to a municipal sewer line (optional)--The student will be able to:
- 29.01 Describe who is allowed, according to municipal codes, to tap into a sewer line.
 - 29.02 Excavate from the house drain to a sewer main.
 - 29.03 Connect the house drain to the sewer main.
 - 29.04 Test, and inspect the system.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Civil Engineering Technology
Career Cluster: Architecture and Construction

AS	
CIP Number	1715020101
Program Type	College Credit
Standard Length	63 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3022 - Civil Engineering Technicians
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fl DOE.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp

Purpose

The purpose of this program is to prepare students for employment as surveyors, civil engineering technicians (SOC 173022), or surveyor helpers or to provide supplemental training for persons previously or currently employed in these occupations.

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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to surveying, highway design, soils and foundations, photogrammetry, asphalt design, drainage and geology, concrete design, orientation to utilities, structural design, estimating, drafting, legal and ethical considerations, employability skills, leadership and human relations skills, health and safety, and supportive general education. Computer use is essential. Technical report writing, record keeping and mathematical computations are important aspects of this occupation.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

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

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

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

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2),

F.A.C. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

Standards

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

- 01.0 Solve general, technical, and engineering type problems.
- 02.0 Use the computer as an aid to drafting.
- 03.0 Use instruments to construct engineering, mechanical, and geometrical type drawings.
- 04.0 Sketch, letter, and generate line-work to describe various objects.
- 05.0 Read and produce drawings (orthographic) involving orthographic projection, sections, pictorial, and auxiliary views.
- 06.0 Solve problems involving plane trigonometry using a standard scientific calculator.
- 07.0 Solve typical engineering strength of materials problems using a standard scientific calculator.
- 08.0 Recognize the use of the various materials in the construction industry.
- 09.0 Utilize standard surveying equipment to make measurements and calculations to run a traverse, establish levels, keep notes, and produce required drawings.
- 10.0 Recognize the use of the various materials of selected industries.
- 11.0 Produce drawings using computer aided drafting (CAD) software.
- 12.0 Solve engineering graphics problems using standard techniques and reference materials.
- 13.0 Analyze physical and mechanical properties of soil and concrete.
- 14.0 Solve basic hydraulic problems using the theory of incompressible fluids.
- 15.0 Solve problems using theories learned in engineering mechanics.
- 16.0 Establish grades, locate property lines, and utilities; and produce plots and calculate cut and fill by average-end-area.
- 17.0 Demonstrate employability skills.

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**Florida Department of Education
Student Performance Standards**

Program Title: Civil Engineering Technology
CIP Number: 1715020101
Program Length: 63 Credit Hours
SOC Code(s): 17-3022

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Solve general, technical, and engineering type problems--The student will be able to:

- 01.01 Given two pieces of data concerning a right triangle, compute the missing sides and/or angles.
- 01.02 Given necessary data concerning polygons, compute the area.
- 01.03 Given three pieces of data concerning an oblique triangle, compute the missing sides and angles.
- 01.04 Given necessary data concerning an oblique triangle, compute the area.
- 01.05 Given a line graph and one piece of data (ordinate or abscissa), solve for missing ordinate or abscissa data.
- 01.06 Read and interpret engineering related graphs.

02.0 Use the computer as an aid to drafting--The student will be able to:

- 02.01 Use COGO programs to plot surveying/engineering problems.
- 02.02 Use coordinate data generated from data collectors and computers to plot topographic maps, plats, roadway alignments, parking lots, subdivisions, and other appropriate civil engineering projects.
- 02.03 Using a desktop computer and surveying/engineering software, solve engineering and surveying type problems, such as plats, and direction traverses with corrections.

03.0 Use instruments to construct engineering, mechanical, and geometrical type drawings--
The student will be able to:

- 03.01 Use curve sets to draw plans and profiles.
- 03.02 Use curve templates to draw plans and profiles.
- 03.03 Demonstrate correct use of appropriate drafting instruments in given situations.

04.0 Sketch, letter, and generate line-work to describe various objects--The student will be able to:

- 04.01 Prepare sketches and descriptions of real property.
- 04.02 Use topographic map symbols including line-work to enhance topographic maps.
- 04.03 Use proper line symbols and notes from road design standards to prepare plans and profiles.

- 05.0 Read and produce drawings (orthographic) involving orthographic projection, sections, pictorial, and auxiliary views--The student will be able to:
- 05.01 Produce orthographic projections.
 - 05.02 Produce typical road cross section drawings.
 - 05.03 Produce auxiliary view drawings of utility conflicts.
- 06.0 Solve problems involving plane trigonometry using a standard scientific calculator--The student will be able to:
- 06.01 Solve right triangle problems using sine, cosine, tangent and Pythagorean theorem.
 - 06.02 Solve oblique triangle problems using the Law of Sines and the Law of Cosines.
 - 06.03 Compute areas of right and oblique triangles.
 - 06.04 Solve surveying problems using a scientific calculator.
- 07.0 Solve typical engineering strength of materials problems using a standard scientific calculator --The student will be able to:
- 07.01 Calculate forces, and stresses in various structural members as determined by the material(s) used.
 - 07.02 Calculate the stresses in bolts and rivets and determine the number needed in different types of connections.
 - 07.03 Determine the centroid location of different cross-sectional shapes.
 - 07.04 Calculate:
 - a. moments of inertia
 - b. radius of gyration
 - c. bending moments of beams
 - 07.05 Draw a stress-strain diagram.
 - 07.06 Understand the appropriate engineering vocabulary and terminology.
 - 07.07 Have a basic knowledge of the strengths of various engineering materials used in the design of machines and structures.
 - 07.08 Understand the use of the universal testing machine.
- 08.0 Recognize the use of the various materials in the construction industry--The student will be able to:
- 08.01 Understand placement and testing of storm sewer drainage pipe and gravity sewer pipe.
 - 08.02 Understand placement and test pressure pipe systems.
 - 08.03 Understand standard ASTM test of deformed steel bars and compute results.
 - 08.04 Understand standard ASTM test for flat stock and compute results.
 - 08.05 Understand standard ASTM test for standard 505 samples and compute results.
 - 08.06 Understand standard Rockwell hardness test.
 - 08.07 Understand standard ASTM test for shear and compute results.
 - 08.08 Understand standard ASTM test for compressive strength and compute results.
 - 08.09 Understand standard ASTM test for air entrainment.
 - 08.10 Understand standard ASTM test for volume.

- 09.0 Utilize standard surveying equipment to make measurements and calculations to run a traverse, establish levels, keep notes, and produce required drawings--The student will be able to:
- 09.01 Use engineers tape.
 - 09.02 Use chaining pins.
 - 09.03 Use plumb bobs.
 - 09.04 Use tension pulls scale.
 - 09.05 Use Lock hand level.
 - 09.06 Use thermometers.
 - 09.07 Use total station (EDM and data collector) equipment.
 - 09.08 Use automatic level.
 - 09.09 Use laser level.
 - 09.10 Use digital level.
 - 09.11 Use field book to keep field notes.
 - 09.12 Use GPS equipment.
 - 09.13 Use a standard scientific calculator to solve surveying problems.
- 10.0 Recognize the use of the various materials of selected industries--The student will be able to:
- 10.01 Identify clay pipe and give use.
 - 10.02 Identify PVC pipe and give use.
 - 10.03 Identify cast iron pipe and give use.
 - 10.04 Identify steel structural members and give use.
 - 10.05 Identify reinforcing steel and give use.
 - 10.06 Identify concrete structures.
 - 10.07 Identify asphalt types and uses.
 - 10.08 Identify corrosion preventing coatings.
 - 10.09 Identify concrete (RCP) pipe and give use.
 - 10.10 Identify pre stressed concrete cylinder pipe and give use.
- 11.0 Produce drawings using computer aided drafting (CAD) software--The student will be able to:
- 11.01 Draw large-scale civil drawings.
 - 11.02 Draw details.
- 12.0 Solve engineering graphics problems using standard techniques and reference materials--The student will be able to:
- 12.01 Use Location Survey Manual and other Florida DOT manuals.
 - 12.02 Use typical design standards.
 - 12.03 Use Public Works Manuals.
 - 12.04 Use current software for the hydrology of small watersheds.
 - 12.05 Use manual of standard practice for detailing reinforced concrete structure (ACI 315-99) and others.
 - 12.06 Use county soil survey by soil conservation service –USDA assisted by GIS data.
 - 12.07 Prepare a topographic map of a subdivision with standard soil types.
 - 12.08 Using current software and the prepared soils type map, compute peak run off.

13.0 Analyze physical and mechanical properties of soil and concrete--The student will be able to:

13.01 Understand the process and importance of running standard ASTM soil test and compute results for the following:

- a. gradation analysis
- b. liquid limit
- c. plastic limit
- d. modified proctor
- e. moisture content-oven and/or speedy
- f. nuclear density

13.02 Make a trial batch and run a standard ASTM concrete test and compute results for the following:

- a. Slump
- b. air entrainment
- c. compressive strength

14.0 Solve basic hydraulic problems using the theory of incompressible fluids--The student will be able to:

14.01 Compute peak discharge.

14.02 Compute discharge due to developed condition of project.

14.03 Compute quantity of water and wastewater flow and size pressure pipes.

14.04 Size pipes for gravity flow of storm waters.

15.0 Solve problems using theories learned in engineering mechanics--The student will be able to:

15.01 Solve vector addition problems by the component method.

15.02 Given two coordinates, calculate length of line and reference angle.

15.03 Convert from polar to rectangular coordinates and its inverse.

15.04 Compute resultant of concurrent force systems.

15.05 Compute moments about a given point.

15.06 Compute the resultant force from several given couples.

15.07 Compute resultant of plane parallel force systems.

15.08 Compute resultant of nonparallel non-concurrent force systems.

15.09 Replace a force by a force and a couple.

15.10 Construct free body diagrams.

15.11 Solve concurrent coplanar force systems (2 equations and 2 unknowns).

15.12 Solve coplanar nonparallel force systems.

15.13 Analyze frame and truss problems.

16.0 Establish grades, locate property lines, and utilities; and produce plots and calculate cut and fill by average-end-area--The student will be able to:

16.01 Calculate horizontal alignment for civil engineering structures.

16.02 Calculate vertical alignment for civil engineering structures.

16.03 Plot and draft maps, plats, plans and profiles, charts and graphs.

16.04 Calculate cuts and fills using average-end-area method.

16.05 Calculate borrow pit quantities.

17.0 Demonstrate employability skills--The student will be able to:

- 17.01 Conduct a job search.
- 17.02 Secure information about a job.
- 17.03 Identify documents that may be required when applying for a job.
- 17.04 Complete a job application.
- 17.05 Demonstrate competence in job interview techniques.
- 17.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 17.07 Identify acceptable work habits.
- 17.08 Demonstrate knowledge of how to make job changes appropriately.
- 17.09 Demonstrate acceptable employee health habits.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Course Title: Introduction to Architecture & Construction
Course Type: Orientation/Exploratory
Career Cluster: Architecture & Construction

Secondary - Middle School	
Program Number	8109350
CIP Number	148109350M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	TEC ED 1@2 BLDG CONST @7 7G BLDG MAINT @7 7G DRAFTING @7 7G
CTSO	SkillsUSA
Facility Code	245 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 Architecture & Construction career cluster. The content includes but is not limited to careers in designing, planning, managing, building and maintaining the built environment. 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.

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)

SkillsUSA, Inc. 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 IEP or 504 plan to meet individual needs and ensure equal access. 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.

Standards

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

- 01.0 Demonstrate an understanding of the Design/ Pre-Construction career pathway.
- 02.0 Demonstrate an understanding of the Construction career pathway.
- 03.0 Demonstrate an understanding of the Maintenance/ Operation career pathway.
- 04.0 Apply leadership and communication skills.
- 05.0 Describe how information technology is used in the Architecture and Construction career cluster.
- 06.0 Use information technology tools.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Introduction to Architecture & Construction
Course Number: 8109350
Course Credit: Semester

Course Description:

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

01.0 Demonstrate an understanding of the Design/ Pre-Construction career pathway--The student will be able to:

- 01.01 Define and use proper terminology associated with the Design/ Pre-Construction career pathway.
- 01.02 Describe some of the careers available in the Design/ Pre-Construction career pathway.
- 01.03 Identify common characteristics of the careers in the Design/ Pre-Construction career pathway.
- 01.04 Research the history of the Design/ Pre-Construction 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 Design/Pre-Construction career pathway.
- 01.06 Describe technologies associated in careers within the Design/ Pre-Construction career pathway.

02.0 Demonstrate an understanding of the Construction career pathway--The student will be able to:

- 02.01 Define and use proper terminology associated with the Construction career pathway.
- 02.02 Describe some of the careers available in the Construction career pathway.
- 02.03 Identify common characteristics of the careers in the Construction career pathway.
- 02.04 Research the history of the Construction career pathway and describe how the careers have evolved and impacted society.
- 02.05 Identify skills required to successfully enter any career in the Construction career pathway.
- 02.06 Describe technologies associated in careers within the Construction career pathway.

03.0 Demonstrate an understanding of the Maintenance/ Operation career pathway--The student will be able to:

- 03.01 Define and use proper terminology associated with the Maintenance/ Operation career pathway.

- 03.02 Describe some of the careers available in the Maintenance/ Operation career pathway.
 - 03.03 Identify common characteristics of the careers in the Maintenance/ Operation career pathway.
 - 03.04 Research the history of the Maintenance/ Operation 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/ Operation career pathway.
 - 03.06 Describe technologies associated in careers within the Maintenance/ Operation career pathway.
- 04.0 Apply leadership and communication skills--The student will be able to:
- 04.01 Discuss the establishment and history of the SkillsUSA organization.
 - 04.02 Identify the characteristics and responsibilities of organizational leaders.
 - 04.03 Demonstrate parliamentary procedure skills during a meeting.
 - 04.04 Participate on a committee which has an assigned task and report to the class.
 - 04.05 Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
 - 04.06 Use a computer to assist in the completion of a project related to the Architecture & Construction career cluster.
- 05.0 Describe how information technology is used in the Architecture and Construction career cluster. – The student will be able to:
- 05.01 Identify information technology (IT) careers in the Architecture and Construction career cluster, including the responsibilities, tasks and skills they require.
 - 05.02 Relate information technology project management concepts and terms to careers in the Architecture and Construction career cluster.
 - 05.03 Manage information technology components typically used in professions of the Architecture and Construction career cluster.
 - 05.04 Identify security-related ethical and legal IT issues faced by professionals in the Architecture and Construction career cluster.
- 06.0 Use information technology tools. – The student will be able to:
- 06.01 Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Architecture and Construction career cluster.
 - 06.02 Use e-mail clients to send simple messages and files to other Internet users.
 - 06.03 Demonstrate ways to communicate effectively using Internet technology.
 - 06.04 Use different types of web search engines effectively to locate information relevant to the Architecture and Construction career cluster.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Course Title: Introduction to Architecture & Construction and Career Planning
Course Type: Orientation/Exploratory
Career Cluster: Architecture & Construction

Secondary - Middle School	
Program Number	8109360
CIP Number	148109360M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	TEC ED 1@2 BLDG CONST @7 7G BLDG MAINT @7 7G DRAFTING @7 7G
CTSO	SkillsUSA
Facility Code	245 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 Architecture & Construction career cluster. The content includes but is not limited to careers in designing, planning, managing, building and maintaining the built environment. 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.

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)

SkillsUSA, Inc. 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 IEP or 504 plan to meet individual needs and ensure equal access. 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.

Career Planning

The career and education planning course required by Section 1003.4156, Florida Statutes, has been integrated into this course. This course must include career exploration using CHOICES or a comparable cost-effective program and educational planning using the online student advising system known as Florida Academic Counseling and Tracking for Students at the Internet website FACTS.org; and shall result in the completion of a personalized academic and career plan.

Standards

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

- 01.0 Demonstrate an understanding of the Design/ Pre-Construction career pathway.
- 02.0 Demonstrate an understanding of the Construction career pathway.
- 03.0 Demonstrate an understanding of the Maintenance/ Operation career pathway.
- 04.0 Apply leadership and communication skills.
- 05.0 Describe how information technology is used in the Architecture and Construction career cluster.
- 06.0 Use information technology tools.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Introduction to Architecture & Construction and Career Planning
Course Number: 8109360
Course Credit: Semester

Course Description:

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

01.0 Demonstrate an understanding of the Design/ Pre-Construction career pathway--The student will be able to:

- 01.01 Define and use proper terminology associated with the Design/ Pre-Construction career pathway.
- 01.02 Describe some of the careers available in the Design/ Pre-Construction career pathway.
- 01.03 Identify common characteristics of the careers in the Design/ Pre-Construction career pathway.
- 01.04 Research the history of the Design/ Pre-Construction 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 Design/Pre-Construction career pathway.
- 01.06 Describe technologies associated in careers within the Design/ Pre-Construction career pathway.

02.0 Demonstrate an understanding of the Construction career pathway--The student will be able to:

- 02.01 Define and use proper terminology associated with the Construction career pathway.
- 02.02 Describe some of the careers available in the Construction career pathway.
- 02.03 Identify common characteristics of the careers in the Construction career pathway.
- 02.04 Research the history of the Construction career pathway and describe how the careers have evolved and impacted society.
- 02.05 Identify skills required to successfully enter any career in the Construction career pathway.
- 02.06 Describe technologies associated in careers within the Construction career pathway.

03.0 Demonstrate an understanding of the Maintenance/ Operation career pathway--The student will be able to:

- 03.01 Define and use proper terminology associated with the Maintenance/ Operation career pathway.

- 03.02 Describe some of the careers available in the Maintenance/ Operation career pathway.
 - 03.03 Identify common characteristics of the careers in the Maintenance/ Operation career pathway.
 - 03.04 Research the history of the Maintenance/ Operation 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/ Operation career pathway.
 - 03.06 Describe technologies associated in careers within the Maintenance/ Operation career pathway.
- 04.0 Apply leadership and communication skills--The student will be able to:
- 04.01 Discuss the establishment and history of the SkillsUSA organization.
 - 04.02 Identify the characteristics and responsibilities of organizational leaders.
 - 04.03 Demonstrate parliamentary procedure skills during a meeting.
 - 04.04 Participate on a committee which has an assigned task and report to the class.
 - 04.05 Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
 - 04.06 Use a computer to assist in the completion of a project related to the Architecture & Construction career cluster.
- 05.0 Describe how information technology is used in the Architecture and Construction career cluster. – The student will be able to:
- 05.01 Identify information technology (IT) careers in the Architecture and Construction career cluster, including the responsibilities, tasks and skills they require.
 - 05.02 Relate information technology project management concepts and terms to careers in the Architecture and Construction career cluster.
 - 05.03 Manage information technology components typically used in professions of the Architecture and Construction career cluster.
 - 05.04 Identify security-related ethical and legal IT issues faced by professionals in the Architecture and Construction career cluster.
- 06.0 Use information technology tools. – The student will be able to:
- 06.01 Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Architecture and Construction career cluster.
 - 06.02 Use e-mail clients to send simple messages and files to other Internet users.
 - 06.03 Demonstrate ways to communicate effectively using Internet technology.
 - 06.04 Use different types of web search engines effectively to locate information relevant to the Architecture and Construction 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:

- 07.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.

- 08.0 Develop skills to locate, evaluate, and interpret career information.
- 09.0 Identify and demonstrate processes for making short and long term goals.
- 10.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills.
- 11.0 Understand the relationship between educational achievement and career choices/postsecondary options.
- 12.0 Identify a career cluster and related pathways that match career and education goals.
- 13.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
- 14.0 Demonstrate knowledge of technology and its application in career fields/clusters.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Fundamentals of Architecture and Construction
Program Type: Orientation/Exploratory
Career Cluster: Architecture and Construction

Secondary – Middle School	
Program Number	8130300
CIP Number	148130300M
Grade Level	6-8
Standard Length	Year
Teacher Certification	TEC ED 1@2 BLDG CONST @7 7G BLDG MAINT @7 7G DRAFTING @7 7G
CTSO	SkillsUSA
Facility Code	245 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 Architecture and Construction career cluster. The content includes but is not limited to investigating careers, reading and drawing plans and constructing models. 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.

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

Career and Technical Student Organization (CTSO)

Skills USA, Inc. 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 IEP or 504 plan to meet individual needs and ensure equal access. 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.

Standards

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

- 01.0 Investigate careers and entry requirements within the design/ preconstruction pathway.
- 02.0 Use safe work practices.
- 03.0 Read and interpret basic construction documents and specifications.
- 04.0 Draw basic plans by hand.
- 05.0 Read civil, architectural and mechanical, electrical and plumbing (MEP) drawings.
- 06.0 Investigate careers and entry requirements within the construction pathway.
- 07.0 Plan the construction of a model or architectural detail from a set of plans.
- 08.0 Construct a model or architectural detail from plans and specifications.
- 09.0 Investigate careers and entry requirements within the operation and maintenance pathway.
- 10.0 Analyze the impact of design decisions on building operations and maintenance.
- 11.0 Explain sustainability issues related to the design, construction and maintenance of the built environment.
- 12.0 Identify components of network systems.
- 13.0 Describe and use communication features of information technology.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Fundamentals of Architecture and Construction
Course Number: 8130300
Course Credit: Year

Course Description:

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 Architecture and Construction career cluster. The content includes but is not limited to investigating careers, reading and drawing plans and constructing models.

01.0 Investigate careers and entry requirements within the design/ preconstruction pathway--
The student will be able to:

- 01.01 Describe careers in design/preconstruction (e.g. architects, interior designers, drafters, engineers - civil, MEP and structural, urban and regional planners, etc.)
- 01.02 Explain educational and training pathways available for these careers.
- 01.03 Research and present information on a design / preconstruction career including roles and responsibilities, opportunities for employment and the requirements for education and training.

02.0 Use safe work practices--The student will be able to:

- 02.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
- 02.02 Use appropriate safety equipment.
- 02.03 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.

03.0 Read and interpret basic construction documents and specifications--The student will be able to:

- 03.01 Name various types of drawings used in construction documents and explain their purpose.
- 03.02 Locate sections, elevations and details indicated on the floor plan within the set of construction documents.
- 03.03 Identify appropriate architectural scales used for various drawings and relate printed size to actual size.
- 03.04 Identify various symbols and terminology used in construction documents.
- 03.05 Read and interpret specifications.
- 03.06 Identify the use of building codes within construction documents.

04.0 Draw basic plans by hand--The student will be able to:

- 04.01 Draw plans and corresponding elevations, sections and details.
- 04.02 Apply appropriate architectural scales to drawings.
- 04.03 Apply basic building codes in drawings.

- 04.04 Create door, window and finish schedules.
- 05.0 Read civil, architectural and mechanical, electrical and plumbing (MEP) drawings--The student will be able to:
 - 05.01 Locate civil plans within a construction documents set, identify defining features and state the importance of these plans.
 - 05.02 Locate architectural plans within a construction documents set, identify defining features and state the importance of these plans.
 - 05.03 Locate mechanical plans within a construction documents set, identify defining features and state the importance of these plans.
 - 05.04 Locate electrical plans within a construction documents set, identify defining features and state the importance of these plans.
 - 05.05 Locate plumbing plans within a construction documents set, identify defining features and state the importance of these plans.
 - 05.06 Name types of careers associated with the development of civil, architectural and mechanical, electrical and plumbing (MEP) drawings.
- 06.0 Investigate careers and entry requirements within the construction pathway--The student will be able to:
 - 06.01 Describe careers in design/preconstruction (e.g. managers - project managers, project engineers, estimators, superintendents; sub-contractors and tradespersons - carpenters, masons, electricians, plumbers, HVAC technicians; etc.)
 - 06.02 Explain educational and training pathways available for these careers.
 - 06.03 Research and present information on a construction career including roles and responsibilities, opportunities for employment and the requirements for education and training.
- 07.0 Plan the construction of a model or architectural detail from a set of plans--The student will be able to:
 - 07.01 Calculate material quantities and costs.
 - 07.02 Determine the critical path of construction activities.
 - 07.03 Draw a bar chart depicting construction schedule.
- 08.0 Construct a model or architectural detail from plans and specifications--The student will be able to:
 - 08.01 Use appropriate tools while demonstrating safe work practices.
 - 08.02 Apply proper cutting and fastening techniques for basic model materials.
- 09.0 Investigate careers and entry requirements within the operation and maintenance pathway--The student will be able to:
 - 09.01 Describe careers in operation and maintenance (energy auditors; building inspectors; system installers - HVAC, telecommunications, security/fire, solar, etc.; maintenance technicians; hazardous materials removers; environmental engineers).
 - 09.02 Explain educational and training pathways available for these careers.

- 09.03 Research and present information on an operation and maintenance career including roles and responsibilities, opportunities for employment and the requirements for education and training.
- 10.0 Analyze the impact of design decisions on building operations and maintenance--The student will be able to:
 - 10.01 Compare life-cycle costs for various building materials and/ or systems within the built environment.
 - 10.02 Recommend a maintenance plan based on product or material specifications.
- 11.0 Explain sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
 - 11.01 Describe the impact of the construction industry on the natural environment.
 - 11.02 Identify and analyze sustainable alternatives to conventional practices.
 - 11.03 Identify specific practices that can lessen adverse impacts on the environment.
- 12.0 Identify components of network systems--The student will be able to:
 - 12.01 Identify structure to access internet, including hardware and software components.
 - 12.02 Identify and configure user customization features in web browsers, including preferences, caching, and cookies.
 - 12.03 Recognize essential database concepts.
 - 12.04 Define and use additional networking and internet services.
- 13.0 Describe and use communication features of information technology--The student will be able to:
 - 13.01 Define important internet communications protocols and their roles in delivering basic Internet services.
 - 13.02 Identify basic principles of the Domain Name System (DNS).
 - 13.03 Identify security issues related to Internet clients.
 - 13.04 Identify and use principles of Personal Information Management (PIM), including common applications.
 - 13.05 Efficiently transmit text and binary files using popular Internet services.
 - 13.06 Conduct a webcast and related services.
 - 13.07 Represent technical issues to a non technical audience.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Smart Home/Mobile Electronics Technology
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8140300	C400300
CIP Number	0647010104	0647010104
Grade Level	9-12, 30, 31	30, 31
Standard Length	4 Credits	600 Hours
Teacher Certification	SMART HOME/MET 7G COMP SVC @7 G ELECTRONIC @7 7G BUS MACH @7 G *Special Note	SMART HOME/MET 7G COMP SVC @7 G ELECTRONIC @7 7G BUS MACH @7 G *Special Note
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-2097 - Electronic Home Entertainment Equipment Installers and Repairers 49-2096 - Electronic Equipment Installers and Repairers, Motor Vehicles	49-2097 - Electronic Home Entertainment Equipment Installers and Repairers 49-2096 - Electronic Equipment Installers and Repairers, Motor Vehicles
Facility Code	246 - 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	Mathematics: 10 Language: 9 Reading: 9

**Note: Any Vocational Coverage suitable for Secondary or PSAV implementation accompanied by industry-recognized Smart Home/Mobile Electronics Technician certification in accordance with FS 1012.39.*

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of occupations in the Smart Home/Mobile Electronics technology industry.

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

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 Architecture and Construction 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 Architecture and Construction career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in network support services positions.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points as follows: (A) Helper (B) Level 1 Technician (C) Level II Technician (D) Mobile Electronics Technician. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training certifications. A student who completes the applicable competencies at any occupational completion point may either continue with the training or become an occupational completer.

The courses content includes, but is not limited to, installation, configuration, operation, and maintenance of computer operating systems; network, telecommunications, cable TV, Satellite, antenna, audio/video and low voltage wiring systems. Security, CCTV and environmental control systems and the integration with the other listed systems is included. Content also includes preparation for industry-level certifications. Other course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

When offered at the postsecondary level, 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	EEV0710	Installation Assistant	150 Hours	49-2097
B	EEV0711	Level 1 Installer	150 Hours	49-2097
C	EEV0712	Level 2 Installer	150 Hours	49-2097
D	EEV0713	Mobile Electronics Technician	150 Hours	49-2096

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8140310	Smart Home Technology 1	1 Credit	49-2097	2
B	8140320	Smart Home Technology 2	1 Credit	49-2097	2
C	8140330	Smart Home Technology 3	1 Credit	49-2097	2
D	8140340	Mobile Electronics Technology 4	1 Credit	49-2096	2

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

Any Vocational Coverage suitable for Secondary or PSAV implementation accompanied by industry-recognized Smart Home/Mobile Electronics Technician certification in accordance with FS 1012.39.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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 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. 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>).

Standards

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

- 01.0 Demonstrate proficiency in occupational safety.
- 02.0 Demonstrate science knowledge and skills.
- 03.0 Demonstrate proficiency in basic cabling.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate language arts knowledge and skills.
- 06.0 Demonstrate proficiency in electrical basics.
- 07.0 Demonstrate proficiency in basic computer usage.
- 08.0 Solve problems using critical thinking skills, creativity and innovation.
- 09.0 Demonstrate mathematics knowledge and skills.
- 10.0 Demonstrate proficiency in premises wiring.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 12.0 Describe the importance of professional ethics and legal responsibilities.
- 13.0 Demonstrate proficiency in networking.
- 14.0 Demonstrate proficiency in audio/video systems configuration and installation.
- 15.0 Use information technology tools.
- 16.0 Demonstrate proficiency in telephony/VoIP systems configuration and installation.
- 17.0 Demonstrate proficiency in security and surveillance systems configuration and installation.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 19.0 Demonstrate proficiency in home control integration and management.
- 20.0 Demonstrate proficiency in the assessment of vehicle electrical system condition.

- 21.0 Demonstrate proficiency in evaluating and assessing various circuits in a vehicle where aftermarket components will connect.
- 22.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive audio system elements, enhancements or the replacement of audio system components.
- 23.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive security and convenience elements and components.
- 24.0 Demonstrate proficiency in the installation of Rear Seat Entertainment (RSE) Systems.
- 25.0 Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles.
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 28.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Smart Home/Mobile Electronics Technology
PSAV Number: C400300

Course Number: EEV0710
Occupational Completion Point: A
Installation Assistant – 150 Hours – SOC Code 49-2097

- 01.0 Demonstrate proficiency in occupational safety--The student will be able to:
- 01.01 List the level of electricity (shock) considered lethal to humans.
 - 01.02 Describe OSHA body restraint rules and list hazards associated with the use of ladders and working at Heights.
 - 01.03 Explain the purpose and reasons for adherence to NEC and NFPC codes.
 - 01.04 Explain the purpose and usage of the REMC – Residential Electrical Maintenance Code.
 - 01.05 Describe safety considerations when working in and around motor vehicles.
- 02.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 02.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 02.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 03.0 Demonstrate proficiency in basic cabling--The student will be able to:
- 03.01 Identify and define network cabling characteristics and performance.
 - 03.02 Explain cable length limitations.
 - 03.03 Describe network protocols.
 - 03.04 Explain how to find correct cable pair colors and list applicable TIA/EIA standard.
 - 03.05 Describe the situations where an installer needs to refer and abide by TIA 570-A.
 - 03.06 Describe cabling components and methods addressed by TIA 568 A&B.
 - 03.07 Describe the Telcordia standards related to cabling.
 - 03.08 List fiber optic cable skin, eye and inhalation precautions.
 - 03.09 Demonstrate connector and splice methods and testing.
 - 03.10 Differentiate between glass and plastic fiber and list reasons for choices.
 - 03.11 Summarize basic light theory and list commonly used wavelengths/frequencies
 - 03.12 Install, configure and troubleshoot LAN cable systems (twisted pair, coax, or fiber).
 - 03.13 Configure and troubleshoot patch bay and network equipment.
 - 03.14 Install proper termination (e.g. RCA, BNC and F).
 - 03.15 Define Backbone/Distribution cabling and compare with link, workstation and patch cables.
 - 03.16 Explain the differences between Composite and Hybrid Cables.
 - 03.17 List the types of signal losses in cables, the purpose of matching correct impedances and convert dB levels to microvolt levels.
 - 03.18 Make connections using crimp connectors.

- 03.19 Explain the color applications for crimp connectors.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 04.02 Locate, organize and reference written information from various sources. CM3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 05.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 05.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 06.0 Demonstrate proficiency in electrical basics--The student will be able to:
- 06.01 Identify and use hand tools properly.
 - 06.02 Demonstrate acceptable soldering and desoldering and rework and repair techniques.
 - 06.03 Identify and use power tools properly.
 - 06.04 Identify sources of electricity.
 - 06.05 Define voltage, current, resistance, power and energy.
 - 06.06 Apply Ohm's law and power formulas.
 - 06.07 Measure properties of a circuit using appropriate test equipment.
 - 06.08 Demonstrate Electrostatic Discharge (ESD) safety procedures.
 - 06.09 Read and interpret color codes and symbols to identify electrical/electronic components and values.

Course Number: EEV0711
Occupational Completion Point: B
Level 1 Technician – 150 Hours – SOC Code 49-2097

- 07.0 Demonstrate proficiency in basic computer usage--The student will be able to:
- 07.01 Demonstrate knowledge of OS file systems.
 - 07.02 Demonstrate basic operation and usage of common applications.
 - 07.03 Demonstrate operation and usage of fundamental OS utilities.
 - 07.04 Demonstrate operation and usage of browser software and the internet.
 - 07.05 Demonstrate an understanding of the boot process.
 - 07.06 Locate and install device drivers.
 - 07.07 Identify front panel controls, indicators, rear case connectors and indicators.

- 07.08 Demonstrate an understanding of the effects of temperature extremes and moisture content in regards to computer/network equipment.
 - 07.09 Demonstrate an understanding of the effects of heat load and ventilation in regards to computer/network equipment.
 - 07.10 Install, configure and troubleshoot smart home related computer applications.
 - 07.11 Demonstrate an understanding of input and output devices.
 - 07.12 Demonstrate proficiency installing and troubleshooting serial, parallel, USB and IEEE 1394 devices.
- 08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 09.01 Solve problems for volume, weight, area and circumference and perimeter measurements for rectangles, square and cylinders.
 - 09.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, and feet and inches.
 - 09.03 Add, subtract, multiply and divide using fractions, decimals and whole numbers.
 - 09.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 09.05 Demonstrate an understanding of federal, state and local taxes and their computation.
 - 09.06 Demonstrate knowledge of arithmetic operations. AF3.2
 - 09.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 09.08 Construct charts/tables/graphs using functions and data. AF3.5
- 10.0 Demonstrate proficiency in premises wiring--The student will be able to:
- 10.01 Demonstrate roughing-in cabling in new structures, installing wall boxes, conduit, distribution boxes, speaker in-wall units and CCTV mounts.
 - 10.02 Explain the use of biscuit jacks/surface mount boxes.
 - 10.03 Explain the use of wall plates and indicate proper locations.
 - 10.04 Describe purposes and locations for J-Hooks and cable trays.
 - 10.05 Explain inductive signals and interference, their effects and precautions and separation distances for cabling.
 - 10.06 List advantages of stranded vs. solid wiring and reasons for choosing either.
 - 10.07 Describe detriments in exceeding TIA/EIA Tensile Strength/Bend Ratios.
 - 10.08 Outline the purposes of wiring labeling and how it is applied.
 - 10.09 Explain methods used to closely estimate cable requirements for individual applications.
 - 10.10 Explain UTP untwist precautions and define NEXT/FEXT.
 - 10.11 List common problems encountered in coaxial cable installation or repair.

- 10.12 Describe Surface Mount Channeling and how it is utilized.
- 10.13 Describe the need for drywall and other penetrations of walls and ceilings in retrofit applications.
- 10.14 Demonstrate restoration techniques and list materials used.

Course Number: EEV0712**Occupational Completion Point: C****Level 2 Technician -- 150 Hours – SOC Code 49-2097**

- 11.0 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:
 - 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 11.02 Explain emergency procedures to follow in response to workplace accidents.
 - 11.03 Create a disaster and/or emergency response plan. SHE2.0

- 12.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
 - 12.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 12.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 12.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 12.04 Interpret and explain written organizational policies and procedures. ELR2.0

- 13.0 Demonstrate proficiency in networking--The student will be able to:
 - 13.01 Identify basic networking protocols and their uses and know when and how to apply them.
 - 13.02 Install, connect and maintain network clients and peripherals to various network operating systems.
 - 13.03 Demonstrate setup, configuring and sharing of user security, file, printer and network resources.
 - 13.04 Connect, configure, and troubleshoot devices for network connectivity.
 - 13.05 Recognize and implement methods of network security.
 - 13.06 Configure setup and maintain a residential LAN (Local Area Network).
 - 13.07 Configure setup and maintain a secure wireless network.

- 14.0 Demonstrate proficiency in audio/video systems configuration and installation--The student will be able to:
 - 14.01 Install, configure and maintain residential home theater system video components.
 - 14.02 Identify display types (e.g. Plasma, DLP, LCD, LCOS, CRT, Rear projection).
 - 14.03 Define hi definition resolutions options (e.g. 720p, 1080i, 1080p, etc.).
 - 14.04 Define tuner types (e.g. NTSC, PAL, ATSC, QAM, Cable card, VSB, NDVBT, DVBS).
 - 14.05 Describe Video Processing (e.g. scalers, processors, up-conversion).

- 14.06 Explain video aspect ratios.
 - 14.07 Perform video setup (Calibration e.g. color balance, contrast, brightness, etc.).
 - 14.08 Identify digital video cable and connector types (e.g. DVI and HDMI – compatibility and interoperability issues).
 - 14.09 Install, configure and maintain residential home theater system audio components.
 - 14.10 Define basics of acoustics (e.g. Sound reflection, speaker placement, sound cancellation, and sound balance).
 - 14.11 Define multichannel surround (e.g. SACD, DVDA, DTS, DTSES, DDEX, DD, etc.) (e.g. Crossovers and speaker setup).
 - 14.12 Install and configure content management systems and describe their applications in a residential environment.
 - 14.13 Describe typical applications and physical connection for the following media resources: media servers, media PC, MP3 players, DVD players, satellite, cable, DVR, gaming systems, satellite radio, Legacy devices, streaming media.
 - 14.14 Implement, maintain and troubleshoot multiroom video systems.
 - 14.15 Define signal types and their applications such as Digital Distribution (e.g. Analog to IP converters, IP to Analog converters, Wireless distribution, IEEE 1394) and RF Distribution and Analog Distribution (e.g. Composite, Component, and S-Video, Balun.)
 - 14.16 Identify and troubleshoot noise and interference (e.g. Splitters and taps, active and passive, Attenuators, Bidirectional, Modulation and filtration, Amplification, IR over COAX.)
 - 14.17 Describe components satellite signal distribution: multi-switches, diplexer and LNB (Low Noise Block Down Converter).
- 15.0 Use information technology tools--The students will be able to:
- 15.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 15.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 15.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 15.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 16.0 Demonstrate proficiency in telephony/VoIP systems configuration and installation--The student will be able to:
- 16.01 Describe POTS vs. VoIP delivery.
 - 16.02 Identify and troubleshoot common VoIP issues such as: VoIP compatibility, whole house distribution of VoIP, Performance and Quality of Service (QoS).
 - 16.03 Identify and troubleshoot common POTS issues such: Cross talk, radio interference, dead ports and REN (Ringer Equivalence Number).
 - 16.04 Describe and define fundamentals of telephone systems.
 - 16.05 Diagram a basic telephone circuit.
 - 16.06 Define Tip and Ring and show wiring conventions in POTS systems and list expected voltages on telephone plugs.
 - 16.07 Name the conventional color of UTP wires used with 2/4/8 wire connections.
 - 16.08 Compare Analog and Digital telephone systems.

- 16.09 Explain where Punch Down Blocks – 66/110 are used and their purpose.
- 16.10 Differentiate between Internet - Cable TV - Wireless Systems and B-VolIP.
- 17.0 Demonstrate proficiency in security and surveillance systems configuration and installation--The student will be able to:
- 17.01 Define monitored and notification methods such as: phone line, cell phone, radio frequency and IP.
- 17.02 Explain the monitoring formats SIA and Contact ID, 4/2 and 3/1
- 17.03 Describe basic security terminology.
- 17.04 Install and configure security panel.
- 17.05 Define types of peripherals and accessories such as: motion sensors, glass break detectors, magnetic contacts, smoke fire (e.g. smoke detection, heat detection), environmental sensors (e.g. carbon monoxide, gas, water, temperature), vehicle detection, photo-electric beam devices, microwave beam devices, cameras, pressure sensors, sirens, strobes, security keypads, keyfobs and panic buttons.
- 17.06 Describe wired security infrastructure: 22/4- standard power devices, 22/2- Magnetic contacts, 2 and 4 conductor fire wire (e.g. keypads, sounders, power supplies, smoke and fire detectors), power supervision relays, polarity reversal relays, line seizure, end of line resistors.
- 17.07 Describe wireless security infrastructure.
- 17.08 Identify access control devices such as keypads, card readers, biometric readers, proximity readers, door strikes, electronic deadbolts, magnetic locks.)
- 17.09 Identify access control protocols such as Weigand.
- 17.10 Identify, configure, install, maintain and troubleshoot security and surveillance cameras: IP, Analog and Hybrid.
- 17.11 Define Camera specifications including: lens type, lux rating, resolution, B&W vs. Color, IR illumination and power consumption.
- 17.12 Explain security camera applications: indoor/outdoor, day/night, fixed vs. animated, surveillance (e.g. door cams, nanny cams), recording (e.g. DVR, triggers – internal vs. external detection) and sequencing vs. multiplexing.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 18.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 18.02 Describe the effect of money management on personal and career goals. FL3.0
- 18.03 Develop a personal budget and financial goals. FL3.1
- 18.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 18.05 Maintain financial records. FL3.3
- 18.06 Read and reconcile financial statements. FL3.4
- 18.07 Research, compare and contrast investment opportunities.
- 19.0 Demonstrate proficiency in home control integration and management--The student will be able to:
- 19.01 Identify user interface devices and their appropriate applications: remote controls, keypads, touchscreens, keyfobs, telephones, smartphones, cell phones, PDA's, web tablets, personal computers and laptops.

- 19.02 Define, recognize and install control systems which integrate subsystems in the home such as Embedded control systems and Personal Computer (PC) based control systems.
- 19.03 Identify commonly used communication protocols and their application: IR, Serial, IP, RF, Bluetooth, Contact closure, Inputs (zones), Z-wave and Zigbee, ASCII and Proprietary protocols.
- 19.04 Describe basic HVAC (Heating Ventilation and Air Conditioning) terminology and install peripheral control devices.
- 19.05 Describe basic lighting terminology and install peripheral control devices.
- 19.06 Identify lighting control applications: Indoor and outdoor, Centralized and distributed, Dimming, Scenes, Relay/switching, Occupancy/motion sensing, Time and event driven, Window, treatments, Energy management, Security interface, Lighting, Connectivity and Motor speed control.
- 19.07 Describe communication interface/bridge: Power line phase couplers.
- 19.08 Identify lighting control protocols (Open standards) such as: Z-wave, ZigBee, Powerline carrier (X10 protocol /PLC) and UPB Universal Powerline Bus).
- 19.09 Identify lighting control protocols (Proprietary RF and low voltage).
- 19.10 Identify and install component power protection devices.
- 19.11 Identify whole house protection options: Surge Suppression and Power Conditioning.
- 19.12 Identify and install point protection: Surge protectors (high voltage and ancillary low voltage devices: e.g. satellite, CATV, etc.), UPS (Uninterruptible Power Supply) and Power Conditioning.

Course Number: EEV0713

Occupational Completion Point: D

Mobile Electronics Technician -- 150 Hours -- SOC Code 49-2096

20.0 Demonstrate proficiency in the assessment of vehicle electrical system condition--The student will be able to:

- 20.01 Identify vehicle electrical system components.
- 20.02 Evaluate the vehicle's current electrical system condition.
- 20.03 Identify faulty or weak components.

21.0 Demonstrate proficiency in evaluating and assessing various circuits in a vehicle where aftermarket components will connect--The student will be able to:

- 21.01 Evaluate the vehicle's ability to support aftermarket equipment, in particular audio amplifiers.
- 21.02 Determine electrical upgrades according electrical demands.
- 21.03 Evaluate ignition switch wiring and associated circuits.
- 21.04 Test all ignition switch circuits.
- 21.05 Determine the polarity and function of each wire connected to the ignition switch.
- 21.06 Evaluate headlight switch wiring and associated circuits.
- 21.07 Test all headlight switch circuits.
- 21.08 Determine the polarity and function of each wire connected to the headlight switch.
- 21.09 Evaluate the door lock/unlock switch wiring and associated circuits.
- 21.10 Test all door lock/unlock switch circuits.

- 21.11 Determine the polarity and function of each wire connected to the door lock/unlock switch.
 - 21.12 Evaluate the door pin switches wiring and associated circuits.
 - 21.13 Test all door pin switch circuits.
 - 21.14 Determine the polarity and function of each wire connected to the door pin switches and interior lights.
 - 21.15 Evaluate the trunk release switch wiring and associated circuits.
 - 21.16 Test the trunk release switch circuit.
 - 21.17 Determine the polarity and function of each wire connected to the trunk release switch.
 - 21.18 Evaluate the foot brake switch wiring and associated circuits.
 - 21.19 Test the foot brake switch circuit.
 - 21.20 Determine the polarity and function of each wire connected to the foot brake switch.
- 22.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive audio system elements, enhancements or the replacement of audio system components--The student will be able to:
- 22.01 Describe the components used in soldering.
 - 22.02 Perform Soldered connections.
 - 22.03 Determine if soldering is appropriate for a particular installation situation.
 - 22.04 Determine the physical characteristics of an aftermarket head unit.
 - 22.05 Determine what connections and installation accessories are required for a particular head unit replacement.
 - 22.06 Install an aftermarket head unit.
 - 22.07 Determine the physical characteristics of aftermarket speakers.
 - 22.08 Determine what connections and installation accessories are required for a particular set of replacement speakers.
 - 22.09 Install aftermarket speakers.
 - 22.10 Determine the physical characteristics of aftermarket amplifier.
 - 22.11 Determine what connections and installation accessories are required for a particular amplifier.
 - 22.12 Install an aftermarket amplifier.
 - 22.13 Connect multiple speakers to a single channel.
 - 22.14 Perform both series and parallel wiring configurations noting the electrical characteristics of each.
 - 22.15 Perform amplifier bridging to one speaker.
 - 22.16 Perform amplifier bridging to two speakers.
 - 22.17 Install an aftermarket amplifier in an OEM system.
 - 22.18 Install and configure an aftermarket head unit in an OEM system.
 - 22.19 Install an aftermarket power antenna.
- 23.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive security and convenience elements and components--The student will be able to:
- 23.01 Determine the physical characteristics of an aftermarket security system.
 - 23.02 Determine what connections and installation accessories are required to interface a particular security system with the vehicle.
 - 23.03 Install, program and configure an aftermarket security system.

- 23.04 Describe the characteristics and functions of various automotive relays and some of their common applications.
 - 23.05 Describe the characteristics and functions of various silicone diodes and some of their common applications.
 - 23.06 Describe situations when relays and diodes need to be added to an automotive security system.
 - 23.07 Install relays and diodes in an automotive security system.
 - 23.08 Determine the physical characteristics of a remote starter system.
 - 23.09 Determine what connections are required to interface a particular remote starter system with the vehicle.
 - 23.10 Install, program and configure a remote starter system.
- 24.0 Demonstrate proficiency in the installation of Rear Seat Entertainment (RSE) Systems--
The student will be able to:
- 24.01 Determine the physical characteristics of a stand alone rear seat entertainment system.
 - 24.02 Determine what connections are required to interface a particular stand alone rear seat entertainment system with the vehicle.
 - 24.03 Install, program and configure a stand alone rear seat entertainment system.
 - 24.04 Integrate the sound from the video system through the OEM audio system.
- 25.0 Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles--The student will be able to:
- 25.01 Describe the overall effect of voltage drops and determine the points at which they can originate.
 - 25.02 Measure voltage drops between two points.
 - 25.03 Diagnose a voltage drop against a known good reference measurement.
 - 25.04 Evaluate short circuits and determine how they can originate.
 - 25.05 Locate and repair a short circuit between two points.
 - 25.06 Evaluate open circuits and determine how they can originate.
 - 25.07 Locate and repair an open circuit between two points.
 - 25.08 Measure and evaluate critical components for proper functioning.
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 26.01 Describe the nature and types of business organizations. SY1.0
 - 26.02 Explain the effect of key organizational systems on performance and quality.
 - 26.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 26.04 Explain the impact of the global economy on business organizations.
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 27.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 27.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 27.03 Conduct and participate in meetings to accomplish work tasks. LT4.0

- 27.04 Employ mentoring skills to inspire and teach others. LT5.0
- 28.0 Explain the importance of employability and entrepreneurship skills --The student will be able to:
- 28.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 28.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 28.08 Research the benefits of ongoing professional development. ECD9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 28.10 Demonstrate knowledge of the “Right-To-Know Law” as recorded in (29 CFR-1910.1200).
 - 28.11 Read and understand manufacturer’s specification sheets, equipment installation instructions and equipment owner’s manuals.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Smart Home Technology 1
Course Number: 8140310
Course Credit: 1

Course Description:

This course is designed to provide instruction in basic cabling.

01.0 Demonstrate proficiency in occupational safety--The student will be able to:

- 01.01 List the level of electricity (shock) considered lethal to humans.
- 01.02 Describe OSHA body restraint rules and list hazards associated with the use of ladders and working at Heights.
- 01.03 Explain the purpose and reasons for adherence to NEC and NFPC codes.
- 01.04 Explain the purpose and usage of the REMC – Residential Electrical Maintenance Code.
- 01.05 Describe safety considerations when working in and around motor vehicles.

02.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 02.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 02.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

03.0 Demonstrate proficiency in basic cabling--The student will be able to:

- 03.01 Identify and define network cabling characteristics and performance.
- 03.02 Explain cable length limitations.
- 03.03 Describe network protocols.
- 03.04 Explain how to find correct cable pair colors and list applicable TIA/EIA standard.
- 03.05 Describe the situations where an installer needs to refer and abide by TIA 570-A.
- 03.06 Describe cabling components and methods addressed by TIA 568 A&B.
- 03.07 Describe the Telcordia standards related to cabling.
- 03.08 List fiber optic cable skin, eye and inhalation precautions.
- 03.09 Demonstrate connector and splice methods and testing.
- 03.10 Differentiate between glass and plastic fiber and list reasons for choices.
- 03.11 Summarize basic light theory and list commonly used wavelengths/frequencies.
- 03.12 Install, configure and troubleshoot LAN cable systems (twisted pair, coax, or fiber).
- 03.13 Configure and troubleshoot patch bay and network equipment.
- 03.14 Install proper termination (e.g. RCA, BNC and F).
- 03.15 Define Backbone/Distribution cabling and compare with link, workstation and patch cables.
- 03.16 Explain the differences between Composite and Hybrid Cables.
- 03.17 List the types of signal losses in cables, the purpose of matching correct impedances and convert dB levels to microvolt levels.

- 03.18 Make connections using crimp connectors.
- 03.19 Explain the color applications for crimp connectors.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 04.02 Locate, organize and reference written information from various sources. CM3.0
- 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 04.05 Apply active listening skills to obtain and clarify information. CM7.0
- 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 05.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 05.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 06.0 Demonstrate proficiency in electrical basics--The student will be able to:
- 06.01 Identify and use hand tools properly.
- 06.02 Demonstrate acceptable soldering and desoldering and rework and repair techniques.
- 06.03 Identify and use power tools properly.
- 06.04 Identify sources of electricity.
- 06.05 Define voltage, current, resistance, power and energy.
- 06.06 Apply Ohm's law and power formulas.
- 06.07 Measure properties of a circuit using appropriate test equipment.
- 06.08 Demonstrate Electrostatic Discharge (ESD) safety procedures.
- 06.09 Read and interpret color codes and symbols to identify electrical/electronic components and values.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Smart Home Technology 2
Course Number: 8140300
Course Credit: 1

Course Description:

This course is designed to provide instruction in wiring and basic electronics.

- 07.0 Demonstrate proficiency in basic computer usage--The student will be able to:
- 07.01 Demonstrate knowledge of OS file systems.
 - 07.02 Demonstrate basic operation and usage of common applications.
 - 07.03 Demonstrate operation and usage of fundamental OS utilities.
 - 07.04 Demonstrate operation and usage of browser software and the internet.
 - 07.05 Demonstrate an understanding of the boot process.
 - 07.06 Locate and install device drivers.
 - 07.07 Identify front panel controls, indicators, rear case connectors and indicators.
 - 07.08 Demonstrate an understanding of the effects of temperature extremes and moisture content in regards to computer/network equipment.
 - 07.09 Demonstrate an understanding of the effects of heat load and ventilation in regards to computer/network equipment.
 - 07.10 Install, configure and troubleshoot smart home related computer applications.
 - 07.11 Demonstrate an understanding of input and output devices.
 - 07.12 Demonstrate proficiency installing and troubleshooting serial, parallel, USB and IEEE 1394 devices.
- 08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 09.01 Solve problems for volume, weight, area and circumference and perimeter measurements for rectangles, square and cylinders.
 - 09.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, and feet and inches.
 - 09.03 Add, subtract, multiply and divide using fractions, decimals and whole numbers.
 - 09.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 09.05 Demonstrate an understanding of federal, state and local taxes and their computation.

- 09.06 Demonstrate knowledge of arithmetic operations. AF3.2
- 09.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.08 Construct charts/tables/graphs using functions and data. AF3.5
- 10.0 Demonstrate proficiency in premises wiring--The student will be able to:
- 10.01 Demonstrate roughing-in cabling in new structures, installing wall boxes, conduit, distribution boxes, speaker in-wall units and CCTV mounts.
- 10.02 Explain the use of biscuit jacks/surface mount boxes.
- 10.03 Explain the use of wall plates and indicate proper locations.
- 10.04 Describe purposes and locations for J-Hooks and cable trays.
- 10.05 Explain inductive signals and interference, their effects and precautions and separation distances for cabling.
- 10.06 List advantages of stranded vs. solid wiring and reasons for choosing either.
- 10.07 Describe detriments in exceeding TIA/EIA Tensile Strength/Bend Ratios.
- 10.08 Outline the purposes of wiring labeling and how it is applied.
- 10.09 Explain methods used to closely estimate cable requirements for individual applications.
- 10.10 Explain UTP untwist precautions and define NEXT/FEXT.
- 10.11 List common problems encountered in coaxial cable installation or repair.
- 10.12 Describe Surface Mount Channeling and how it is utilized.
- 10.13 Describe the need for drywall and other penetrations of walls and ceilings in retrofit applications.
- 10.14 Demonstrate restoration techniques and list materials used.
- 11.0 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:
- 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 11.02 Explain emergency procedures to follow in response to workplace accidents.
- 11.03 Create a disaster and/or emergency response plan. SHE2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Smart Home Technology 3
Course Number: 8140300
Course Credit: 1

Course Description:

This course is designed to provide instruction in systems installation and integration.

12.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 12.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 12.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 12.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 12.04 Interpret and explain written organizational policies and procedures. ELR2.0

13.0 Use information technology tools--The students will be able to:

- 13.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Demonstrate proficiency in networking--The student will be able to:

- 14.01 Identify basic networking protocols and their uses and know when and how to apply them.
- 14.02 Install, connect and maintain network clients and peripherals to various network operating systems.
- 14.03 Demonstrate setup, configuring and sharing of user security, file, printer and network resources.
- 14.04 Connect, configure, and troubleshoot devices for network connectivity.
- 14.05 Recognize and implement methods of network security.
- 14.06 Configure setup and maintain a residential LAN (Local Area Network).
- 14.07 Configure setup and maintain a secure wireless network.

15.0 Demonstrate proficiency in audio/video systems configuration and installation--The student will be able to:

- 15.01 Install, configure and maintain residential home theater system video components.

- 15.02 Identify display types (e.g. Plasma, DLP, LCD, LCOS, CRT, Rear projection).
 - 15.03 Define hi definition resolutions options (e.g. 720p, 1080i, 1080p, etc.).
 - 15.04 Define tuner types (e.g. NTSC, PAL, ATSC, QAM, Cable card, VSB, NDVBT, DVBS).
 - 15.05 Describe Video Processing (e.g. scalers, processors, up-conversion).
 - 15.06 Explain video aspect ratios.
 - 15.07 Perform video setup (Calibration e.g. color balance, contrast, brightness, etc.).
 - 15.08 Identify digital video cable and connector types (e.g. DVI and HDMI – compatibility and interoperability issues).
 - 15.09 Install, configure and maintain residential home theater system audio components.
 - 15.10 Define basics of acoustics (e.g. Sound reflection, speaker placement, sound cancellation, and sound balance).
 - 15.11 Define multichannel surround (e.g. SACD, DVDA, DTS, DTSES, DDEX, DD, etc.) (e.g. Crossovers and speaker setup).
 - 15.12 Install and configure content management systems and describe their applications in a residential environment.
 - 15.13 Describe typical applications and physical connection for the following media resources: media servers, media PC, MP3 players, DVD players, satellite, cable, DVR, gaming systems, satellite radio, Legacy devices, streaming media.
 - 15.14 Implement, maintain and troubleshoot multiroom video systems.
 - 15.15 Define signal types and their applications such as Digital Distribution (e.g. Analog to IP converters, IP to Analog converters, Wireless distribution, IEEE 1394) and RF Distribution and Analog Distribution (e.g. Composite, Component, and S-Video, Balun.)
 - 15.16 Identify and troubleshoot noise and interference. (e.g. Splitters and taps, active and passive, Attenuators, Bidirectional, Modulation and filtration, Amplification, IR over COAX.)
 - 15.17 Describe components satellite signal distribution: multi-switches, diplexer and LNB (Low Noise Block Down Converter).
- 16.0 Demonstrate proficiency in telephony/VoIP systems configuration and installation--The student will be able to:
- 16.01 Describe POTS vs. VoIP delivery.
 - 16.02 Identify and troubleshoot common VoIP issues such as: VoIP compatibility, whole house distribution of VoIP, Performance and Quality of Service (QoS).
 - 16.03 Identify and troubleshoot common POTS issues such: Cross talk, radio interference, dead ports and REN (Ringer Equivalence Number).
 - 16.04 Describe and define fundamentals of telephone systems.
 - 16.05 Diagram a basic telephone circuit.
 - 16.06 Define Tip and Ring and show wiring conventions in POTS systems and list expected voltages on telephone plugs.
 - 16.07 Name the conventional color of UTP wires used with 2/4/8 wire connections.
 - 16.08 Compare Analog and Digital telephone systems.
 - 16.09 Explain where Punch Down Blocks – 66/110 are used and their purpose.
 - 16.10 Differentiate between Internet - Cable TV - Wireless Systems and B-VoIP.
- 17.0 Demonstrate proficiency in security and surveillance systems configuration and installation--The student will be able to:

- 17.01 Define monitored and notification methods such as: phone line, cell phone, radio frequency and IP.
 - 17.02 Explain the monitoring formats SIA and Contact ID, 4/2 and 3/1.
 - 17.03 Describe basic security terminology.
 - 17.04 Install and configure security panel.
 - 17.05 Define types of peripherals and accessories such as: motion sensors, glass break detectors, magnetic contacts, smoke fire (e.g. smoke detection, heat detection), environmental sensors (e.g. carbon monoxide, gas, water, temperature), vehicle detection, photo-electric beam devices, microwave beam devices, cameras, pressure sensors, sirens, strobes, security keypads, keyfobs and panic buttons.
 - 17.06 Describe wired security infrastructure: 22/4- standard power devices, 22/2- magnetic contacts, 2 and 4 conductor fire wire (e.g. keypads, sounders, power supplies, smoke and fire detectors), power supervision relays, polarity reversal relays, line seizure, end of line resistors.
 - 17.07 Describe wireless security infrastructure.
 - 17.08 Identify access control devices such as keypads, card readers, biometric readers, proximity readers, door strikes, electronic deadbolts, magnetic locks.)
 - 17.09 Identify access control protocols such as Weigand.
 - 17.10 Identify, configure, install, maintain and troubleshoot security and surveillance cameras: IP, Analog and Hybrid.
 - 17.11 Define Camera specifications including: lens type, lux rating, resolution, B&W vs. Color, IR illumination and power consumption.
 - 17.12 Explain security camera applications: Indoor/outdoor, day/night, fixed vs. animated, surveillance (e.g. door cams, nanny cams), recording (e.g. DVR, triggers – internal vs. external detection) and sequencing vs. multiplexing.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 18.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 18.02 Describe the effect of money management on personal and career goals. FL3.0
 - 18.03 Develop a personal budget and financial goals. FL3.1
 - 18.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 18.05 Maintain financial records. FL3.3
 - 18.06 Read and reconcile financial statements. FL3.4
 - 18.07 Research, compare and contrast investment opportunities.
- 19.0 Demonstrate proficiency in home control integration and management--The student will be able to:
- 19.01 Identify user interface devices and their appropriate applications: remote controls, keypads, touchscreens, keyfobs, telephones, smartphones, cell phones, PDA's, web tablets, personal computers and laptops.
 - 19.02 Define, recognize and install control systems which integrate subsystems in the home such as Embedded control systems and Personal Computer (PC) based control systems.
 - 19.03 Identify commonly used communication protocols and their application: IR, Serial, IP, RF, Bluetooth, Contact closure, Inputs (zones), Z-wave and Zigbee, ASCII and Proprietary protocols.

- 19.04 Describe basic HVAC (Heating Ventilation and Air Conditioning) terminology and install peripheral control devices.
- 19.05 Describe basic lighting terminology and install peripheral control devices.
- 19.06 Identify lighting control applications: Indoor and outdoor, Centralized and distributed, Dimming, Scenes, Relay/switching, Occupancy/motion sensing, Time and event driven, Window, treatments, Energy management, Security interface, Lighting, Connectivity and Motor speed control.
- 19.07 Describe communication interface/bridge: Power line phase couplers.
- 19.08 Identify lighting control protocols (Open standards) such as: Z-wave, ZigBee, Powerline carrier (X10 protocol /PLC) and UPB Universal Powerline Bus).
- 19.09 Identify lighting control protocols (Proprietary RF and low voltage).
- 19.10 Identify and install component power protection devices.
- 19.11 Identify whole house protection options: Surge Suppression and Power Conditioning.
- 19.12 Identify and install point protection: Surge protectors (high voltage and ancillary low voltage devices: e.g. satellite, CATV, etc.), UPS (Uninterruptible Power Supply) and Power Conditioning.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mobile Electronics Technology 4
Course Number: 8140300
Course Credit: 1

Course Description:

This course is designed to provide instruction in audio systems.

20.0 Demonstrate proficiency in the assessment of vehicle electrical system condition--The student will be able to:

- 20.01 Identify vehicle electrical system components.
- 20.02 Evaluate the vehicle's current electrical system condition.
- 20.03 Identify faulty or weak components.

21.0 Demonstrate proficiency in evaluating and assessing various circuits in a vehicle where aftermarket components will connect--The student will be able to:

- 21.01 Evaluate the vehicle's ability to support aftermarket equipment, in particular audio amplifiers.
- 21.02 Determine electrical upgrades according electrical demands.
- 21.03 Evaluate ignition switch wiring and associated circuits.
- 21.04 Test all ignition switch circuits.
- 21.05 Determine the polarity and function of each wire connected to the ignition switch.
- 21.06 Evaluate headlight switch wiring and associated circuits.
- 21.07 Test all headlight switch circuits.
- 21.08 Determine the polarity and function of each wire connected to the headlight switch.
- 21.09 Evaluate the door lock/unlock switch wiring and associated circuits.
- 21.10 Test all door lock/unlock switch circuits.
- 21.11 Determine the polarity and function of each wire connected to the door lock/unlock switch.
- 21.12 Evaluate the door pin switches wiring and associated circuits.
- 21.13 Test all door pin switch circuits.
- 21.14 Determine the polarity and function of each wire connected to the door pin switches and interior lights.
- 21.15 Evaluate the trunk release switch wiring and associated circuits.
- 21.16 Test the trunk release switch circuit.
- 21.17 Determine the polarity and function of each wire connected to the trunk release switch.
- 21.18 Evaluate the foot brake switch wiring and associated circuits.
- 21.19 Test the foot brake switch circuit.
- 21.20 Determine the polarity and function of each wire connected to the foot brake switch.

22.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive audio system elements, enhancements or the replacement of audio system components--The student will be able to:

- 22.01 Describe the components used in soldering.
- 22.02 Perform Soldered connections.
- 22.03 Determine if soldering is appropriate for a particular installation situation.
- 22.04 Determine the physical characteristics of an aftermarket head unit.
- 22.05 Determine what connections and installation accessories are required for a particular head unit replacement.
- 22.06 Install an aftermarket head unit.
- 22.07 Determine the physical characteristics of aftermarket speakers.
- 22.08 Determine what connections and installation accessories are required for a particular set of replacement speakers.
- 22.09 Install aftermarket speakers.
- 22.10 Determine the physical characteristics of aftermarket amplifier.
- 22.11 Determine what connections and installation accessories are required for a particular amplifier.
- 22.12 Install an aftermarket amplifier.
- 22.13 Connect multiple speakers to a single channel.
- 22.14 Perform both series and parallel wiring configurations noting the electrical characteristics of each.
- 22.15 Perform amplifier bridging to one speaker.
- 22.16 Perform amplifier bridging to two speakers.
- 22.17 Install an aftermarket amplifier in an OEM system.
- 22.18 Install and configure an aftermarket head unit in an OEM system.
- 22.19 Install an aftermarket power antenna.

23.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive security and convenience elements and components--The student will be able to:

- 23.01 Determine the physical characteristics of an aftermarket security system.
- 23.02 Determine what connections and installation accessories are required to interface a particular security system with the vehicle.
- 23.03 Install, program and configure an aftermarket security system.
- 23.04 Describe the characteristics and functions of various automotive relays and some of their common applications.
- 23.05 Describe the characteristics and functions of various silicone diodes and some of their common applications.
- 23.06 Describe situations when relays and diodes need to be added to an automotive security system.
- 23.07 Install relays and diodes in an automotive security system.
- 23.08 Determine the physical characteristics of a remote starter system.
- 23.09 Determine what connections are required to interface a particular remote starter system with the vehicle.
- 23.10 Install, program and configure a remote starter system.

24.0 Demonstrate proficiency in the installation of Rear Seat Entertainment (RSE) Systems--The student will be able to:

- 24.01 Determine the physical characteristics of a stand alone rear seat entertainment system.
- 24.02 Determine what connections are required to interface a particular stand alone rear seat entertainment system with the vehicle.
- 24.03 Install, program and configure a stand alone rear seat entertainment system.
- 24.04 Integrate the sound from the video system through the OEM audio system.

- 25.0 Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles--The student will be able to:
 - 25.01 Describe the overall effect of voltage drops and determine the points at which they can originate.
 - 25.02 Measure voltage drops between two points.
 - 25.03 Diagnose a voltage drop against a known good reference measurement.
 - 25.04 Evaluate short circuits and determine how they can originate.
 - 25.05 Locate and repair a short circuit between two points.
 - 25.06 Evaluate open circuits and determine how they can originate.
 - 25.07 Locate and repair an open circuit between two points.
 - 25.08 Measure and evaluate critical components for proper functioning

- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 - 26.01 Describe the nature and types of business organizations. SY1.0
 - 26.02 Explain the effect of key organizational systems on performance and quality.
 - 26.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 26.04 Explain the impact of the global economy on business organizations.

- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 27.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 27.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 27.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 27.04 Employ mentoring skills to inspire and teach others. LT5.0

- 28.0 Explain the importance of employability and entrepreneurship skills --The student will be able to:
 - 28.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 28.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 28.08 Research the benefits of ongoing professional development. ECD9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

- 28.10 Demonstrate knowledge of the “Right-To-Know Law” as recorded in (29 CFR-1910.1200).
- 28.11 Read and understand manufacturer’s specification sheets, equipment installation instructions and equipment owner’s manuals.

2013 - 2014

**Florida Department of Education
Curriculum Framework**

Course Title: Architecture and Construction Directed Study
Career Cluster: Architecture and Construction

Secondary – Career Preparatory	
Course Number	8700100
CIP Number	0647999901
Grade Level	11-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	Any 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 Architecture and Construction cluster that will enhance opportunities for employment in the career field chosen by the student.

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.

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.

Special Notes

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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 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).

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.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architecture and Construction Directed Study
Course Number: 8700100
Course Credit: 1 credit

01.0 Demonstrate expertise in a specific occupation within the career cluster.

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.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Course Title: **Architecture and Construction Cooperative Education OJT**
Course Type: **Career Preparatory**
Career Cluster: **Architecture and Construction**

	Secondary	PSAV
Course Number	8700400	I469999
CIP Number	06469999CP	06469999CP
Grade Level	9-12, 30, 31	30, 31
Standard Length	Multiple credits	Multiple hours
Teacher Certification	Any Certification appropriate to the students' chosen career field	Any Certification appropriate to the students' chosen career field
CTSO	SkillsUSA	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 Architecture and Construction 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 Architecture and Construction cluster

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.

Architecture and Construction 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.

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.fl DOE.org/workforce/dwdframe/pdf/STEPS-Manual.pdf>.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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 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 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).

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.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Architecture and Construction Cooperative Education OJT
Secondary Number: 8700400
PSAV Number: I469999

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.

2013 - 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Industrial Electricity
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8706300	I460313
CIP Number	0646030203	0646030203
Grade Level	9-12, 30, 31	30, 31
Standard Length	6 Credits	960 Hours
Teacher Certification	ELECTRICAL @7 7G	ELECTRICAL @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3013 - Helpers—Electricians 47-2111- Electricians	47-3013 - Helpers—Electricians 47-2111- Electricians
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries.

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 Architecture & Construction 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 Architecture & Construction career cluster.

This program focuses on broad, transferable skills, stresses the understanding of all aspects of the electricity 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.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. The recommended sequence allows students to complete specified portions of a program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0603	Electrician Helper	300 Hours	47-3013
B	BCV0667	Industrial Electrician	300 Hours	47-2111
C	BCV0666	Electrical Technician	360 Hours	47-2111

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8706310	Industrial Electricity 1	1 Credit	47-3013	2
	8706320	Industrial Electricity 2	1 Credit		2
B	8706330	Industrial Electricity 3	1 Credit	47-2111	2
	8706340	Industrial Electricity 4	1 Credit		2
C	8706350	Industrial Electricity 5	1 Credit	47-2111	2
	8706360	Industrial Electricity 6	1 Credit		2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.

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. 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>).

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.

- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate an understanding of basic electricity.
- 07.0 Read and interpret basic electric codes.
- 08.0 Apply mathematics knowledge and skills to electricity.
- 09.0 Demonstrate further understanding of electricity.
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate language arts knowledge and skills.
- 12.0 Demonstrate science knowledge and skills.
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Use information technology tools.
- 16.0 Demonstrate competency in industrial wiring.
- 17.0 Demonstrate competency in transformers.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 20.0 Demonstrate competency in AC and DC motors.
- 21.0 Demonstrate competency in electrical and electronic control circuits and equipment.
- 22.0 Demonstrate competency in electronic circuits and devices.
- 23.0 Demonstrate competency in Programmable Logic Controllers (PLCs).

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Industrial Electricity
PSAV Number: I460313

Course: BCV0603
Occupational Completion Point: A
Electrician Helper - 300 Hours - SOC 47-3013

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Create a disaster and/or emergency response plan. SHE2.0
 - 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
 - 01.08 Describe "Right-to-Know" Law as recorded in (29 CFR.1910.1200)
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:
- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
 - 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
 - 02.03 Lay out electrical devices, complying with regulations.
 - 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 03.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 03.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 03.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 03.04 Draw each type of circuit and calculate the circuit values.
 - 03.05 Explain and apply Ohm's Law.

- 03.06 Compute conductance and resistance of conductors and insulators.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 04.02 Locate, organize and reference written information from various sources. CM3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 05.0 Demonstrate mathematics knowledge and skills--The student will be able to:
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate an understanding of basic electricity--The student will be able to:
- 06.01 Explain the principles of electromagnetism.
 - 06.02 Explain the magnetic properties of circuits and devices.
 - 06.03 Relate electricity to the nature of matter.
 - 06.04 Describe various ways that electricity is produced.
- 07.0 Read and interpret basic electric codes--The student will be able to:
- 07.01 Describe the importance of following the local, state and national electric codes.
 - 07.02 Read and interpret basic electric codes, wiring plans and specifications.
 - 07.03 Identify licensure requirements for electrical occupations.
 - 07.04 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.
- 08.0 Apply mathematics knowledge and skills to electricity--The student will be able to:
- 08.01 Demonstrate Solve basic algebraic formulas related to electricity.
 - 08.02 Solve basic trigonometric functions related to electrical theory.
 - 08.03 Explain basic AC theory and solve related mathematical problems using appropriate test equipment.
 - 08.04 Solve math-related problems from measurements on training aids. (Optional)
- 09.0 Demonstrate further understanding of electricity--The student will be able to:
- 09.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.

- 09.02 Explain how voltage is produced by chemical, mechanical, thermal, photoelectric and piezo electric means.
- 09.03 Identify electrical symbols in construction documents.
- 10.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 11.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 11.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 12.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 12.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 12.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

Course: BCV0667**Occupational Completion Point: B****Industrial Electrician – 300 Hours – SOC 47-2111**

- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 13.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 13.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 13.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 13.04 Employ mentoring skills to inspire and teach others. LT5.0
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

- 15.0 Use information technology tools--The students will be able to:
- 15.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 15.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 15.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 15.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 16.0 Demonstrate competency in industrial wiring--The student will be able to:
- 16.01 Draw an industrial one-line power diagram.
 - 16.02 Test insulation resistance using a megohm meter.
 - 16.03 Install a motor branch circuit.
 - 16.04 Using the National Electrical Code (NEC), make the following required calculations:
 - a. Conductor size
 - b. Overcurrent protection
 - c. Overload protection
 - d. Short circuit protection
 - 16.05 Install a 277v lighting branch circuit.
 - 16.06 Describe a bus duct power distribution system.
 - 16.07 Describe fiber-optic installation requirements.
 - 16.08 Demonstrate the use of industrial test equipment.
 - 16.09 Install the following:
 - a. Disconnect switch - fused and unfused
 - b. Raceways
 - c. Emergency stop switch
 - d. Circuit breaker
 - e. Panelboard
- 17.0 Demonstrate competency in transformers--The student will be able to:
- 17.01 Explain the basic principles of mutual induction and transformer action.
 - 17.02 Explain the operation and use of a current transformer.
 - 17.03 Explain the operation and use of a potential transformer.
 - 17.04 Explain the operation and use of a buck-boost transformer and when it is used.
 - 17.05 Explain and connect 3 phase transformers in both delta and wye configuration.
 - 17.06 Calculate the over current protection requirements for the primary and secondary.
 - 17.07 Explain what transformer impedance is and its importance.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 18.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 18.02 Describe the effect of money management on personal and career goals. FL3.0

- 18.03 Develop a personal budget and financial goals. FL3.1
- 18.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 18.05 Maintain financial records. FL3.3
- 18.06 Read and reconcile financial statements. FL3.4
- 18.07 Research, compare and contrast investment opportunities.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 19.01 Describe the nature and types of business organizations. SY1.0
- 19.02 Explain the effect of key organizational systems on performance and quality.
- 19.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 19.04 Explain the impact of the global economy on business organizations.
- 20.0 Demonstrate competency in AC and DC motors--The student will be able to:
- 20.01 Install and connect the following types of DC motors:
- a. Series
 - b. Shunt
 - c. Compound
- 20.02 Install and connect the following types of single phase AC motors:
- a. Capacitor-start
 - b. Capacitor-start and run
 - c. Split-phase inductor
 - d. Universal
 - e. Repulsion-start, induction-run
- 20.03 Install and connect the following types of three phase AC motors:
- a. Squirrel-cage induction
 - b. Wound-rotor
 - c. Synchronous
- 20.04 Demonstrate the ability to select and connect a three-phase induction motor for either high or low voltage requirements.
- 21.0 Demonstrate competency in electrical and electronic control circuits and equipment--The student will be able to:
- 21.01 Draw an elementary motor control ladder diagram.
- 21.02 Interpret symbols, read and troubleshoot from schematics and ladder diagrams.
- 21.03 Describe the operation of the following overload relays:
- a. Thermal
 - b. Magnetic
 - c. Thermal-magnetic
- 21.04 Install a manual single phase and three phase control station.
- 21.05 Install a three-phase magnetic starter.
- 21.06 Install the following control devices:
- a. Start/stop station
 - b. Forward/reverse/stop station
 - c. Hands/off/auto station
 - d. Start/jog/stop station
 - e. Limit switches

- f. Pressure, temperature, level, and float switches
 - g. Pilot, run, and stop indicator lights
 - h. Control relay, and timing relays
 - i. Multi-motor push-button station
- 21.07 Install, operate, and troubleshoot the following relay control circuits:
- a. Start/stop
 - b. Forward/reverse
 - c. Hands-off-auto
 - d. Start/jog
 - e. Automatic timed sequence, "ON" and "OFF" delays
 - f. Manually timed sequence, "ON" and "OFF" delays
 - g. Plugging
 - h. DC injection braking
- 21.08 Install, operate and troubleshoot the following electronic control equipment and circuits:
- a. Variable Frequency Drive (VFD)
 - b. DC drive
- 21.09 Explain the alternatives to relay logic control.

Course: BCV0666

Occupational Completion Point: C

Electrical Technician – 360 Hours -- SOC 47-2111

22.0 Demonstrate competency in electronic circuits and devices--The student will be able to:

- 22.01 Explain the principles of operation of the following devices:
- a. Rectifiers and diodes
 - b. Transistors, PNP and NPN
 - c. Operational amplifiers
 - d. Logic gates
 - e. 555 timers
 - f. DC power supplies
 - g. Inductive, capacitive, and magnetic proximity switches
 - h. Photoelectric-eyes
 - i. Infrared scanners (bar-code)
 - j. Ultra-sonic sensors
- 22.02 Demonstrate competency in using the following test equipment:
- a. Oscilloscope
 - b. True RMS voltmeter
 - c. Signal generator
 - d. LCR meter
 - e. Logic probe
 - f. Function generator
 - g. Frequency counter
- 22.03 Conduct, test and troubleshoot the following:
- a. Half and full-wave DC power supplies
 - b. A filtered full-wave regulated DC power supply
 - c. And, or, not, and, exclusive or, and exclusive nor logic circuits
 - d. Operational amplifier circuit
 - e. Timing circuit using a 555 timer
 - f. Common base, common collector, and common emitter transistor circuits

for both NPN and PNP transistors.

22.04 Describe and write a simple Boolean equation.

22.05 Explain and demonstrate proper shielding and grouping methods.

23.0 Demonstrate competency in Programmable Logic Controllers (PLCs)--The student will be able to:

23.01 Name the basic components of a PLC.

23.02 Explain the operation of the following:

- a. Input modules
- b. Output modules
- c. Power supply
- d. Central Processing Unit (CPU)
- e. Programming device

23.03 Explain typical memory structure and the terms, ROM, RAM, EEPROM, Bit, Byte, Word, and Double-word.

23.04 Explain the following numbering systems and demonstrate ability to convert from one to another.

- a. Decimal
- b. Binary
- c. Octal
- d. Hexadecimal

23.05 Explain how digital logic gate devices are used in programming.

23.06 Connect, test, and operate the following input devices to the PLC:

- a. Pushbuttons (NC and NO)
- b. Proximity switches (capacitive and inductive)
- c. Photo-eyes (NC and NO)
- d. On/off switches
- e. Analog (4-20 ma and 0-10v) devices

23.07 Connect, test, and operate the following output devices:

- a. Indicator lights
- b. Magnetic motor contractors
- c. Solenoid operated valves

23.08 Demonstrate the ability to access the PLC software and monitor an operating program.

23.09 Write, debug, download, and run the following application programs:

- a. Basic start/stop operation
- b. Forward/reverse operation
- c. Timed sequence operation
- d. Counting operation
- e. Shift register operation
- f. Word transfer operation
- g. Analog input/output operation
- h. Jump instruction operation
- i. Set-reset operation
- j. Compare values operation
- k. Compute values operation

23.10 Demonstrate the ability to address inputs and outputs in programming language.

23.11 Demonstrate the ability to edit an existing operational program, document changes, and save changes to a file.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Industrial Electricity 1
Course Number: 8706310
Course Credit: 1

Course Description:

This course enables students to develop the essential competencies for working in the electrical industry. These competencies include safety practices, direct-current electrical-circuit skills, appropriate communication and math skills, basic electricity and electric codes.

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Create a disaster and/or emergency response plan. SHE2.0
 - 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
 - 01.08 Describe "Right-to-Know" Law as recorded in (29 CFR.1910.1200)
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:
- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
 - 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
 - 02.03 Lay out electrical devices, complying with regulations.
 - 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 03.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 03.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).

- 03.03 Analyze, and explain a series, series-parallel, and parallel circuit.
- 03.04 Draw each type of circuit and calculate the circuit values.
- 03.05 Explain and apply Ohm's Law.
- 03.06 Compute conductance and resistance of conductors and insulators.

- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
 - 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 04.02 Locate, organize and reference written information from various sources. CM3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

- 05.0 Demonstrate mathematics knowledge and skills--The student will be able to:
 - 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 05.03 Construct charts/tables/graphs using functions and data. AF3.5

- 06.0 Demonstrate an understanding of basic electricity--The student will be able to:
 - 06.01 Explain the principles of electromagnetism.
 - 06.02 Explain the magnetic properties of circuits and devices.
 - 06.03 Relate electricity to the nature of matter.
 - 06.04 Describe various ways that electricity is produced.

- 07.0 Read and interpret basic electric codes--The student will be able to:
 - 07.01 Describe the importance of following the local, state and national electric codes.
 - 07.02 Read and interpret basic electric codes, wiring plans and specifications.
 - 07.03 Identify licensure requirements for electrical occupations.
 - 07.04 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Industrial Electricity 2
Course Number: 8706320
Course Credit: 1

Course Description:

This course enables students to develop competencies related to math and science applications in electricity.

- 08.0 Apply mathematics knowledge and skills to electricity--The student will be able to:
- 08.01 Demonstrate Solve basic algebraic formulas related to electricity.
 - 08.02 Solve basic trigonometric functions related to electrical theory.
 - 08.03 Explain basic AC theory and solve related mathematical problems using appropriate test equipment.
 - 08.04 Solve math-related problems from measurements on training aids. (Optional)
- 09.0 Demonstrate further understanding of electricity--The student will be able to:
- 09.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.
 - 09.02 Explain how voltage is produced by chemical, mechanical, thermal, photoelectric and piezo electric means.
 - 09.03 Identify electrical symbols in construction documents.
- 10.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 11.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 11.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 12.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 12.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1

12.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.AF4.3

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Industrial Electricity 3
Course Number: 870633
Course Credit: 1

Course Description:

This course enables students to develop competencies related to, industrial wiring, and transformers.

- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 13.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 13.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 13.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 13.04 Employ mentoring skills to inspire and teach others. LT5.0
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 12.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 13.0 Use information technology tools--The students will be able to:
- 13.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 13.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 14.0 Demonstrate competency in industrial wiring--The student will be able to:
- 14.01 Draw an industrial one-line power diagram.
 - 14.02 Test insulation resistance using a megohm meter.
 - 14.03 Install a motor branch circuit.
 - 14.04 Using the National Electrical Code (NEC), make the following required calculations:
 - a. Conductor size

- b. Overcurrent protection
- c. Overload protection
- d. Short circuit protection
- 14.05 Install a 277v lighting branch circuit.
- 14.06 Describe a bus duct power distribution system.
- 14.07 Describe fiber-optic installation requirements.
- 14.08 Demonstrate the use of industrial test equipment.
- 14.09 Install the following:
 - a. Disconnect switch - fused and unfused
 - b. Raceways
 - c. Emergency stop switch
 - d. Circuit breaker
 - e. Panelboard
- 15.0 Demonstrate competency in transformers--The student will be able to:
 - 15.01 Explain the basic principles of mutual induction and transformer action.
 - 15.02 Explain the operation and use of a current transformer.
 - 15.03 Explain the operation and use of a potential transformer.
 - 15.04 Explain the operation and use of a buck-boost transformer and when it is used.
 - 15.05 Explain and connect 3 phase transformers in both delta and wye configuration.
 - 15.06 Calculate the over current protection requirements for the primary and secondary.
 - 15.07 Explain what transformer impedance is and its importance.
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
 - 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 16.02 Describe the effect of money management on personal and career goals. FL3.0
 - 16.03 Develop a personal budget and financial goals. FL3.1
 - 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 16.05 Maintain financial records. FL3.3
 - 16.06 Read and reconcile financial statements. FL3.4
 - 16.07 Research, compare and contrast investment opportunities.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Industrial Electricity 4
Course Number: 8706340
Course Credit: 1

Course Description:

This course enables students to develop competencies related to, AC and DC motors and electrical and electronic control circuits and equipment.

- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 17.01 Describe the nature and types of business organizations. SY1.0
 - 17.02 Explain the effect of key organizational systems on performance and quality.
 - 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 17.04 Explain the impact of the global economy on business organizations.
- 18.0 Demonstrate competency in AC and DC motors--The student will be able to:
- 18.01 Install and connect the following types of DC motors:
 - a. Series
 - b. Shunt
 - c. Compound
 - 18.02 Install and connect the following types of single phase AC motors:
 - a. Capacitor-start
 - b. Capacitor-start and run
 - c. Split-phase inductor
 - d. Universal
 - e. Repulsion-start, induction-run
 - 18.03 Install and connect the following types of three phase AC motors:
 - a. Squirrel-cage induction
 - b. Wound-rotor
 - c. Synchronous
 - 18.04 Demonstrate the ability to select and connect a three-phase induction motor for either high or low voltage requirements.
- 19.0 Demonstrate competency in electrical and electronic control circuits and equipment--The student will be able to:
- 19.01 Draw an elementary motor control ladder diagram.
 - 19.02 Interpret symbols, read and troubleshoot from schematics and ladder diagrams.
 - 19.03 Describe the operation of the following overload relays:
 - a. Thermal
 - b. Magnetic
 - c. Thermal-magnetic
 - 19.04 Install a manual single phase and three phase control station.

- 19.05 Install a three-phase magnetic starter.
- 19.06 Install the following control devices:
 - a. Start/stop station
 - b. Forward/reverse/stop station
 - c. Hands/off/auto station
 - d. Start/jog/stop station
 - e. Limit switches
 - f. Pressure, temperature, level, and float switches
 - g. Pilot, run, and stop indicator lights
 - h. Control relay, and timing relays
 - i. Multi-motor push-button station
- 19.07 Install, operate, and troubleshoot the following relay control circuits:
 - a. Start/stop
 - b. Forward/reverse
 - c. Hands-off-auto
 - d. Start/jog
 - e. Automatic timed sequence, "ON" and "OFF" delays
 - f. Manually timed sequence, "ON" and "OFF" delays
 - g. Plugging
 - h. DC injection braking
- 19.08 Install, operate and troubleshoot the following electronic control equipment and circuits:
 - a. Variable Frequency Drive (VFD)
 - b. DC drive
- 19.09 Explain the alternatives to relay logic control.

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**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 5
Course Number: 8706350
Course Credit: 1

Course Description:

This course enables student to develop competencies related to electronic circuits and devices.

20.0 Demonstrate competency in electronic circuits and devices--The student will be able to:

- 20.01 Explain the principles of operation of the following devices:
 - a. Rectifiers and diodes
 - b. Transistors, PNP and NPN
 - c. Operational amplifiers
 - d. Logic gates
 - e. 555 timers
 - f. DC power supplies
 - g. Inductive, capacitive, and magnetic proximity switches
 - h. Photoelectric-eyes
 - i. Infrared scanners (bar-code)
 - j. Ultra-sonic sensors
- 20.02 Demonstrate competency in using the following test equipment:
 - a. Oscilloscope
 - b. True RMS voltmeter
 - c. Signal generator
 - d. LCR meter
 - e. Logic probe
 - f. Function generator
 - g. Frequency counter
- 20.03 Conduct, test and troubleshoot the following:
 - a. Half and full-wave DC power supplies
 - b. A filtered full-wave regulated DC power supply
 - c. And, or, not, and, exclusive or, and exclusive nor logic circuits
 - d. Operational amplifier circuit
 - e. Timing circuit using a 555 timer
 - f. Common base, common collector, and common emitter transistor circuits for both NPN and PNP transistors
- 20.04 Describe and write a simple Boolean equation.
- 20.05 Explain and demonstrate proper shielding and grouping methods.

2013 - 2014**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 6
Course Number: 8706360
Course Credit: 1

Course Description:

This course enables students to develop competencies related to programmable logic controllers.

21.0 Demonstrate competency in Programmable Logic Controllers (PLCs)--The student will be able to:

- 21.01 Name the basic components of a PLC.
- 21.02 Explain the operation of the following:
 - a. Input modules
 - b. Output modules
 - c. Power supply
 - d. Central Processing Unit (CPU)
 - e. Programming device
- 21.03 Explain typical memory structure and the terms, ROM, RAM, EEPROM, Bit, Byte, Word, and Double-word.
- 21.04 Explain the following numbering systems and demonstrate ability to convert from one to another.
 - a. Decimal
 - b. Binary
 - c. Octal
 - d. Hexadecimal
- 21.05 Explain how digital logic gate devices are used in programming.
- 21.06 Connect, test, and operate the following input devices to the PLC:
 - a. Pushbuttons (NC and NO)
 - b. Proximity switches (capacitive and inductive)
 - c. Photo-eyes (NC and NO)
 - d. On/off switches
 - e. Analog (4-20 ma and 0-10v) devices
- 21.07 Connect, test, and operate the following output devices:
 - a. Indicator lights
 - b. Magnetic motor contractors
 - c. Solenoid operated valves
- 21.08 Demonstrate the ability to access the PLC software and monitor an operating program.
- 21.09 Write, debug, download, and run the following application programs:
 - a. Basic start/stop operation
 - b. Forward/reverse operation
 - c. Timed sequence operation
 - d. Counting operation
 - e. Shift register operation
 - f. Word transfer operation

- g. Analog input/output operation
 - h. Jump instruction operation
 - i. Set-reset operation
 - j. Compare values operation
 - k. Compute values operation
- 21.10 Demonstrate the ability to address inputs and outputs in programming language.
- 21.11 Demonstrate the ability to edit and existing operational program, document changes, and save changes to a file.

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**Florida Department of Education
Curriculum Framework**

Program Title: Cabinetmaking
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8720100	I480704
CIP Number	0648070302	0648070302
Grade Level	9-12, 30, 31	30,31
Standard Length	5 Credits	1200 Hours
Teacher Certification	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONSTR @7 7G TEC CONSTR @7 7G	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONSTR @7 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3012 - Helpers—Carpenters 51-7011 - Cabinetmakers and Bench Carpenters	47-3012 - Helpers—Carpenters 51-7011 - Cabinetmakers and Bench Carpenters
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the carpentry and cabinetmaking industry with a stress on basic cabinet making skills.

This program focuses on broad, transferable skills, stresses the understanding of the carpentry and cabinetmaking industry, and demonstrates elements of the industry. Such as planning, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for additional training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0107	Carpenter Helper	300 Hours	47-3012
B	BCV0235	Cabinet Finisher	150 Hours	51-7011
C	BCV0240	Cabinet Assembler	300 Hours	51-7011
D	BCV0243	Cabinetmaker	450 Hours	51-7011

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8722110	Carpentry & Cabinetmaking 1	1 Credit	47-3012	2
	8722120	Carpentry & Cabinetmaking 2	1 Credit		2
B	8722130	Carpentry & Cabinetmaking 3	1 Credit	51-7011	3
C	8720140	Cabinetmaking 4	1 Credit	51-7011	2
	8720150	Cabinetmaking 5	1 Credit		2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.fl DOE.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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 01.0 Apply shop safety skills.
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field.
- 04.0 Create basic construction drawings.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Recommend appropriate building materials for specific scenarios.
- 07.0 Select appropriate fasteners and hardware for specific scenarios.
- 08.0 Demonstrate science knowledge and skills.
- 09.0 Apply occupational safety skills.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession.
- 12.0 Fasten stock and joints.
- 13.0 Construct millwork from a set of drawings.
- 14.0 Demonstrate language arts knowledge and skills.
- 15.0 Read and design construction documents.
- 16.0 Assemble and install cabinets and components.
- 17.0 Solve problems using critical thinking skills, creativity and innovation.
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions.
- 19.0 Assemble and install cabinetry.
- 20.0 Install interior and exterior doors (wood and/or metal).
- 21.0 Use information technology tools.
- 22.0 Install trim and finish carpentry using plans and specifications.
- 23.0 Cut and install framing members for a floor (wood and/or metal).
- 24.0 Cut and install a wall and partition framing (wood and/or metal).
- 25.0 Install an interior wall and ceiling materials.
- 26.0 Describe the importance of professional ethics and legal responsibilities.
- 27.0 Lay out and construct an interior-stair system.
- 28.0 Demonstrate personal money-management concepts, procedures and strategies.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 31.0 Explain the importance of employability and entrepreneurship skills.
- 32.0 Prepare cabinets for finish.
- 33.0 Apply finishes.
- 34.0 Install cabinets.
- 35.0 Apply laminates.
- 36.0 Plan, design, and lay out casework.
- 37.0 Utilize power tools specific to cabinet making.
- 38.0 Construct joints.
- 39.0 Cut casework components.
- 40.0 Assemble casework components.

- 41.0 Construct cabinet drawers.
- 42.0 Construct cabinet doors.
- 43.0 Construct curved pieces.
- 44.0 Construct millwork details.

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**Florida Department of Education
Student Performance Standards**

Program Title: Cabinetmaking
PSAV Number: I480704

Course Number: BCV0107
Occupational Completion Point: A
Carpenter Helper – 300 Hours – SOC Code 47-3012

- 01.0 Apply shop safety skills--The student will be able to:
- 01.01 Maintain a clean, orderly and safe work area.
 - 01.02 Transport, handle and store materials safely.
 - 01.03 Operate a fire extinguisher.
 - 01.04 Qualify in basic first-aid procedures.
 - 01.05 Identify safety hazards.
 - 01.06 Demonstrate the use and care of personal protective equipment (PPE).
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions--The student will be able to:
- 02.01 Identify various hand and power tools.
 - 02.02 Select correct tools for specific jobs.
 - 02.03 Clean and care for tools and equipment.
 - 02.04 Demonstrate proficiency in the safe use of hand and power tools.
 - 02.05 Read and use carpenter's measuring tools.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field--The student will be able to: AF3.0
- 03.01 Apply geometry and algebra skills to solve math problems related to carpentry and/or cabinetmaking with and without a calculator. AF3.2
 - 03.02 Demonstrate knowledge of arithmetic operations. AF3.4
 - 03.03 Solve problems for distance, area and volume. AF3.5
 - 03.04 Analyze and apply data and measurements to solve problems and interpret documents. AF3.5
 - 03.05 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Create basic construction drawings--The student will be able to:
- 04.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 04.02 Relate information on construction drawings to actual locations on the print.
 - 04.03 Recognize different classifications of construction drawings.
 - 04.04 Interpret and use drawing dimensions and scales.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:

- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 05.02 Locate, organize and reference written information from various sources. CM3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.0 Recommend appropriate building materials for specific scenarios--The student will be able to:
- 06.01 Identify the grades and species of lumber and their appropriate uses.
- 06.02 Identify the actual and nominal sizes of lumber.
- 06.03 Identify the grades of plywood and wood products.
- 06.04 Identify defects and blemishes that affect the durability and strength of lumber.
- 06.05 Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
- 06.06 Explain the uses of various types of engineered lumber.
- 07.0 Select appropriate fasteners and hardware for specific scenarios--The student will be able to:
- 07.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
- 07.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 08.0 Demonstrate science knowledge and skills--The student will be able to: AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3
- 09.0 Apply occupational safety skills--The student will be able to:
- 09.01 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 09.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 09.03 Identify health-related problems that may result from exposure to hazardous materials.
- 09.04 Describe the proper precautions for handling hazardous materials.
- 09.05 Explain eligibility and the procedures for obtaining worker's compensation.
- 09.06 Explain the importance of complying with the Americans with Disabilities Act (ADA) requirements.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE2.0

- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession--The student will be able to:
- 11.01 Identify the hand tools commonly used by carpenters and describe their uses.
 - 11.02 Use hand tools in a safe and appropriate manner.
 - 11.03 State the general safety rules for operating all power tools, regardless of type.
 - 11.04 State the general rules for properly maintaining all power tools, regardless of type.
 - 11.05 Identify the portable power tools commonly used by carpenters and describe their uses.
 - 11.06 Use portable power tools in a safe and appropriate manner.
- 12.0 Fasten stock and joints--The student will be able to:
- 12.01 Identify types of glues and fasteners and describe their applications.
 - 12.02 Fasten stock with glue and clamps.
 - 12.03 Fasten stock and joints with appropriate fasteners, such as:
 - a. nails
 - b. staples
 - c. screws
 - d. bolts
 - 12.04 Fill and finish nail and screw holes with fillers and plugs.
 - 12.05 Glue and clamp stock, using various techniques.
- 13.0 Construct millwork from a set of drawings--The student will be able to:
- 13.01 Recognize the common types of woods used to make cabinets.
 - 13.02 Use stationary power tools.
 - 13.03 Identify and cut the various types of joints used in cabinetmaking.
 - 13.04 Build a cabinet from a set of drawings.
 - 13.05 Install plastic laminate on a countertop core.
- 14.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0
- 14.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 14.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 14.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 15.0 Read and design construction documents--The student will be able to:
- 15.01 Explain the types of drawings usually included in a set of plans and list the information found on each type.
 - 15.02 Identify the different types of lines used on construction drawings.
 - 15.03 Identify selected abbreviations commonly used on plans.
 - 15.04 Read and interpret plans, elevations, schedules, sections and details contained in basic construction drawings.
 - 15.05 State the purpose of written specifications.
 - 15.06 Identify and describe the parts of a specification.
 - 15.07 Conduct quantity takeoff for materials.
 - 15.08 Design millwork and draw details in construction documents for a given scenario.

- 16.0 Assemble and install cabinets and components--The student will be able to:
- 16.01 Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
 - 16.02 Install fasteners.
 - 16.03 Install drawers.
 - 16.04 Install various types of doors, including:
 - a. overlay
 - b. lipped
 - c. flush
 - 16.05 Install adjustable shelving.
 - 16.06 Install glass panels and metal grills.
 - 16.07 Install specialty hardware, such as a lazy Susan, wire racks and "pull-outs".
 - 16.08 Install sliding doors and track.
- 17.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 17.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 17.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 17.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 17.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions--The student will be able to:
- 18.01 Describe the impact of the construction industry on the natural environment.
 - 18.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 18.03 Recommend sustainable alternatives to conventional carpentry and cabinetmaking practices.
 - 18.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 18.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 18.06 Assess construction activities pertaining to the carpentry and cabinetmaking profession that contribute to a project's overall sustainability.

Course Number: BCV0235
Occupational Completion Point: B
Cabinet Finisher – 150 Hours – SOC Code 51-7011

- 19.0 Assemble and install cabinetry--The student will be able to:
- 19.01 Recognize the common types of woods used to make cabinets.
 - 19.02 Use stationary power tools.
 - 19.03 Identify and cut the various types of joints used in cabinetmaking.
 - 19.04 Build a cabinet from a set of drawings.
 - 19.05 Install plastic laminate on a countertop core.

- 20.0 Install interior and exterior doors (wood and/or metal)--The student will be able to:
- 20.01 Identify the types and parts of door systems.
 - 20.02 Install a door jamb and hang a door.
 - 20.03 Identify and install door hardware.
- 21.0 Use information technology tools--The student will be able to:
- 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, and email and internet applications. IT2.0
 - 21.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
 - 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 22.0 Install trim and finish carpentry using plans and specifications--The student will be able to:
- 22.01 Read an architect's scale for a trim and finish carpentry job.
 - 22.02 Determine dimensions from plans.
 - 22.03 Relate information on plans and specifications to real parts, locations, hardware and fasteners.
- 23.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:
- 23.01 Identify and describe floor-framing members, including subfloor.
 - 23.02 Lay out, cut and install supports for structures (e.g., sills, columns, beams and girders).
 - 23.03 Lay out and install various types of joists and openings, including joists for a cantilevered floor.
 - 23.04 Install various types of bridging.
 - 23.05 Install various types of subfloors, applying fastening techniques.
- 24.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
- 24.01 Identify framing members used in wall and partition construction.
 - 24.02 Lay out wall lines and partition locations on a floor.
 - 24.03 Lay out walls for studs, doors and windows.
 - 24.04 Cut studs, trimmers, cripples, headers and fire stops to length.
 - 24.05 Build T's, corners and headers.
 - 24.06 Lay out and assemble wall sections.
 - 24.07 Install wall sheathing and/or diagonal bracing.
 - 24.08 Install insulation material and a vapor barrier.
- 25.0 Install an interior wall and ceiling materials--The student will be able to:

- 25.01 Install furring strips.
 - 25.02 Install drywall.
 - 25.03 Identify and install paneling and trim.
 - 25.04 Identify and install ceiling materials and systems.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 27.0 Lay out and construct an interior-stair system--The student will be able to:
- 27.01 Identify the types and styles of interior-stair systems.
 - 27.02 Identify the components of an interior-stair system.
 - 27.03 Calculate the number of risers and treads for an interior-stair system.
 - 27.04 Lay out, cut and assemble an interior-stair system (rough and finish).
- 28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
- 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 28.02 Describe the effect of money management on personal and career goals. FL3.0
 - 28.03 Develop a personal budget and financial goals. FL3.1
 - 28.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 28.05 Maintain financial records. FL3.3
 - 28.06 Read and reconcile financial statements. FL3.4
 - 28.07 Research, compare and contrast investment opportunities.

Course Number: BCV0240
Occupational Completion Point: C
Cabinet Assembler – 300 Hours – SOC Code 51-7011

- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 30.01 Describe the nature and types of business organizations. SY1.0

- 30.02 Explain the effect of key organizational systems on performance and quality.
 - 30.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 30.04 Explain the impact of the global economy on business organizations.
- 31.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 31.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 31.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
 - 31.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
 - 31.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
 - 31.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 31.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 31.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 31.08 Research the benefits of ongoing professional development. ECD9.0
 - 31.09 Examine and describe entrepreneurship opportunities as a career planning option.
- 32.0 Prepare cabinets for finish--The student will be able to:
- 32.01 Fill nail and screw holes.
 - 32.02 Install wood plugs in prepared holes.
 - 32.03 Sand a cabinet and joints for finish.
 - 32.04 Select and apply proper filler.
 - 32.05 Sand wood surfaces for finishing.
 - 32.06 Stain, bleach, fill, and seal wood surfaces, as needed.
- 33.0 Apply finishes--The student will be able to:
- 33.01 Apply various types of finishes, including:
 - a. lacquer-based
 - b. water-based
 - c. oil-based
 - d. enamel
 - e. polyurethane
 - 33.02 Apply the types of finishes that the local market demands.
 - 33.03 Observe safety precautions when applying finishes, including wearing respirator and protective clothing approved by National Institute of Occupational Safety and Health (NIOSH).
- 34.0 Install cabinets--The student will be able to:
- 34.01 Load and secure casework for hauling.
 - 34.02 Check walls and floors for level and plumb.
 - 34.03 Determine fasteners for block or walls.
 - 34.04 Install upper and lower cabinets and other casework.
 - 34.05 Fasten a suspended cabinet unit to ceiling.
 - 34.06 Install countertops, including sink cutouts and back splash.
 - 34.07 Cut and install molding and trim.
 - 34.08 Adjust doors and drawers.

34.09 Clean work site.

35.0 Apply laminates--The student will be able to:

- 35.01 Lay out and cut core stock to specifications.
- 35.02 Lay out and cut laminate to specification.
- 35.03 Apply adhesive.
- 35.04 Apply laminate to core stock.
- 35.05 Trim and file plastic laminate edges.
- 35.06 Clean laminated surfaces.
- 35.07 Laminate a curved surface.
- 35.08 Repair laminate defects.

Course Number: BCV0243

Occupational Completion Point: D

Cabinetmaker – 450 Hours – SOC Code 51-7011

36.0 Plan, design, and lay out casework--The student will be able to:

- 36.01 Convert measurements from English to the metric system and from the metric system to the English system.
- 36.02 Interpret plans and explain common abbreviations used on drawings.
- 36.03 Draw a set of plans to scale.
- 36.04 Make a layout.
- 36.05 Develop a plan or procedure and a cut list for a specific job.
- 36.06 Estimate the materials required for the job.
- 36.07 Estimate labor and materials cost, using computer-application programs, if available.
- 36.08 Select and match wood stock for compatibility of grain and color.
- 36.09 Design and lay out cabinets, using a Computer-Assisted Design (CAD) program, if available.

37.0 Utilize power tools specific to cabinet making--The student will be able to:

- 37.01 Operate both portable and stationary power tools, observing safety precautions.
- 37.02 Select the correct power tools required for specific jobs.
- 37.03 Maintain power tools according to the manufacturer's specifications.

38.0 Construct joints--The student will be able to:

- 38.01 Construct various types of joints, including:
 - a. butt
 - b. dado
 - c. rabbeted
 - d. lap
 - e. miter
 - f. splined
 - g. tongue-and-groove
 - h. mortise-and-tenon
- 38.02 Install dowels in common wood joints.
- 38.03 Install biscuit spline in common wood joints.

39.0 Cut casework components--The student will be able to:

- 39.01 Cut frame stiles and rails.
- 39.02 Cut end, top, and bottom panels.
- 39.03 Cut partitions and sleepers.
- 39.04 Cut shelf panels.
- 39.05 Cut skeleton frame stiles and rails.
- 39.06 Cut a toe board and a back panel.
- 39.07 Cut a casework top or countertop and a back splash.
- 39.08 Cut drawer front, sides, back, and bottom.
- 39.09 Cut wood drawer guides.
- 39.10 Cut doors, such as:
 - a. solid
 - b. flexible
 - c. paneled
- 39.11 Route or shape casework components.

40.0 Assemble casework components--The student will be able to:

- 40.01 Assemble face frame, panels, toe boards, and skeleton frame.
- 40.02 Fasten a top or countertop and a back splash to casework.
- 40.03 Assemble drawers.
- 40.04 Assemble flexible and paneled doors.
- 40.05 Install shelving.
- 40.06 Attach trim, molding, and edge banding.

41.0 Construct cabinet drawers--The student will be able to:

- 41.01 Make various types of drawers, including:
 - a. overlay
 - b. lipped
 - c. flush
- 41.02 Construct drawer guides.

42.0 Construct cabinet doors--The student will be able to:

- 42.01 Make solid and tambour doors.
- 42.02 Make a frame and panel door.
- 42.03 Cut and set glass in a frame.
- 42.04 Band edges of solid doors.
- 42.05 Construct wood-door tracks.

43.0 Construct curved pieces--The student will be able to:

- 43.01 Cut a curved piece from solid stock.
- 43.02 Make a curved piece by saw kerfing.
- 43.03 Construct a curved piece, using curved segments.
- 43.04 Construct a curved piece by laminating thin strips.

44.0 Construct millwork details--The student will be able to:

- 44.01 Build shaped moldings to specifications.
- 44.02 Cut built-up moldings.
- 44.03 Cut a cornice.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry and Cabinetmaking 1
Course Number: 8722110
Course Credit: 1

Course Description:

The purpose of this course is for the student to develop competencies essential to the carpentry and cabinetmaking industry. These competencies include safety, use of manual and power tools, applied math, plan reading, building materials, fasteners and hardware.

01.0 Apply shop safety skills--The student will be able to:

- 01.01 Maintain a clean, orderly and safe work area.
- 01.02 Transport, handle and store materials safely.
- 01.03 Operate a fire extinguisher.
- 01.04 Qualify in basic first-aid procedures.
- 01.05 Identify safety hazards.
- 01.06 Demonstrate the use and care of personal protective equipment (PPE).

02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions--The student will be able to:

- 02.01 Identify various hand and power tools.
- 02.02 Select correct tools for specific jobs.
- 02.03 Clean and care for tools and equipment.
- 02.04 Demonstrate proficiency in the safe use of hand and power tools.
- 02.05 Read and use carpenter's measuring tools.

03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field--The student will be able to: AF3.0

- 03.01 Apply geometry and algebra skills to solve math problems related to carpentry and/or cabinetmaking with and without a calculator.
- 03.02 Demonstrate knowledge of arithmetic operations. AF3.2
- 03.03 Solve problems for distance, area and volume.
- 03.04 Analyze and apply data and measurements to solve problems and interpret documents.
AF3.4
- 03.05 Construct charts/tables/graphs using functions and data.
AF3.5

04.0 Create basic construction drawings--The student will be able to:

- 04.01 Recognize and identify basic construction drawing terms, components and symbols.
- 04.02 Relate information on construction drawings to actual locations on the print.

- 04.03 Recognize different classifications of construction drawings.
- 04.04 Interpret and use drawing dimensions and scales.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
 - 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 05.02 Locate, organize and reference written information from various sources. CM3.0
 - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.0 Recommend appropriate building materials for specific scenarios --The student will be able to:
 - 06.01 Identify the grades and species of lumber and their appropriate uses.
 - 06.02 Identify the actual and nominal sizes of lumber.
 - 06.03 Identify the grades of plywood and wood products.
 - 06.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 06.05 Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
 - 06.06 Explain the uses of various types of engineered lumber.
- 07.0 Select appropriate fasteners and hardware for specific scenarios --The student will be able to:
 - 07.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 07.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 08.0 Demonstrate science knowledge and skills--The student will be able to:
 - AF4.0
 - 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Carpentry and Cabinetmaking 2**
Course Number: **8722120**
Course Credit: **1**

Course Description:

The purpose of this course is for the student to continue developing competencies essential to the carpentry and cabinetmaking professions. These competencies include safety, hand and power tools, fastening methods, cabinet assembly and plan reading.

09.0 Apply occupational safety skills--The student will be able to:

- 09.01 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 09.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 09.03 Identify health-related problems that may result from exposure to hazardous materials.
- 09.04 Describe the proper precautions for handling hazardous materials.
- 09.05 Explain eligibility and the procedures for obtaining worker's compensation.
- 09.06 Explain the importance of complying with the Americans with Disabilities Act (ADA) requirements.

10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE2.0

11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession--The student will be able to:

- 11.01 Identify the hand tools commonly used by carpenters and describe their uses.
- 11.02 Use hand tools in a safe and appropriate manner.
- 11.03 State the general safety rules for operating all power tools, regardless of type.
- 11.04 State the general rules for properly maintaining all power tools, regardless of type.
- 11.05 Identify the portable power tools commonly used by carpenters and describe their uses.
- 11.06 Use portable power tools in a safe and appropriate manner.

12.0 Fasten stock and joints--The student will be able to:

- 12.01 Identify types of glues and fasteners and describe their applications.
- 12.02 Fasten stock with glue and clamps.

- 12.03 Fasten stock and joints with appropriate fasteners, such as:
 - a. nails
 - b. staples
 - c. screws
 - d. bolts
- 12.04 Fill and finish nail and screw holes with fillers and plugs.
- 12.05 Glue and clamp stock, using various techniques.

- 13.0 Construct millwork from a set of drawings--The student will be able to:
 - 13.01 Recognize the common types of woods used to make cabinets.
 - 13.02 Use stationary power tools.
 - 13.03 Identify and cut the various types of joints used in cabinetmaking.
 - 13.04 Build a cabinet from a set of drawings.
 - 13.05 Install plastic laminate on a countertop core.

- 14.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0
 - 14.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 14.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 14.03 Present information formally and informally for specific purposes and audiences. AF2.9

- 16.0 Read and design construction documents--The student will be able to:
 - 16.01 Explain the types of drawings usually included in a set of plans and list the information found on each type.
 - 16.02 Identify the different types of lines used on construction drawings.
 - 16.03 Identify selected abbreviations commonly used on plans.
 - 16.04 Read and interpret plans, elevations, schedules, sections and details contained in basic construction drawings.
 - 16.05 State the purpose of written specifications.
 - 16.06 Identify and describe the parts of a specification.
 - 16.07 Conduct quantity takeoff for materials.
 - 16.08 Design millwork and draw details in construction documents for a given scenario.

- 17.0 Assemble and install cabinets and components--The student will be able to:
 - 17.01 Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
 - 17.02 Install fasteners.
 - 17.03 Install drawers.
 - 17.04 Install various types of doors, including:
 - a. overlay
 - b. lipped
 - c. Flush
 - 17.05 Install adjustable shelving.
 - 17.06 Install glass panels and metal grills.
 - 17.07 Install specialty hardware, such as a lazy Susan, wire racks and "pull-outs".
 - 17.08 Install sliding doors and track.

- 18.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 18.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 18.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 18.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 18.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 19.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions--The student will be able to:
- 19.01 Describe the impact of the construction industry on the natural environment.
 - 19.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 19.03 Recommend sustainable alternatives to conventional carpentry and cabinetmaking practices.
 - 19.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 19.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 19.06 Assess construction activities pertaining to the carpentry and cabinetmaking profession that contribute to a project's overall sustainability.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry and Cabinetmaking 3
Course Number: 8722130
Course Credit: 1

Course Description:

This course provides students with a more in-depth knowledge of trim and finish carpentry, as well as an introduction to rough carpentry. Students will further their understanding of plan and specifications, assemble and install cabinetry, install doors, frame floors and walls and construct stairs.

20.0 Assemble and install cabinetry--The student will be able to:

- 20.01 Recognize the common types of woods used to make cabinets.
- 20.02 Use stationary power tools.
- 20.03 Identify and cut the various types of joints used in cabinetmaking.
- 20.04 Build a cabinet from a set of drawings.
- 20.05 Install plastic laminate on a countertop core.

21.0 Install interior and exterior doors (wood and/or metal)--The student will be able to:

- 21.01 Identify the types and parts of door systems.
- 21.02 Install a door jamb and hang a door.
- 21.03 Identify and install door hardware.

22.0 Use information technology tools--The student will be able to:

- 22.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 22.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, and email and internet applications. IT2.0
- 22.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
- 22.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

23.0 Install trim and finish carpentry using plans and specifications --The student will be able to:

- 23.01 Read an architect's scale for a trim and finish carpentry job.
- 23.02 Determine dimensions from plans.
- 23.03 Relate information on plans and specifications to real parts, locations, hardware and fasteners.

24.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:

- 24.01 Identify and describe floor-framing members, including subfloor.
 - 24.02 Lay out, cut and install supports for structures (e.g., sills, columns, beams and girders).
 - 24.03 Lay out and install various types of joists and openings, including joists for a cantilevered floor.
 - 24.04 Install various types of bridging.
 - 24.05 Install various types of subfloors, applying fastening techniques.
- 25.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
- 25.01 Identify framing members used in wall and partition construction.
 - 25.02 Lay out wall lines and partition locations on a floor.
 - 25.03 Lay out walls for studs, doors and windows.
 - 25.04 Cut studs, trimmers, cripples, headers and fire stops to length.
 - 25.05 Build T's, corners and headers.
 - 25.06 Lay out and assemble wall sections.
 - 25.07 Install wall sheathing and/or diagonal bracing.
 - 25.08 Install insulation material and a vapor barrier.
- 26.0 Install an interior wall and ceiling materials--The student will be able to:
- 26.01 Install furring strips
 - 26.02 Install drywall.
 - 26.03 Identify and install paneling and trim.
 - 26.04 Identify and install ceiling materials and systems.
- 27.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 27.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 27.02 Evaluate alternative responses to workplace situations based on personal professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 27.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 27.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 28.0 Lay out and construct an interior-stair system--The student will be able to:
- 28.01 Identify the types and styles of interior-stair systems.
 - 28.02 Identify the components of an interior-stair system.
 - 28.03 Calculate the number of risers and treads for an interior-stair system.
 - 28.04 Lay out, cut and assemble an interior-stair system (rough and finish).
- 29.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
- 29.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 29.02 Describe the effect of money management on personal and career goals. FL3.0

- | | | |
|-------|---|-------|
| 29.03 | Develop a personal budget and financial goals. | FL3.1 |
| 29.04 | Complete financial instruments for making deposits and withdrawals. | FL3.2 |
| 29.05 | Maintain financial records. | FL3.3 |
| 29.06 | Read and reconcile financial statements. | FL3.4 |
| 29.07 | Research, compare and contrast investment opportunities. | |

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Cabinetmaking 4
Course Number: 8720140
Course Credit: 1

Course Description:

This course is designed to provide students with an in-depth knowledge of cabinet finishing. The content includes training in the assembly of cabinet components and how to fasten stock and joints.

- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 30.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 30.04 Employ mentoring skills to inspire and teach others. LT5.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The student will be able to:
- 31.01 Describe the nature and types of business organizations. SY1.0
 - 31.02 Explain the effect of key organizational systems on performance and quality.
 - 31.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 31.04 Explain the impact of the global economy on business organizations.
- 32.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 32.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 32.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
 - 32.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
 - 32.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
 - 32.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 32.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 32.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 32.08 Research the benefits of ongoing professional development. ECD9.0
 - 32.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 33.0 Prepare cabinets for finish--The student will be able to:
- 33.01 Fill nail and screw holes.
 - 33.02 Install wood plugs in prepared holes.
 - 33.03 Sand a cabinet and joints for finish.

- 33.04 Select and apply proper filler.
- 33.05 Sand wood surfaces for finishing.
- 33.06 Stain, bleach, fill, and seal wood surfaces, as needed.

34.0 Apply finishes--The student will be able to:

- 34.01 Apply various types of finishes, including:
 - a. lacquer-based
 - b. water-based
 - c. oil-based
 - d. enamel
 - e. polyurethane
- 34.02 Apply the types of finishes that the local market demands.
- 34.03 Observe safety precautions when applying finishes, including wearing respirator and protective clothing approved by National Institute of Occupational Safety and Health (NIOSH).

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Cabinetmaking 5
Course Number: 8720150
Course Credit: 1

Course Description:

This course is designed to provide students with the competencies needed and provides students with the in-depth training in the installation and lamination of cabinets.

35.0 Install cabinets--The student will be able to:

- 35.01 Load and secure casework for hauling.
- 35.02 Check walls and floors for level and plumb.
- 35.03 Determine fasteners for block or walls.
- 35.04 Install upper and lower cabinets and other casework.
- 35.05 Fasten a suspended cabinet unit to ceiling.
- 35.06 Install countertops, including sink cutouts and back splash.
- 35.07 Cut and install molding and trim.
- 35.08 Adjust doors and drawers.
- 35.09 Clean work site.

36.0 Apply laminates--The student will be able to:

- 36.01 Lay out and cut core stock to specifications.
- 36.02 Lay out and cut laminate to specification.
- 36.03 Apply adhesive.
- 36.04 Apply laminate to core stock.
- 36.05 Trim and file plastic laminate edges.
- 36.06 Clean laminated surfaces.
- 36.07 Laminate a curved surface.
- 36.08 Repair laminate defects.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Building Construction Technologies
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8720300	I460401
CIP Number	0646040102	0646040102
Grade Level	9-12, 30, 31	30, 31
Standard Length	7 Credits	1050 Hours
Teacher Certification	BLDG CONST @7 7G BLDG MAINT @7 7G TROWEL TR @7 7G CARPENTRY @7 7G PLUMBIN @7 7G DRAFTING @7 7G ELECTRICAL @7 7G SHEETMETAL @7 7G AC HEAT ME @7 7G TEC DRAFT 7 G TEC CONSTR @7 7G ENG 7 G WOODWORIN@4	BLDG CONST @7 7G BLDG MAINT @7 7G TROWEL TR @7 7G CARPENTRY @7 7G PLUMBIN @7 7G DRAFTING @7 7G ELECTRICAL @7 7G SHEETMETAL @7 7G AC HEAT ME @7 7G TEC DRAFT 7 G TEC CONSTR @7 7G ENG 7 G WOODWORIN@4
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-9071 - Maintenance and Repair Workers	49-9071 - Maintenance and Repair 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	N/A	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in the building construction industry.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at the first occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0400	Building Construction Helper	450 Hours	49-9071
B	BCV0401	Building Construction Technician 1	300 Hours	49-9071
	BCV0402	Building Construction Technician 2	300 Hours	49-9071

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8720310	Building Construction Technologies 1	1 Credit	49-9071	2
	8720320	Building Construction Technologies 2	1 Credit		2
	8720330	Building Construction Technologies 3	1 Credit		3
B	8720340	Building Construction Technologies 4	1 Credit	49-9071	2
	8720350	Building Construction Technologies 5	1 Credit		2
	8720360	Building Construction Technologies 6	1 Credit		2
	8720370	Building Construction Technologies 7	1 Credit		2

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Building Construction Technologies 1	^^	^^	^^	1/53 2%	1/52 2%	2/56 4%	3/55 5%	1/58 2%	1/35 3%	1/42 2%	4/56 7%	#
Building Construction Technologies 1	^^	^^	^^	1/53 2%	5/52 8%	4/56 7%	5/55 9%	2/58 3%	1/35 3%	5/42 12%	10/56 18%	5/53 9%
Building Construction Technologies 3	^^	^^	^^	1/53 2%	2/52 4%	4/56 7%	4/55 7%	2/58 3%	1/35 3%	7/42 17%	5/56 9%	1/53 2%
Building Construction Technologies 4	^^	^^	^^	#	#	#	#	1/58 2%	#	#	#	1/53 2%
Building Construction Technologies 5	^^	^^	^^	#	1/52 2%	#	#	1/58 2%	#	#	#	1/53 2%
Building Construction Technologies 6	^^	^^	^^	#	#	#	1/55 2%	#	#	#	1/56 2%	#
Building Construction Technologies 7	^^	^^	^^	#	1/52 2%	#	2/55 4%	1/58 2%	#	1/42 2%	5/56 9%	6/53 11%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review

Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fl DOE.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.fl DOE.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 (I460401) has a statewide articulation agreement approved by the Articulation Coordinating Committee:

Building Construction Technology AAS/AS (0615.100101/1615.100101) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fl DOE.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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 00.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 01.0 Investigate the construction industry and explore related occupations.
- 02.0 Select and use basic hand tools.
- 03.0 Select and use power tools and describe their proper operation.
- 05.0 Demonstrate language arts knowledge and skills.
- 06.0 Demonstrate mathematics knowledge and skills.
- 07.0 Demonstrate carpentry skills.
- 08.0 Read and interpret construction drawings.
- 09.0 Frame floor systems based on drawing and specification requirements.
- 10.0 Frame walls and ceilings based on drawing and specification requirements.
- 11.0 Frame a roof based on drawing and specification requirements.
- 12.0 Analyze construction components, materials, hardware, and characteristics.
- 13.0 Demonstrate masonry skills.
- 14.0 Erect, plumb and brace a simple concrete form with reinforcement.
- 15.0 Place concrete.
- 16.0 Lay masonry units.
- 17.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Solve problems using critical thinking skills, creativity and innovation.
- 20.0 Create construction documents, contract documents and specifications.
- 21.0 Select the appropriate heavy equipment for a given task.
- 22.0 Identify local, state, and federal codes and regulations.
- 23.0 Perform site preparation and maintenance.
- 24.0 Estimate project costs and schedule construction activities for a specific job.
- 25.0 Investigate sustainability issues related to the design, construction and maintenance of the built environment.
- 26.0 Use information technology tools.
- 27.0 Describe the importance of professional ethics and legal responsibilities.
- 28.0 Demonstrate personal money-management concepts, procedures and strategies.
- 29.0 Install roofing materials.
- 30.0 Install exterior finishes.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 33.0 Explain the importance of employability and entrepreneurship skills.
- 34.0 Demonstrate interior carpentry skills.
- 35.0 Install cabinets.
- 36.0 Prepare and apply finishes to surfaces.
- 37.0 Build stairs.
- 38.0 Troubleshoot, repair and install plumbing systems.
- 39.0 Demonstrate knowledge of drain, waste and vent (DWV) systems.
- 40.0 Measure, cut and join plastic piping.
- 41.0 Properly measure, ream, cut and join copper piping.

- 42.0 Troubleshoot, repair and install electrical systems.
- 43.0 Demonstrate electrical safety.
- 44.0 Demonstrate a basic understanding of the Heating, Ventilation and Air-Cooling (HVAC) profession.
- 45.0 Maintain, repair and install Heating, Ventilation and Air-Cooling (HVAC) systems.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Building Construction Technologies
PSAV Number: I460401

Course Number: BCV0400
Occupational Completion Point: A
Building Construction Helper – 450 Hours – SOC Code 49-9071

01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

- 01.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
- 01.02 Identify and locate the Material Safety Data Sheets (MSDS) and follow the procedures as necessary.
- 01.03 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 01.04 Identify and use safety equipment.
- 01.05 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 01.06 Explain emergency procedures to follow in response to workplace accidents.
- 01.07 Create a disaster and/or emergency response plan. SHE2.0

02.0 Investigate the construction industry and explore related occupations--The student will be able to:

- 02.01 Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- 02.02 Describe the benefits of the construction industry on health and safety, communication, transportation and the economy.
- 02.03 Demonstrate an understanding of the relationship between construction and the environment.
- 02.04 Describe the role of trade unions in the construction industry.
- 02.05 Demonstrate an understanding of apprenticeship.
- 02.06 Identify the different classifications of construction projects.
- 02.07 Define the roles and responsibilities of the general contractor, specialty contractor, construction management and design build firms.
- 02.08 Identify construction trade occupations and the roles and responsibilities of each craft.
- 02.09 Identify construction management occupations and the roles and responsibilities of each.
- 02.10 Identify design and engineering occupations and the roles and responsibilities of each.
- 02.11 Demonstrate an understanding of the relationship between construction and the economy.
- 02.12 Describe the process of applying for building permits and variances.
- 02.13 Demonstrate an understanding of zoning requirements.

03.0 Select and use basic hand tools--The student will be able to:

- 03.01 Use a claw hammer to drive and pull out nails.
- 03.02 Use handsaws to cut boards.
- 03.03 Use screwdrivers to drive in screws.
- 03.04 Drill holes with hand-powered drills.
- 03.05 Select and use various types of:
 - a. Wrenches
 - b. Pipe wrenches and plumbing tools
 - c. Chisels
 - d. Staple guns
 - e. Wood planes
 - f. Woodworking files
 - g. Spirit levels
 - h. Socket wrench sets
 - i. Hand or block sanders
 - j. Carpenters' squares

04.0 Select and use power tools and describe their proper operation--The student will be able to:

- 04.01 Identify power tools, including:
 - a. Sanders
 - b. Drills
 - c. Screwdrivers
 - d. Hand-held saws
 - e. Reciprocating saws
 - f. Radial-arm saws
 - g. Table saws
 - h. Drill presses
 - i. Band saws
 - j. Miter saws
 - k. Planes
 - l. Electric routers
- 04.02 Describe the proper operation of power tools and equipment.

05.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0

- 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 05.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 05.03 Present information formally and informally for specific purposes and audiences. AF2.9

06.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF3.0

- 06.01 Solve job-related problems by adding, subtracting, multiplying and dividing numbers, using fractions, decimals and whole numbers.
- 06.02 Change numbers to percents.
- 06.03 Demonstrate knowledge of arithmetic operations. AF3.2
- 06.04 Read a ruler and a tape measure.
- 06.05 Compute feet, inches and yards.

- 06.06 Change hours and minutes to decimals, fractions and mixed numbers.
- 06.07 Construct charts/tables/graphs using functions and data. AF3.5
- 06.08 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
- 06.09 Determine ratios and proportions.
- 06.10 Convert measurements from the English to the metric system and from the metric to the English system.
- 06.11 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
- 06.12 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 07.0 Demonstrate carpentry skills--The student will be able to:
- 07.01 Construct various types of concrete forms.
- 07.02 Describe in-beds used in concrete formwork.
- 07.03 Identify appropriate form stripping and handling techniques.
- 07.04 Layout and install framing members for a structure.
- 07.05 Demonstrate the ability to dry in a structure.
- 08.0 Read and interpret construction drawings--The student will be able to:
- 08.01 Identify basic construction drawing terms, components and symbols.
- 08.02 Locate sections, elevations and details to their location on the plan view.
- 08.03 Use drawing dimensions to layout a construction project,
- 08.04 Interpret and use architectural scales.
- 09.0 Frame floor systems based on drawing and specification requirements--The student will be able to:
- 09.01 Identify floor and sill framing and support members.
- 09.02 Name the methods used to fasten sills to the foundation.
- 09.03 Select the proper girder/beam and joist size from a list, given specific floor load and span data,
- 09.04 List and recognize different types of floor joists.
- 09.05 List and recognize different types of bridging.
- 09.06 List and recognize different types of flooring materials.
- 09.07 Explain the purposes of subflooring and underlayment.
- 09.08 Match selected fasteners used in floor framing to their correct uses.
- 09.09 Estimate the amount of material needed to frame a floor assembly.
- 09.10 Demonstrate the ability to:
- a. Lay out and construct a floor assembly
 - b. Install bridging
 - c. Install joists for a cantilever floor
 - d. Install a subfloor using butt-joint plywood/OSB panels
 - e. Install a single floor system using tongue-and-groove plywood/OSB panels
- 10.0 Frame walls and ceilings based on drawing and specification requirements--The student will be able to:
- 10.01 Identify the components of a wall and ceiling layout.

- 10.02 Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing and firestops.
 - 10.03 Describe the correct procedure for assembling and erecting an exterior wall.
 - 10.04 Identify the common materials and methods used for installing sheathing on walls.
 - 10.05 Lay out, assemble, erect and brace exterior walls for a frame building.
 - 10.06 Describe wall framing techniques used in masonry construction.
 - 10.07 Explain the use of metal studs in wall framing.
 - 10.08 Describe the correct procedure for laying out ceiling joists.
 - 10.09 Cut and install ceiling joists on a wood frame building.
 - 10.10 Estimate the materials required to frame walls and ceilings.
- 11.0 Frame a roof based on drawing and specification requirements--The student will be able to:
- 11.01 Understand the terms associated with roof framing.
 - 11.02 Identify the roof framing members used in gable and hip roofs.
 - 11.03 Identify the methods used to calculate the length of a rafter.
 - 11.04 Identify the various types of trusses used in roof framing.
 - 11.05 Use a rafter framing square, speed square and calculator in laying out a roof.
 - 11.06 Identify various types of sheathing used in roof construction.
 - 11.07 Frame a gable roof with vent openings.
 - 11.08 Frame a roof opening.
 - 11.09 Erect a gable roof using trusses.
 - 11.10 Estimate the materials used in framing and sheathing a roof.
- 12.0 Analyze construction components, materials, hardware and characteristics--The student will be able to:
- 12.01 Identify the components of various kinds of structures, including:
 - a. Slabs and foundations
 - b. Interior walls
 - c. Exterior walls
 - d. Roofs
 - e. Flooring systems
 - 12.02 Identify the types of wall sections.
 - 12.03 Identify the types and installation procedures of:
 - a. Roof sheathing
 - b. Wall sheathing
 - c. Floor sheathing
 - 12.04 Identify various roof supports.
- 13.0 Demonstrate masonry skills--The student will be able to:
- 13.01 Select the tools and equipment used for mixing mortar.
 - 13.02 Describe the factors that affect the consistency of mortar.
 - 13.03 Identify the common ratios (M, N, S and O) of mortar mixtures.
 - 13.04 Identify pointing tools and strike mortar joints.
 - 13.05 Repoint old work.
 - 13.06 Prepare a work area, protecting adjacent areas.
 - 13.07 Apply mortar.

- 13.08 Identify the methods of putting up the line.
 - 13.09 Identify the types of trowels.
 - 13.10 Identify various types of caulking and application.
 - 13.11 Describe procedures for stucco application and repair.
 - 13.12 Mix various types of stucco.
 - 13.13 Mix various types of concrete, considering application and Pounds per Square Inch (PSI) strength.
 - 13.14 Identify and select concrete tools.
 - 13.15 Demonstrate procedures for concrete repair and installation.
 - 13.16 Identify and select cleaning materials and equipment.
 - 13.17 Demonstrate safe and proper procedures for cleaning equipment, materials, work areas and worker.
- 14.0 Erect, plumb and brace a simple concrete form with reinforcement--The student will be able to:
- 14.01 Identify the properties of cement.
 - 14.02 Describe the composition of concrete.
 - 14.03 Perform volume estimates for concrete quantity requirements.
 - 14.04 Identify types of concrete reinforcement materials and describe their uses.
 - 14.05 Identify various types of footings and explain their uses.
 - 14.06 Identify the parts of various types of forms.
 - 14.07 Explain the safety procedures associated with the construction and use of concrete forms.
- 15.0 Place concrete--The student will be able to:
- 15.01 Identify equipment used to transport and place concrete.
 - 15.02 Describe the factors that contribute to the quality of concrete placement.
 - 15.03 Demonstrate the correct methods for placing and consolidating concrete into forms.
 - 15.04 Demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.
 - 15.05 Demonstrate how to use tools for placing, floating and finishing concrete.
 - 15.06 Determine when conditions permit the concrete finishing operation to start.
 - 15.07 Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
- 16.0 Lay masonry units--The student will be able to:
- 16.01 Describe the most common types of masonry units.
 - 16.02 Describe and demonstrate how to set up a wall.
 - 16.03 Lay a dry bond.
 - 16.04 Spread and furrow a bed joint and butter masonry units.
 - 16.05 Describe the different types of masonry bonds.
 - 16.06 Cut brick and block accurately.
- 17.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:

- 17.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 17.02 Locate, organize and reference written information from various sources. CM3.0
- 17.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 17.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 17.05 Apply active listening skills to obtain and clarify information. CM7.0
- 17.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 17.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 18.0 Demonstrate science knowledge and skills--The student will be able to: AF4.0
- 18.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.
- 18.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 18.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3
- 18.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
- 18.05 Explain pressure measurement in terms of PSI and inches of mercury.
- 18.06 Explain and demonstrate the use of electrical-system testing devices.
- 19.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 19.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 19.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 20.0 Create construction documents, contract documents and specifications--The student will be able to:
- 20.01 Explain the purpose and components of contract documents and specifications.
- 20.02 Design and draw plans, elevations, sections and details.
- 20.03 Explain the relationships of the elements of contract documents.
- 20.04 Create lists of materials and specifications.
- 20.05 Use architectural and engineering scales.
- 20.06 Compare various computer-aided drafting (CAD) and building information modeling (BIM) products and how they can be used by designers and construction project managers.
- 20.07 Prepare estimates using estimating software.
- 20.08 Prepare schedules using bar charts and scheduling software.
- 21.0 Select the appropriate heavy equipment for a given task--The student will be able to:

- 21.01 Identify different types and uses of heavy equipment.
- 21.02 Describe the operations of different types of heavy equipment.
- 22.0 Identify local, state and federal codes and regulations--The student will be able to:
 - 22.01 Identify and locate local, state and federal codes, regulations and standards.
 - 22.02 Identify local, state and federal regulatory agencies.
- 23.0 Perform site preparation and maintenance--The student will be able to:
 - 23.01 Determine zoning requirements.
 - 23.02 Assess suitability for project.
 - 23.03 Determine boundary lines.
 - 23.04 Determine elevations.
 - 23.05 Determine need to add, remove, or relocate fill.
 - 23.06 Layout and mark building location and elevation.
 - 23.07 Clean and maintain the site.
- 24.0 Estimate project costs and schedule construction activities for a specific job--The student will be able to:
 - 24.01 Calculate material quantities and purchase cost (including sales tax).
 - 24.02 Calculate labor costs including work hours, duration and cost of workers.
 - 24.03 Explain and compute federal, state and local taxes.
 - 24.04 Schedule various construction activities.
 - 24.05 Determine amount to be charged to the client at various intervals throughout the project.
- 25.0 Investigate sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
 - 25.01 Describe the impact of the construction industry on the natural environment.
 - 25.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 25.03 Recommend sustainable alternatives to conventional construction practices.
 - 25.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 25.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
- 26.0 Use information technology tools--The student will be able to:
 - 26.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 26.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email and internet applications. IT2.0
 - 26.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
 - 26.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

- 27.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 27.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 27.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 27.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 27.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
- 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 28.02 Describe the effect of money management on personal and career goals. FL3.0
 - 28.03 Develop a personal budget and financial goals. FL3.1
 - 28.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 28.05 Maintain financial records. FL3.3
 - 28.06 Read and reconcile financial statements. FL3.4
 - 28.07 Research, compare and contrast investment opportunities.

Course Number: BCV0402**Occupational Completion Point: B****Building Construction Technician (2of2) – 300 Hours – SOC Code 49-9071**

- 29.0 Install roofing materials--The student will be able to:
- 29.01 Identify and explain different types of roofing systems and applications.
 - 29.02 Install various types of shingles.
 - 29.03 Install roof gutters and downspouts.
 - 29.04 Seal pipes and vents on roofs.
 - 29.05 Identify installation procedures for:
 - a. Sheet metal roofs
 - b. Built-up roofs
 - c. Roof flashing
- 30.0 Install exterior finishes--The student will be able to:
- 30.01 Describe the purpose of wall insulation and flashing.
 - 30.02 Install common cornices.
 - 30.03 Demonstrate lap and panel siding estimating methods.
 - 30.04 Describe the types and applications of various types of siding (e.g. wood, fiber-cement, vinyl, metal, stucco, masonry, etc.).
 - 30.05 Install siding.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 31.01 Describe the nature and types of business organizations. SY1.0
 - 31.02 Explain the effect of key organizational systems on performance and quality.

- 31.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 31.04 Explain the impact of the global economy on business organizations.
- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 32.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 32.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 32.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 32.04 Employ mentoring skills to inspire and teach others. LT5.0
- 33.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 33.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 33.02 Develop personal career plan that includes goals, objectives and strategies. ECD2.0
- 33.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
- 33.04 Maintain a career portfolio to document knowledge, skills and experience. ECD5.0
- 33.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 33.06 Identify and exhibit traits for retaining employment. ECD7.0
- 33.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 33.08 Research the benefits of ongoing professional development. ECD9.0
- 33.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 34.0 Demonstrate interior carpentry skill--The student will be able to:
- 34.01 Install interior finish materials.
- 34.02 Install exterior and interior doors.
- 34.03 Install windows.
- 34.04 Install interior trim.
- 34.05 Measure the size of a room.
- 34.06 Install acoustical ceiling systems.
- 34.07 Identify the types of insulation.
- 35.0 Install cabinets--The student will be able to:
- 35.01 Identify the parts of a cabinet.
- 35.02 Identify the types of cabinet-door installation.
- 35.03 Identify the types of cabinet hardware.
- 35.04 Install cabinet hardware.
- 35.05 Describe cabinet-installation procedures.
- 36.0 Prepare and apply finishes to surfaces--The student will be able to:
- 36.01 Erect an extension ladder and a scaffold.
- 36.02 Prepare the surfaces.
- 36.03 Apply finished coatings to surfaces with a roller, brush and sprayer.

- 37.0 Build stairs--The student will be able to:
- 37.01 Identify various types and parts of stairs.
 - 37.02 Identify materials used in the construction of stairs.
 - 37.03 Interpret construction drawings of stairs.
 - 37.04 Calculate the total rise, the number and size of the risers and treads required for a stairway.
 - 37.05 Lay out and cut stringers, risers and treads.
- 38.0 Troubleshoot, repair and install plumbing systems--The student will be able to:
- 38.01 Troubleshoot, repair and install bathroom fixtures and hardware, such as:
 - a. Lavatory
 - b. Water closet
 - c. Urinal
 - d. Shower
 - e. Bathtub
 - f. Traps
 - g. Drain, Waste and Vent (DWV) system
 - 38.02 Troubleshoot, repair and install kitchen fixtures and hardware, such as sinks, garbage disposals, faucets and hot-water-heater tanks.
 - 38.03 Identify and install various pipes and tubing used in the plumbing trade.
 - 38.04 Test and inspect plumbing systems.
- 39.0 Demonstrate knowledge of drain, waste and vent (DWV) systems: The student will be able to:
- 39.01 Explain how waste moves from a fixture through the drain system to the environment.
 - 39.02 Identify the major components of a drainage system and describe their functions.
 - 39.03 Identify the different types of traps and their components, explain the importance of traps and identify the ways that traps can lose their seals.
 - 39.04 Identify the various types of drain, waste and vent (DWV) fittings and describe their applications.
 - 39.05 Identify significant code and health issues, violations and consequences related to DWV systems.
- 40.0 Measure, cut and join plastic piping--The student will be able to:
- 40.01 Identify types of materials and schedules of plastic piping.
 - 40.02 Identify proper and improper applications of plastic piping.
 - 40.03 Identify types of fittings and valves used with plastic piping.
 - 40.04 Identify and determine the kinds of hangers and supports needed for plastic piping.
 - 40.05 Identify the various techniques used in hanging and supporting plastic piping.
 - 40.06 Explain proper procedures for the handling, storage and protection of plastic pipes.
- 41.0 Properly measure, ream, cut and join copper piping--The student will be able to:
- 41.01 Identify the types of materials and schedules used with copper piping.

- 41.02 Identify the material properties, storage and handling requirements of copper piping.
 - 41.03 Identify the types of fittings and valves used with copper piping.
 - 41.04 Identify the techniques used in hanging and supporting copper piping.
 - 41.05 Identify the hazards and safety precautions associated with copper piping.
- 42.0 Troubleshoot, repair and install electrical systems--The student will be able to:
- 42.01 Explain basic electrical theory.
 - 42.02 Explain branch circuit systems.
 - 42.03 Calculate and select service-entrance equipment.
 - 42.04 Identify and explain Ground Fault Circuit Interrupter (GFCI) circuitry.
 - 42.05 Troubleshoot electrical systems, using testing and metering devices.
 - 42.06 Install electrical:
 - a. Outlets
 - b. Switches
 - c. Light fixtures
 - 42.07 Install and replace breakers and fuses.
 - 42.08 Identify types of wiring raceways.
 - 42.09 Wire a blower motor into an electrical supply.
 - 42.10 Test and inspect electrical systems.
 - 42.11 Explain basic motor-control operation.
 - 42.12 Describe rules for installing electric space heating and HVAC requirements.
- 43.0 Demonstrate electrical safety--The student will be able to:
- 43.01 Identify electrical hazards and how to avoid or minimize them in the workplace.
 - 43.02 Explain safety issues concerning lockout/tag-out procedures, confined space entry, respiratory protection and fall protection systems.
 - 43.03 Develop a task plan and hazard assessment for a given task and select the appropriate personal protective equipment (PPE) and work methods.
 - 43.04 Explain the Role of the National Electric Code and describe how to determine electric service requirements.
- 44.0 Demonstrate a basic understanding of the Heating, Ventilation and Air-Cooling (HVAC) profession--The student will be able to:
- 44.01 Identify careers in the HVAC industry and the educational pathways (including apprenticeships) available.
 - 44.02 Explain what the 'Clean Air Act' means to the HVAC profession.
 - 44.03 Describe regulatory codes relevant to the HVAC industry.
 - 44.04 Read and interpret HVAC plans and schedules.
- 45.0 Maintain, repair and install Heating, Ventilation and Air-Cooling (HVAC) systems--The student will be able to:
- 45.01 Explain heating and cooling principles and code requirements.
 - 45.02 Describe methods of calculating heating and cooling loads.
 - 45.03 Explain the operation and types of the following heating methods: water, steam, forced air, gas, electrical components and heat pumps.

- 45.04 Troubleshoot and repair a circulation pump, zone valves, burners, pilot lights and thermocouples in a heating system.
- 45.05 Identify refrigerants.
- 45.06 Determine a refrigerant level.
- 45.07 Describe the proper procedures for descaling air-conditioner units.
- 45.08 Troubleshoot, repair and replace air filters, drive belts and drain systems.
- 45.09 Troubleshoot, repair and replace control systems.
- 45.10 Explain the computer monitoring system associated with Heating, Ventilation and Air-Conditioning (HVAC) control systems and air-quality management.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 1
Course Number: 8720310
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies essential to the building construction industry. These competencies include skills and knowledge related to safety practices, the proper use of hand and power tools, plan reading, basic rough carpentry and framing.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	2/56 4%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	#	Earth-Space Science	1/58 2%	Physical Science	4/56 7%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

- 01.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
- 01.02 Identify and locate the Material Safety Data Sheets (MSDS) and follow the procedures as necessary.
- 01.03 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 01.04 Identify and use safety equipment.
- 01.05 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 01.06 Explain emergency procedures to follow in response to workplace accidents.
- 01.07 Create a disaster and/or emergency response plan. SHE2.0

02.0 Investigate the construction industry and explore related occupations--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.13, 20

- 02.01 Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- 02.02 Describe the benefits of the construction industry on health and safety, communication, transportation and the economy.
- 02.03 Demonstrate an understanding of the relationship between construction and the environment.
- 02.04 Describe the role of trade unions in the construction industry.
- 02.05 Demonstrate an understanding of apprenticeship.
- 02.06 Identify the different classifications of construction projects.
- 02.07 Define the roles and responsibilities of the general contractor, specialty contractor, construction management and design build firms.
- 02.08 Identify construction trade occupations and the roles and responsibilities of each craft.
- 02.09 Identify construction management occupations and the roles and responsibilities of each.
- 02.10 Identify design and engineering occupations and the roles and responsibilities of each.
- 02.11 Demonstrate an understanding of the relationship between construction and the economy.
- 02.12 Describe the process of applying for building permits and variances.
- 02.13 Demonstrate an understanding of zoning requirements.

03.0 Select and use basic hand tools--The student will be able to:

- 03.01 Use a claw hammer to drive and pull out nails.
- 03.02 Use handsaws to cut boards.
- 03.03 Use screwdrivers to drive in screws.
- 03.04 Drill holes with hand-powered drills.
- 03.05 Select and use various types of:
 - a. Wrenches
 - b. Pipe wrenches and plumbing tools
 - c. Chisels
 - d. Staple guns
 - e. Wood planes
 - f. Woodworking files
 - g. Spirit levels
 - h. Socket wrench sets
 - i. Hand or block sanders
 - j. Carpenters' squares

04.0 Select and use power tools and describe their proper operation--The student will be able to:

- 04.01 Identify power tools, including:
 - a. Sanders
 - b. Drills
 - c. Screwdrivers
 - d. Hand-held saws
 - e. Reciprocating saws
 - f. Radial-arm saws

- g. Table saws
- h. Drill presses
- i. Band saws
- j. Miter saws
- k. Planes
- l. Electric routers

04.02 Describe the proper operation of power tools and equipment.

05.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0

- 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 05.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 05.03 Present information formally and informally for specific purposes and audiences. AF2.9

06.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF3.0

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1

- 06.01 Solve job-related problems by adding, subtracting, multiplying and dividing numbers, using fractions, decimals and whole numbers.
- 06.02 Change numbers to percents.
- 06.03 Demonstrate knowledge of arithmetic operations. AF3.2
- 06.04 Read a ruler and a tape measure.
- 06.05 Compute feet, inches and yards.
- 06.06 Change hours and minutes to decimals, fractions and mixed numbers.
- 06.07 Construct charts/tables/graphs using functions and data. AF3.5
- 06.08 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
- 06.09 Determine ratios and proportions.
- 06.10 Convert measurements from the English to the metric system and from the metric to the English system.
- 06.11 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
- 06.12 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

07.0 Demonstrate carpentry skills--The student will be able to:

- 07.01 Construct various types of concrete forms.
- 07.02 Describe in-beds used in concrete formwork.
- 07.03 Identify appropriate form stripping and handling techniques.
- 07.04 Layout and install framing members for a structure.
- 07.05 Demonstrate the ability to dry in a structure.

08.0 Read and interpret construction drawings--The student will be able to:

- 08.01 Identify basic construction drawing terms, components and symbols.
- 08.02 Locate sections, elevations and details to their location on the plan view.
- 08.03 Use drawing dimensions to layout a construction project,

- 08.04 Interpret and use architectural scales.
- 09.0 Frame floor systems based on drawing and specification requirements--The student will be able to:
- 09.01 Identify floor and sill framing and support members.
 - 09.02 Name the methods used to fasten sills to the foundation.
 - 09.03 Select the proper girder/beam and joist size from a list, given specific floor load and span data,
 - 09.04 List and recognize different types of floor joists.
 - 09.05 List and recognize different types of bridging.
 - 09.06 List and recognize different types of flooring materials.
 - 09.07 Explain the purposes of subflooring and underlayment.
 - 09.08 Match selected fasteners used in floor framing to their correct uses.
 - 09.09 Estimate the amount of material needed to frame a floor assembly.
 - 09.10 Demonstrate the ability to:
 - a. Lay out and construct a floor assembly
 - b. Install bridging
 - c. Install joists for a cantilever floor
 - d. Install a subfloor using butt-joint plywood/OSB panels
 - e. Install a single floor system using tongue-and-groove plywood/OSB panels
- 10.0 Frame walls and ceilings based on drawing and specification requirements--The student will be able to:
- 10.01 Identify the components of a wall and ceiling layout.
 - 10.02 Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing and firestops.
 - 10.03 Describe the correct procedure for assembling and erecting an exterior wall.
 - 10.04 Identify the common materials and methods used for installing sheathing on walls.
 - 10.05 Lay out, assemble, erect and brace exterior walls for a frame building.
 - 10.06 Describe wall framing techniques used in masonry construction.
 - 10.07 Explain the use of metal studs in wall framing.
 - 10.08 Describe the correct procedure for laying out ceiling joists.
 - 10.09 Cut and install ceiling joists on a wood frame building.
 - 10.10 Estimate the materials required to frame walls and ceilings.
- 11.0 Frame a roof based on drawing and specification requirements--The student will be able to:
- 11.01 Understand the terms associated with roof framing.
 - 11.02 Identify the roof framing members used in gable and hip roofs.
 - 11.03 Identify the methods used to calculate the length of a rafter.
 - 11.04 Identify the various types of trusses used in roof framing.
 - 11.05 Use a rafter framing square, speed square and calculator in laying out a roof.
 - 11.06 Identify various types of sheathing used in roof construction.
 - 11.07 Frame a gable roof with vent openings.
 - 11.08 Frame a roof opening.
 - 11.09 Erect a gable roof using trusses.
 - 11.10 Estimate the materials used in framing and sheathing a roof.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 2
Course Number: 8720320
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies necessary for the building, construction and repair industry. These competencies relate to construction components, materials and hardware, concrete and masonry skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	5/52 8%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	5/53 9%	Earth-Space Science	2/58 3%	Physical Science	10/56 18%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

12.0 Analyze construction components, materials, hardware and characteristics--The student will be able to:

12.01 Identify the components of various kinds of structures, including:

- a. Slabs and foundations
- b. Interior walls
- c. Exterior walls
- d. Roofs
- e. Flooring systems

12.02 Identify the types of wall sections.

12.03 Identify the types and installation procedures of:

- a. Roof sheathing
- b. Wall sheathing
- c. Floor sheathing

12.04 Identify various roof supports.

13.0 Demonstrate masonry skills--The student will be able to:

13.01 Select the tools and equipment used for mixing mortar.

- 13.02 Describe the factors that affect the consistency of mortar.
 - 13.03 Identify the common ratios (M, N, S and O) of mortar mixtures.
 - 13.04 Identify pointing tools and strike mortar joints.
 - 13.05 Repoint old work.
 - 13.06 Prepare a work area, protecting adjacent areas.
 - 13.07 Apply mortar.
 - 13.08 Identify the methods of putting up the line.
 - 13.09 Identify the types of trowels.
 - 13.10 Identify various types of caulking and application.
 - 13.11 Describe procedures for stucco application and repair.
 - 13.12 Mix various types of stucco.
 - 13.13 Mix various types of concrete, considering application and Pounds per Square Inch (PSI) strength.
 - 13.14 Identify and select concrete tools.
 - 13.15 Demonstrate procedures for concrete repair and installation.
 - 13.16 Identify and select cleaning materials and equipment.
 - 13.17 Demonstrate safe and proper procedures for cleaning equipment, materials, work areas and worker.
- 14.0 Erect, plumb and brace a simple concrete form with reinforcement--The student will be able to:
- 14.01 Identify the properties of cement.
 - 14.02 Describe the composition of concrete.
 - 14.03 Perform volume estimates for concrete quantity requirements.
 - 14.04 Identify types of concrete reinforcement materials and describe their uses.
 - 14.05 Identify various types of footings and explain their uses.
 - 14.06 Identify the parts of various types of forms.
 - 14.07 Explain the safety procedures associated with the construction and use of concrete forms.
- 15.0 Place concrete--The student will be able to:
- 15.01 Identify equipment used to transport and place concrete.
 - 15.02 Describe the factors that contribute to the quality of concrete placement.
 - 15.03 Demonstrate the correct methods for placing and consolidating concrete into forms.
 - 15.04 Demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.
 - 15.05 Demonstrate how to use tools for placing, floating and finishing concrete.
 - 15.06 Determine when conditions permit the concrete finishing operation to start.
 - 15.07 Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
- 16.0 Lay masonry units--The student will be able to:
- 16.01 Describe the most common types of masonry units.
 - 16.02 Describe and demonstrate how to set up a wall.
 - 16.03 Lay a dry bond.
 - 16.04 Spread and furrow a bed joint and butter masonry units.
 - 16.05 Describe the different types of masonry bonds.

16.06 Cut brick and block accurately.

17.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1

- 17.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 17.02 Locate, organize and reference written information from various sources. CM3.0
- 17.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 17.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 17.05 Apply active listening skills to obtain and clarify information. CM7.0
- 17.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 17.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

18.0 Demonstrate science knowledge and skills--The student will be able to: AF4.0

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 7; SC.912.L.18.12; SC.912.P.8.2; SC.912.P.10.13, 14, 15, 16, 17;
SC.912.P.12.3, 11

- 18.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.
- 18.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 18.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3
- 18.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
- 18.05 Explain pressure measurement in terms of PSI and inches of mercury.
- 18.06 Explain and demonstrate the use of electrical-system testing devices.

19.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N1.1, 3, 4, 7

- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 19.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 19.04 Conduct technical research to gather information necessary for decision-making. PS4.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 3
Course Number: 8720330
Course Credit: 1

Course Description:

This course is designed to provide students with a more in-depth knowledge of construction documents, as well as competencies in construction management. These include heavy equipment selection, knowledge of codes and regulations, site preparation, estimating, scheduling and knowledge of sustainability issues relevant to the construction industry.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	4/55 7%	Genetics	1/35 3%	Marine Science 1 Honors	7/42 17%
Geometry	^^	Physics 1	1/53 2%	Earth-Space Science	2/58 3%	Physical Science	5/56 9%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

20.0 Create construction documents, contract documents and specifications--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.1.1; SC.912.N.3.5

- 20.01 Explain the purpose and components of contract documents and specifications.
- 20.02 Design and draw plans, elevations, sections and details.
- 20.03 Explain the relationships of the elements of contract documents.
- 20.04 Create lists of materials and specifications.
- 20.05 Use architectural and engineering scales.
- 20.06 Compare various computer-aided drafting (CAD) and building information modeling (BIM) products and how they can be used by designers and construction project managers.
- 20.07 Prepare estimates using estimating software.
- 20.08 Prepare schedules using bar charts and scheduling software.

21.0 Select the appropriate heavy equipment for a given task--The student will be able to:

- 21.01 Identify different types and uses of heavy equipment.
- 21.02 Describe the operations of different types of heavy equipment.

22.0 Identify local, state and federal codes and regulations--The student will be able to:

- 22.01 Identify and locate local, state and federal codes, regulations and standards.
- 22.02 Identify local, state and federal regulatory agencies.

23.0 Perform site preparation and maintenance--The student will be able to:

- 23.01 Determine zoning requirements.
- 23.02 Assess suitability for project.
- 23.03 Determine boundary lines.
- 23.04 Determine elevations.
- 23.05 Determine need to add, remove, or relocate fill.
- 23.06 Layout and mark building location and elevation.
- 23.07 Clean and maintain the site.

24.0 Estimate project costs and schedule construction activities for a specific job--The student will be able to:

- 24.01 Calculate material quantities and purchase cost (including sales tax).
- 24.02 Calculate labor costs including work hours, duration and cost of workers.
- 24.03 Explain and compute federal, state and local taxes.
- 24.04 Schedule various construction activities.
- 24.05 Determine amount to be charged to the client at various intervals throughout the project.

25.0 Investigate sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.L.17.10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

- 25.01 Describe the impact of the construction industry on the natural environment.
- 25.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
- 25.03 Recommend sustainable alternatives to conventional construction practices.
- 25.04 Identify specific practices that can lessen adverse impacts on the environment.
- 25.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.

26.0 Use information technology tools--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1

- 26.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0

- 26.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email and internet applications. IT2.0
- 26.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
- 26.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

27.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.L.17.3; SC.912.N.4.1

- 27.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 27.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities and employer policies. ELR1.1
- 27.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 27.04 Interpret and explain written organizational policies and procedures. ELR2.0

28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:

- 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 28.02 Describe the effect of money management on personal and career goals. FL3.0
- 28.03 Develop a personal budget and financial goals. FL3.1
- 28.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 28.05 Maintain financial records. FL3.3
- 28.06 Read and reconcile financial statements. FL3.4
- 28.07 Research, compare and contrast investment opportunities.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 4
Course Number: 8720340
Course Credit: 1

Course Description:

The purpose of this course is to develop competencies in exterior finish carpentry.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	1/53 2%	Earth-Space Science	1/58 2%	Physical Science	#

^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

29.0 Install roofing materials--The student will be able to:

- 29.01 Identify and explain different types of roofing systems and applications.
- 29.02 Install various types of shingles.
- 29.03 Install roof gutters and downspouts.
- 29.04 Seal pipes and vents on roofs.
- 29.05 Identify installation procedures for:
 - a. Sheet metal roofs
 - b. Built-up roofs
 - c. Roof flashing

30.0 Install exterior finishes--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.P.10.4

- 30.01 Describe the purpose of wall insulation and flashing.
- 30.02 Install common cornices.
- 30.03 Demonstrate lap and panel siding estimating methods.
- 30.04 Describe the types and applications of various types of siding (e.g. wood, fiber-cement, vinyl, metal, stucco, masonry, etc.).
- 30.05 Install siding.

- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 31.01 Describe the nature and types of business organizations. SY1.0
 - 31.02 Explain the effect of key organizational systems on performance and quality.
 - 31.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 31.04 Explain the impact of the global economy on business organizations.
- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 32.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 32.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 32.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 32.04 Employ mentoring skills to inspire and teach others. LT5.0
- 33.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 33.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 33.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
 - 33.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
 - 33.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
 - 33.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 33.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 33.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 33.08 Research the benefits of ongoing professional development. ECD9.0
 - 33.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 5
Course Number: 8720350
Course Credit: 1

Course Description:

The purpose of this course is to develop knowledge and skills in interior finish carpentry.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	1/53 2%	Earth-Space Science	1/58 2%	Physical Science	#

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

34.0 Demonstrate interior carpentry skills--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.P.10.4

- 34.01 Install interior finish materials.
- 34.02 Install exterior and interior doors.
- 34.03 Install windows.
- 34.04 Install interior trim.
- 34.05 Measure the size of a room.
- 34.06 Install acoustical ceiling systems.
- 34.07 Identify the types of insulation.

35.0 Install cabinets--The student will be able to:

- 35.01 Identify the parts of a cabinet.
- 35.02 Identify the types of cabinet-door installation.
- 35.03 Identify the types of cabinet hardware.
- 35.04 Install cabinet hardware.
- 35.05 Describe cabinet-installation procedures.

36.0 Prepare and apply finishes to surfaces--The student will be able to:

- 36.01 Erect an extension ladder and a scaffold.
- 36.02 Prepare the surfaces.
- 36.03 Apply finished coatings to surfaces with a roller, brush and sprayer.

37.0 Build stairs--The student will be able to:

- 37.01 Identify various types and parts of stairs.
- 37.02 Identify materials used in the construction of stairs.
- 37.03 Interpret construction drawings of stairs.
- 37.04 Calculate the total rise, the number and size of the risers and treads required for a stairway.
- 37.05 Lay out and cut stringers, risers and treads.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 6
Course Number: 8720360
Course Credit: 1

Course Description:

This course is designed to develop competencies in the repair and installation of plumbing systems.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review

Alignment attempted, but no correlation to academic course.

38.0 Troubleshoot, repair and install plumbing systems--The student will be able to:

38.01 Troubleshoot, repair and install bathroom fixtures and hardware, such as:

- a. Lavatory
- b. Water closet
- c. Urinal
- d. Shower
- e. Bathtub
- f. Traps
- g. Drain, Waste and Vent (DWV) system

38.02 Troubleshoot, repair and install kitchen fixtures and hardware, such as sinks, garbage disposals, faucets and hot-water-heater tanks.

38.03 Identify and install various pipes and tubing used in the plumbing trade.

38.04 Test and inspect plumbing systems.

39.0 Demonstrate knowledge of drain, waste and vent (DWV) systems: The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.P.12.10

- 39.01 Explain how waste moves from a fixture through the drain system to the environment.
- 39.02 Identify the major components of a drainage system and describe their functions.
- 39.03 Identify the different types of traps and their components, explain the importance of traps and identify the ways that traps can lose their seals.
- 39.04 Identify the various types of drain, waste and vent (DWV) fittings and describe their applications.
- 39.05 Identify significant code and health issues, violations and consequences related to DWV systems.

40.0 Measure, cut and join plastic piping--The student will be able to:

- 40.01 Identify types of materials and schedules of plastic piping.
- 40.02 Identify proper and improper applications of plastic piping.
- 40.03 Identify types of fittings and valves used with plastic piping.
- 40.04 Identify and determine the kinds of hangers and supports needed for plastic piping.
- 40.05 Identify the various techniques used in hanging and supporting plastic piping.
- 40.06 Explain proper procedures for the handling, storage and protection of plastic pipes.

41.0 Properly measure, ream, cut and join copper piping--The student will be able to:

- 41.01 Identify the types of materials and schedules used with copper piping.
- 41.02 Identify the material properties, storage and handling requirements of copper piping.
- 41.03 Identify the types of fittings and valves used with copper piping.
- 41.04 Identify the techniques used in hanging and supporting copper piping.
- 41.05 Identify the hazards and safety precautions associated with copper piping.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Construction Technologies 7
Course Number: 8720370
Course Credit: 1

Course Description:

This course is designed to provide students with knowledge and skills for the installation, repair and replacement of electrical and Heating, Ventilation and Air-Cooling (HVAC) systems.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	#	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	6/53 11%	Earth-Space Science	1/58 2%	Physical Science	5/56 9%

** Alignment pending

Alignment attempted, but no correlation to academic course.

42.0 Troubleshoot, repair and install electrical systems--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.P.10.13, 14, 15, 16, 17

- 42.01 Explain basic electrical theory.
- 42.02 Explain branch circuit systems.
- 42.03 Calculate and select service-entrance equipment.
- 42.04 Identify and explain Ground Fault Circuit Interrupter (GFCI) circuitry.
- 42.05 Troubleshoot electrical systems, using testing and metering devices.
- 42.06 Install electrical:
 - a. Outlets
 - b. Switches
 - c. Light fixtures
- 42.07 Install and replace breakers and fuses.
- 42.08 Identify types of wiring raceways.
- 42.09 Wire a blower motor into an electrical supply.
- 42.10 Test and inspect electrical systems.
- 42.11 Explain basic motor-control operation.
- 42.12 Describe rules for installing electric space heating and HVAC requirements.

43.0 Demonstrate electrical safety--The student will be able to:

- 43.01 Identify electrical hazards and how to avoid or minimize them in the workplace.
- 43.02 Explain safety issues concerning lockout/tag-out procedures, confined space entry, respiratory protection and fall protection systems.
- 43.03 Develop a task plan and hazard assessment for a given task and select the appropriate personal protective equipment (PPE) and work methods.
- 43.04 Explain the Role of the National Electric Code and describe how to determine electric service requirements.

44.0 Demonstrate a basic understanding of the Heating, Ventilation and Air-Cooling (HVAC) profession--The student will be able to:

- 44.01 Identify careers in the HVAC industry and the educational pathways (including apprenticeships) available.
- 44.02 Explain what the 'Clean Air Act' means to the HVAC profession.
- 44.03 Describe regulatory codes relevant to the HVAC industry.
- 44.04 Read and interpret HVAC plans and schedules.

45.0 Maintain, repair and install Heating, Ventilation and Air-Cooling (HVAC) systems--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.P.10.2, 4, 5; SC.912.P.12.10

- 45.01 Explain heating and cooling principles and code requirements.
- 45.02 Describe methods of calculating heating and cooling loads.
- 45.03 Explain the operation and types of the following heating methods: water, steam, forced air, gas, electrical components and heat pumps.
- 45.04 Troubleshoot and repair a circulation pump, zone valves, burners, pilot lights and thermocouples in a heating system.
- 45.05 Identify refrigerants.
- 45.06 Determine a refrigerant level.
- 45.07 Describe the proper procedures for descaling air-conditioner units.
- 45.08 Troubleshoot, repair and replace air filters, drive belts and drain systems.
- 45.09 Troubleshoot, repair and replace control systems.
- 45.10 Explain the computer monitoring system associated with Heating, Ventilation and Air-Conditioning (HVAC) control systems and air-quality management.

2013 - 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Painting and Decorating
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8721500	I460408
CIP Number	0646040800	0646040800
Grade Level	9-12, 30, 31	30, 31
Standard Length	4 Credits	600 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G PAINTING 7G	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G PAINTING 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-2141 - Painters, Construction and Maintenance	47-2141 - Painters, Construction and Maintenance
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment as painters.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of content that includes, but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, materials and cost estimates, surface preparation, paint mixing and matching, application procedures, special effects, wall covering application, blueprint reading, ladder and scaffold erection and use, selection, application and care of materials, use of hand and power tools, and use of current industry standards, practices and techniques.

When offered at the postsecondary level, 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	BCV0164	Painter and Paper Hanger 1	300 Hours	47-2141
	BCV0165	Painter and Paper Hanger 2	300 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8721510	Painting 1	1 Credit	47-2141	2
	8721520	Painting 2	1 Credit		2
	8721530	Painting and Decorating 3	1 Credit		2
	8721540	Painting and Decorating 4	1 Credit		2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.

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. 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>).

Standards

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

- 00.0 Demonstrate the ability to work safely.
- 01.0 Select, use and care for tools and equipment, scaffolding and ladders.
- 02.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate proficiency in preparation of surfaces.
- 05.0 Demonstrate the use of the materials used in painting.
- 06.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 07.0 Use chemical stripping and cleaning solutions.
- 08.0 Estimate cost and provide quotations.

- 09.0 Demonstrate mathematics knowledge and skills.
- 10.0 Demonstrate proper application of materials used in painting using brushes, rollers, and sprayers.
- 09.0 Mix colors and match samples.
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 13.0 Demonstrate science knowledge and skills.
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 15.0 Apply stains, varnishes, lacquers and acrylics.
- 16.0 Advise on suitability of different materials.
- 17.0 Describe the importance of professional ethics and legal responsibilities.
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 19.0 Use information technology tools.
- 20.0 Fit and apply wallpaper.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 21.0 Explain the importance of employability and entrepreneurship skills.

- 06.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 06.02 Explain emergency procedures to follow in response to workplace accidents.
 - 06.03 Create a disaster and/or emergency response plan. SHE2.0
 - 06.04 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).
- 07.0 Use chemical stripping and cleaning solutions--The student will be able to:
- 07.01 Remove a finish from a painted surface using a chemical solution.
 - 07.02 Use prepared solutions to clean a surface.
 - 07.03 Apply rust inhibitors to metal surfaces.
- 08.0 Estimate cost and provide quotations--The student will be able to:
- 08.01 Compute number of rolls of wallpaper required for a specified job.
 - 08.02 Compute amount of paint for a specified job.
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 09.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 09.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 09.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 09.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 09.07 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 09.08 Demonstrate an understanding of federal, state and local taxes and their computation.

Course Number: BCV0165

Occupational Completion Point: A

Painter and Paper Hanger – 300 Hours – SOC Code 47-2142

- 10.0 Demonstrate proper application of materials used in painting using brushes, rollers, and sprayers--The student will be able to:
- 10.01 Paint a surface using a brush.
 - 10.02 Paint trim with a brush.
 - 10.03 Paint a surface with a roller.
 - 10.04 Spray paint a surface.
- 11.0 Mix colors and match samples--The student will be able to:
- 11.01 Identify fundamental colors.
 - 11.02 Explain the process of mixing to arrive at custom colors or tints.

- 11.03 Mix paint to match a given sample.
- 12.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 12.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 13.0 Demonstrate science knowledge and 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 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 13.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 13.04 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.
 - 13.05 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 14.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 14.02 Locate, organize and reference written information from various sources. CM3.0
 - 14.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 14.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 14.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 14.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 15.0 Apply stains, varnishes, lacquers and acrylics--The student will be able to:
- 15.01 Stain woodwork to a uniform color.
 - 15.02 Stain wood to match a sample.
 - 15.03 Seal wood for finishing.
 - 15.04 Apply a varnish finish to a prepared wood surface.
 - 15.05 Apply an oil finish to a prepared wood surface.
 - 15.06 Apply a lacquer finish to a prepared wood surface.
 - 15.07 Apply an acrylic finish to a prepared wood surface.
- 16.0 Advise on suitability of different materials--The student will be able to:

- 16.01 Select a suitable type of wall covering based on surface of wall and environment.
- 16.02 Select a suitable type of coating based on surface, anticipated wear and environment.
- 17.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 17.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 17.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 17.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 17.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 18.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 18.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 18.02 Describe the effect of money management on personal and career goals. FL3.0
- 18.03 Develop a personal budget and financial goals. FL3.1
- 18.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 18.05 Maintain financial records. FL3.3
- 18.06 Read and reconcile financial statements. FL3.4
- 18.07 Research, compare and contrast investment opportunities.
- 19.0 Use information technology tools--The students will be able to:
- 19.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 19.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 19.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 20.0 Fit and apply wallpaper--The student will be able to:
- 20.01 Select and mix paste (for non-pre-pasted) wall coverings.
- 20.02 Apply grass cloth wall covering.
- 20.03 Apply paper wall covering.
- 20.04 Apply foil wall covering.
- 20.05 Apply Mylar wall covering.
- 20.06 Apply cloth-backed wall covering.
- 20.07 Match a pattern to a corner.
- 20.08 Fit wall paper around a window and door.
- 20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 20.01 Describe the nature and types of business organizations. SY1.0
 - 20.02 Explain the effect of key organizational systems on performance and quality.
 - 20.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 20.04 Explain the impact of the global economy on business organizations.
- 21.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 21.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 21.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 21.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 21.04 Employ mentoring skills to inspire and teach others. LT5.0
- 22.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 22.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 22.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 22.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 22.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 22.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 22.06 Identify and exhibit traits for retaining employment. ECD7.0

- 06.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 06.02 Explain emergency procedures to follow in response to workplace accidents.
 - 06.03 Create a disaster and/or emergency response plan. SHE2.0
 - 06.04 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).
- 07.0 Use chemical stripping and cleaning solutions--The student will be able to:
- 07.01 Remove a finish from a painted surface using a chemical solution.
 - 07.02 Use prepared solutions to clean a surface.
 - 07.03 Apply rust inhibitors to metal surfaces.
- 08.0 Estimate cost and provide quotations--The student will be able to:
- 08.01 Compute number of rolls of wallpaper required for a specified job.
 - 08.02 Compute amount of paint for a specified job.
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 09.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 09.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 09.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 09.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 09.07 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 09.08 Demonstrate an understanding of federal, state and local taxes and their computation.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Painting 2**
Course Number: **8721520**
Course Credit: **1**

Course Description:

This course is designed to provide instruction in the proper use and care of painting equipment, selection, mixing and application of materials used in painting.

- 10.0 Demonstrate proper application of materials used in painting using brushes, rollers, and sprayers--The student will be able to:
- 10.01 Paint a surface using a brush.
 - 10.02 Paint trim with a brush.
 - 10.03 Paint a surface with a roller.
 - 10.04 Spray paint a surface.
- 11.0 Mix colors and match samples--The student will be able to:
- 11.01 Identify fundamental colors.
 - 11.02 Explain the process of mixing to arrive at custom colors or tints.
 - 11.03 Mix paint to match a given sample.
- 12.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 12.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 13.0 Demonstrate science knowledge and 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 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 13.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 13.04 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.
 - 13.05 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.

14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 14.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 14.02 Locate, organize and reference written information from various sources. CM3.0
- 14.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 14.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 14.05 Apply active listening skills to obtain and clarify information. CM7.0
- 14.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Painting and Decorating 3
Course Number: 8721530
Course Credit: 1

Course Description:

This course is designed to provide instruction in the preparation of surfaces for finishes, the selection, mixing and application of stains, varnishes, lacquers and finishes.

15.0 Apply stains, varnishes, lacquers and acrylics--The student will be able to:

- 15.01 Stain woodwork to a uniform color.
- 15.02 Stain wood to match a sample.
- 15.03 Seal wood for finishing.
- 15.04 Apply a varnish finish to a prepared wood surface.
- 15.05 Apply an oil finish to a prepared wood surface.
- 15.06 Apply a lacquer finish to a prepared wood surface.
- 15.07 Apply an acrylic finish to a prepared wood surface.

16.0 Advise on suitability of different materials--The student will be able to:

- 16.01 Select a suitable type of wall covering based on surface of wall and environment.
- 16.02 Select a suitable type of coating based on surface, anticipated wear and environment.

17.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 17.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 17.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 17.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 17.04 Interpret and explain written organizational policies and procedures. ELR2.0

18.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 18.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 18.02 Describe the effect of money management on personal and career goals. FL3.0
- 18.03 Develop a personal budget and financial goals. FL3.1
- 18.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 18.05 Maintain financial records. FL3.3
- 18.06 Read and reconcile financial statements. FL3.4
- 18.07 Research, compare and contrast investment opportunities.

19.0 Use information technology tools--The students will be able to:

- 19.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 19.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 19.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Painting and Decorating 4
Course Number: 8721540
Course Credit: 1

Course Description:

This course is designed to provide instruction in the preparation of surfaces for fitting and applying wallpaper, demonstrate employability skills, and an understanding of entrepreneurship.

20.0 Fit and apply wallpaper--The student will be able to:

- 20.01 Select and mix paste (for non-pre-pasted) wall coverings.
- 20.02 Apply grass cloth wall covering.
- 20.03 Apply paper wall covering.
- 20.04 Apply foil wall covering.
- 20.05 Apply Mylar wall covering.
- 20.06 Apply cloth-backed wall covering.
- 20.07 Match a pattern to a corner.
- 20.08 Fit wall paper around a window and door.

21.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 21.01 Describe the nature and types of business organizations. SY1.0
- 21.02 Explain the effect of key organizational systems on performance and quality.
- 21.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 21.04 Explain the impact of the global economy on business organizations.

22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 22.04 Employ mentoring skills to inspire and teach others. LT5.0

23.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 23.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 23.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 23.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 23.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 23.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 23.06 Identify and exhibit traits for retaining employment. ECD7.0

- 23.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 23.08 Research the benefits of ongoing professional development. ECD9.0
- 23.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Plumbing Technology
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8721600	I460513
CIP Number	0646050302	0646050302
Grade Level	9-12, 30, 31	30, 31
Standard Length	7 Credits	960 Hours
Teacher Certification	PLUMBIN @7 7G BLDG CONST ¶ 7 ¶ G TEC CONSTR ¶ 7 ¶ G	PLUMBIN @7 7G BLDG CONST ¶ 7 ¶ G TEC CONSTR ¶ 7 ¶ G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3015 - Helpers—Pipelayers, Plumbers, Pipefitters, and Steamfitters 47-2152 - Plumbers, Pipefitters, and Steamfitters	47-3015 - Helpers—Pipelayers, Plumbers, Pipefitters, and Steamfitters 47-2152 - Plumbers, Pipefitters, and Steamfitters
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of the programs in this cluster is to prepare students for employment or advanced training in a variety of pipe occupations.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0508	Helper, Plumber, Pipefitter	360 Hours	47-3015
B	BCV0540	Residential Plumber	240 Hours	47-2152
C	BCV0562	Commercial Plumber	240 Hours	47-2152
D	BCV0592	Plumber	120 Hours	47-2152

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8721610	Plumbing Technology 1	1 Credit	47-3015	2
	8721620	Plumbing Technology 2	1 Credit		2
B	8721630	Plumbing Technology 3	1 Credit	47-2152	2
	8721640	Plumbing Technology 4	1 Credit		2
C	8721650	Plumbing Technology 5	1 Credit	47-2152	2
	8721660	Plumbing Technology 6	1 Credit		2
D	8721670	Plumbing Technology 7	1 Credit	47-2152	2

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

Students enrolled in an apprenticeship program for the Fire Sprinkler Systems Technology Program should become journeymen when they complete the apprenticeship program if they meet the program requirements and pass all examinations administered during the apprenticeship period.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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 (I460513) has a statewide articulation agreement approved by the Florida State Board of Education:

Building Construction Technology AAS/AS (0615.100101/1615.100101) – 3 credits

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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 01.0 Describe career and training opportunities in the pipe-trade industry.
- 02.0 Demonstrate a basic knowledge of the pipe-trade industry.
- 03.0 Identify the use and care of basic tools in the pipe-trade industry.
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 07.0 Demonstrate language arts knowledge and skills.
- 08.0 Solve problems using critical thinking skills, creativity and innovation.
- 09.0 Demonstrate science knowledge and skills.
- 10.0 Read and interpret construction documents.
- 11.0 Read and interpret basic pipe-trade codes.
- 12.0 Use information technology tools.
- 13.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 14.0 Describe the importance of professional ethics and legal responsibilities.
- 15.0 Demonstrate knowledge of basic plumbing skills.
- 16.0 Cut and join pipes.
- 17.0 Demonstrate knowledge of plumbing codes.
- 18.0 Read and interpret construction documents and specifications.
- 19.0 Lay out and coordinate a job.
- 20.0 Install first rough (underground).
- 21.0 Install second rough (first floor and above).
- 22.0 Trim out plumbing.
- 23.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 24.0 Explain the importance of employability and entrepreneurship skills.
- 25.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 26.0 Demonstrate knowledge of installing hot-water-heating and circulating-systems.
- 27.0 Demonstrate knowledge of installing interceptors and separators.
- 28.0 Demonstrate knowledge of installing a storm drainage system.
- 29.0 Demonstrate an understanding of the principles of backflow cross and connection control.
- 30.0 Demonstrate knowledge of the process of installing a medical gas system. (optional)
- 31.0 Install a Liquid Propane Gas (LPG) system.
- 32.0 Repair, service, and maintain plumbing systems.
- 33.0 Demonstrate an understanding of how to connect residential plumbing to a municipal sewer line. (optional)

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Plumbing Technology
PSAV Number: I460513

Course Number: BCV0508
Occupational Completion Point: A
Plumber Helper – 360 Hours – SOC Code 47-3015

- 01.0 Describe career and training opportunities in the pipe-trade industry--The student will be able to:
- 01.01 Obtain information on current and future job opportunities in the pipe-trade industry, and discuss its trends.
 - 01.02 Describe career ladders (entry-, intermediate-, and technical-level careers) in each of the pipe-trade-industry programs and preparation requirements.
 - 01.03 Describe advanced-training opportunities, including apprenticeship programs in each of the pipe-trade-industry programs.
- 02.0 Demonstrate a basic knowledge of the pipe-trade industry--The student will be able to:
- 02.01 Discuss the history of pipe trades.
 - 02.02 Identify pipes, fittings, materials, and equipment related to the pipe trades.
 - 02.03 Identify fixtures and appliances for plumbing, fire-sprinkler fitting, pipe fitting, and gas fitting jobs.
 - 02.04 Define the terms used in the pipe-trade industry.
- 03.0 Identify the use and care of basic tools in the pipe-trade industry--The student will be able to:
- 03.01 Identify and use the basic tools, equipment, and materials of the pipe-trade industry.
 - 03.02 Demonstrate the procedures/techniques for the selection, use, care and storage of tools and equipment.
 - 03.03 Compare the various tools used for plumbing, and pipe fitting.
 - 03.04 Identify tools and equipment and the safety hazards associated with them.
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 04.01 Explain the importance of following safety precautions when working in the pipe-trade industry.
 - 04.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 04.03 Observe safety precautions.
 - 04.04 Identify safe working practices and safe working conditions in the pipe-trade industry.
 - 04.05 Explain emergency procedures to follow in response to workplace accidents.

- 04.06 Create a disaster and/or emergency response plan. SHE2.0
- 04.07 Demonstrate Cardiopulmonary Resuscitation (CPR) techniques.
- 04.08 Demonstrate an understanding of when and how to use first aid.
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 05.01 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders. AF3.2
- 05.02 Measure tolerances on horizontal and vertical surfaces, using millimeters, centimeters, feet, and inches.
- 05.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 05.04 Solve pipe-trade-related basic math problems, such as piping offset and metric conversion.
- 05.05 Calculate material length and bend pipe by hand or with a pipe-bending machine and tools.
- 05.06 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 06.02 Locate, organize and reference written information from various sources. CM3.0
- 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 06.05 Apply active listening skills to obtain and clarify information. CM7.0
- 06.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 07.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 07.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 09.0 Demonstrate science knowledge and skills --The student will be able to:

- 09.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 09.02 Describe molecular action as a result of temperature and pressure extremes, chemical reaction, and moisture content.
- 09.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 09.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and describe the proper precautions for handling such materials.
- 09.05 Discuss environmental concerns related to hazardous waste and chemical disposal.
- 09.06 Explain pressure measurement in terms of Pounds per Square Inch (PSI), inches of mercury, and KPA.
- 09.07 Explain how to use alternating-current meters and instruments in the pipe trades.
- 10.0 Read and interpret construction documents --The student will be able to:
- 10.01 Read and interpret measuring devices.
- 10.02 Draw and interpret basic isometric sketches.
- 10.03 Identify the basic symbols used in the pipe trades.
- 10.04 Read and interpret manufacturers' schematics and specifications.
- 11.0 Read and interpret basic pipe-trade codes--The student will be able to:
- 11.01 Describe the importance of following the local, state, and national codes for plumbing, gas fitting, and/or pipe fitting.
- 11.02 Read and interpret current standards and codes for plumbing, gas fitting, and/or pipe fitting.
- 11.03 Read and interpret basic building codes in the pipe-trade industry.
- Course Number: BCV0562**
Occupational Completion Point: B
Residential Plumber -- 240 Hours – SOC Code 47-2152
- 12.0 Use information technology tools--The students will be able to:
- 12.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 12.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 12.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 12.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 13.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 13.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 13.02 Describe the effect of money management on personal and career goals. FL3.0
- 13.03 Develop a personal budget and financial goals. FL3.1

- 13.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 13.05 Maintain financial records. FL3.3
- 13.06 Read and reconcile financial statements. FL3.4
- 13.07 Research, compare and contrast investment opportunities.
- 14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 15.0 Demonstrate knowledge of basic plumbing skills--The student will be able to:
- 15.01 Explain the basic theory and principles of plumbing.
- 15.02 Identify:
- a. Pipe and fitting
 - b. Pipe-joining methods
 - c. Plumbing fixtures, appliances, materials, and equipment
 - d. Valves by type, size, materials, and application
- 16.0 Cut and join pipes--The student will be able to:
- 16.01 Join different types of pipes (including PVC, galvanized, steel, plastic, copper, and cast-iron pipes) according to plumbing codes and specifications, using various methods, including:
- a. Brazing
 - b. Clamping
 - c. Compression
 - d. Threading
 - e. Flange
 - f. Flaring
 - g. Gasket joint
 - h. Gluing
 - i. Soldering
 - j. Welding
- 16.02 Measure, mark, and cut different types of pipes, using various pipe cutters, such as:
- a. One-wheel steel-pipe cutter
 - b. Four-wheel steel-pipe cutter
 - c. Hack saw
 - d. Tubing cutter
 - e. Cutting torch
- 16.03 Thread a steel pipe with a power-driven vise stand or a pipe-threading machine.
- 16.04 Demonstrate proficiency in using the tools, following safety practices and procedures.
- 17.0 Demonstrate knowledge of plumbing codes--The student will be able to:

- 17.01 Describe and explain the purpose of plumbing codes.
 - 17.02 Apply the basic theory and principles of plumbing in relation to the codes.
 - 17.03 Read and locate information in the applicable plumbing codes.
 - 17.04 Define and explain the terms used in the plumbing codes.
 - 17.05 Explain why the code may supersede the manufacturer's specifications.
- 18.0 Read and interpret construction documents and specifications--The student will be able to:
- 18.01 Recognize and identify plumbing symbols.
 - 18.02 Identify basic plumbing systems from the blueprint.
 - 18.03 From the blueprints and specifications, identify the plumbing fixtures and materials required for the plumbing job.
 - 18.04 Relate the blueprint to all applicable (local, state, and federal) plumbing codes.
 - 18.05 Cross-reference all working drawings to determine the location and elevation of the piping system and duct work.
 - 18.06 Demonstrate trade-related computer skills for blueprints and specifications.
- 19.0 Lay out and coordinate a job--The student will be able to:
- 19.01 Identify specifications.
 - 19.02 Make a list of materials required to lay out a job.
 - 19.03 Determine the work aids required and the sequence of installations, according to building plans, specifications, and working drawings.
- 20.0 Install the first rough (underground)--The student will be able to:
- 20.01 Lay out a job on site underground and establish a starting point according to codes and specifications, coordinating with other crafts.
 - 20.02 Install building drain, waste, vent, storm drainage, and water-heating-and-circulating systems.
 - 20.03 Install distribution systems.
 - 20.04 Install a temporary water service with backflow prevention.
 - 20.05 Test and inspect the first rough.
- 21.0 Install the second rough (first floor and above)--The student will be able to:
- 21.01 Lay out a job on site for the first floor and above according to codes and specifications, coordinating with other crafts.
 - 21.02 Cut openings in walls and floors to accommodate the pipe and fittings.
 - 21.03 Install hangers and supports.
 - 21.04 Install building-drain, waste vent, storm-drainage; and water-heating-and-circulating systems, including hot-tubs and spas.
 - 21.05 Install distribution systems.
 - 21.06 Test and inspect the second rough.
- 22.0 Trim out plumbing--The student will be able to:
- 22.01 Distribute and place fixtures, appliances, and equipment, including safety devices and control.

- 22.02 Trim out and install job-site fixtures, appliances, and equipment, which include:
 - a. Closet flanges
 - b. Supply stops on water pipes
 - c. Lavatory
 - d. Water closets
 - e. Showers
 - f. Kitchen sinks
 - g. Garbage disposal
 - h. Ice makers
 - i. Dishwashers
 - j. Water heaters
- 22.03 Install backflow assemblies as required.
- 22.04 Test and inspect the final installation.

- 23.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment --The student will be able to:
 - 23.01 Organize and plan multiple tasks, utilizing various resources such as time, personnel, and materials.
 - 23.02 Analyze problems, identify the causes, and devise plans of action.
 - 23.03 Identify obstacles, generate alternatives, and choose the best alternatives.
 - 23.04 Create new and better ways to perform tasks, applying the latest ideas to putting work in place.
 - 23.05 Explain the nature of the problem(s) and the remedial action(s) needed and advise the customer on preventive maintenance in a professional manner.
 - 23.06 Resolve customer complaints in a positive, professional manner.
 - 23.07 Prepare a job ticket.
 - 23.08 Describe the nature and types of business organizations. SY1.0
 - 23.09 Explain the effect of key organizational systems on performance and quality.
 - 23.10 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 23.11 Explain the impact of the global economy on business organizations.

- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
 - 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 24.10 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)

- 25.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 25.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 25.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 25.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 25.04 Employ mentoring skills to inspire and teach others. LT5.0

Course Number: BCV0562
Occupational Completion Point: C
Commercial Plumber -- 240 Hours – SOC Code 47-2152

26.0 Demonstrate knowledge of the process of installing hot-water-heating and circulating systems--The student will be able to:

- 26.01 Explain the basic theory of domestic hot-water-heating.
- 26.02 Design, size, and lay out a system.
- 26.03 Identify the equipment and materials needed for the job in accordance with job specifications and plumbing codes.
- 26.04 Test and inspect the system.

27.0 Demonstrate knowledge of the process of installing interceptors and separators--The student will be able to:

- 27.01 Identify various types of interceptors and separators.
- 27.02 Explain the theory and function of various interceptors and separators.
- 27.03 Describe and/or demonstrate procedures for installing and maintaining:
 - a. Lint traps and grease traps
 - b. Gas and oil separators
 - c. Sand and sediment interceptors

28.0 Demonstrate knowledge of the process of installing a storm-drainage system--The student will be able to:

- 28.01 Explain the theory of roof drains, leaders, and the storm-drainage system.
- 28.02 Size and lay out a storm-drainage system.
- 28.03 Identify the materials needed to install a storm-drainage system in accordance with job specifications and plumbing codes.
- 28.04 Lay out a job on site according to job specifications and plumbing codes, coordinating with other trades.
- 28.05 Illustrate roof drains, leaders, and drainage systems.
- 28.06 Test, and inspect the systems.

29.0 Demonstrate an understanding of the principles of backflow and cross-connection control--The student will be able to:

- 29.01 Define backflow and cross-connection control.
- 29.02 Describe the importance of backflow and cross-connection control to the health of the public.
- 29.03 Identify the proper devices and assemblies for individual applications.
- 29.04 Explain the "degree of hazard" principle and how it relates to the installation of devices and assemblies.

Course Number: BCV0592
Occupational Completion Point: D
Plumber -- 120 Hours – SOC Code 47-2152

- 30.0 Demonstrate knowledge of the process of installing a medical gas system (optional)--
The student will be able to:
- 30.01 Describe and/or demonstrate procedures for:
 - a. Installing a medical gas system in a health-care facility according to applicable plumbing codes
 - b. Connecting medical equipment, safety devices, and controls
 - c. Testing and inspecting medical gas systems to make sure there is no cross connection and the system is pure
- 31.0 Design a Liquid Propane Gas (LPG) system--The student will be able to:
- 31.01 Identify materials required for LPG installation.
 - 31.02 Design, size, and lay out a job on site according to plumbing codes and specifications codes, coordinating with other trades.
 - 31.03 Install distribution systems, including equipment, safety devices, and controls.
 - 31.04 Test and inspect the systems.
- 32.0 Repair, service, and maintain plumbing systems--The student will be able to:
- 32.01 Troubleshoot and diagnose plumbing systems.
 - 32.02 Repair and replace water service and sanitary lines.
 - 32.03 Repair and replace water closets, ball cocks, flush valves, floats, lift rods, ball stoppers, and trip levers.
 - 32.04 Repair leaks in traps and faucets.
 - 32.05 Repair and replace sink strainers.
 - 32.06 Repair and replace water heaters.
 - 32.07 Replace and repair fixture water-supply pipes.
 - 32.08 Reseal water closets to flanges.
 - 32.09 Test and inspect repaired systems.
 - 32.10 Clear obstructions from kitchen sink, water closet, bathtub, lavatory, and sewer lines, using chemicals and tools.
- 33.0 Demonstrate an understanding of how to connect residential plumbing to a municipal sewer line (optional)--The student will be able to:
- 33.01 Describe who is allowed, according to municipal codes, to tap into a sewer line.
 - 33.02 Excavate from the house drain to a sewer main.
 - 33.03 Connect the house drain to the sewer main.
 - 33.04 Test, and inspect the system.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 1
Course Number: 8721610
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies essential to pipe trades. These competencies relate to career and training opportunities, the use and care of tools and safety precautions.

- 01.0 Describe career and training opportunities in the pipe-trade industry--The student will be able to:
- 01.01 Obtain information on current and future job opportunities in the pipe-trade industry, and discuss its trends.
 - 01.02 Describe career ladders (entry-, intermediate-, and technical-level careers) in each of the pipe-trade-industry programs and preparation requirements.
 - 01.03 Describe advanced-training opportunities, including apprenticeship programs in each of the pipe-trade-industry programs.
- 02.0 Demonstrate a basic knowledge of the pipe-trade industry--The student will be able to:
- 02.01 Discuss the history of pipe trades.
 - 02.02 Identify pipes, fittings, materials, and equipment related to the pipe trades.
 - 02.03 Identify fixtures and appliances for plumbing, fire-sprinkler fitting, pipe fitting, and gas fitting jobs.
 - 02.04 Define the terms used in the pipe-trade industry.
- 03.0 Identify the use and care of basic tools in the pipe-trade industry--The student will be able to:
- 03.01 Identify and use the basic tools, equipment, and materials of the pipe-trade industry.
 - 03.02 Demonstrate the procedures/techniques for the selection, use, care and storage of tools and equipment.
 - 03.03 Compare the various tools used for plumbing, and pipe fitting.
 - 03.04 Identify tools and equipment and the safety hazards associated with them.
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 04.01 Explain the importance of following safety precautions when working in the pipe-trade industry.
 - 04.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 04.03 Observe safety precautions.

- 04.04 Identify safe working practices and safe working conditions in the pipe-trade industry.
 - 04.05 Explain emergency procedures to follow in response to workplace accidents.
 - 04.06 Create a disaster and/or emergency response plan. SHE2.0
 - 04.07 Demonstrate Cardiopulmonary Resuscitation (CPR) techniques.
 - 04.08 Demonstrate an understanding of when and how to use first aid.
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 05.01 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders. AF3.2
 - 05.02 Measure tolerances on horizontal and vertical surfaces, using millimeters, centimeters, feet, and inches.
 - 05.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 05.04 Solve pipe-trade-related basic math problems, such as piping offset and metric conversion.
 - 05.05 Calculate material length and bend pipe by hand or with a pipe-bending machine and tools.
 - 05.06 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 06.02 Locate, organize and reference written information from various sources. CM3.0
 - 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 06.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 06.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
 - 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 2
Course Number: 8721620
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies essential to pipe trades. These competencies relate to reading construction documents and understanding standards and codes.

- 07.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 07.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 09.0 Demonstrate science knowledge and skills --The student will be able to:
- 09.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 09.02 Describe molecular action as a result of temperature and pressure extremes, chemical reaction, and moisture content.
 - 09.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 09.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and describe the proper precautions for handling such materials.
 - 09.05 Discuss environmental concerns related to hazardous waste and chemical disposal.
 - 09.06 Explain pressure measurement in terms of Pounds per Square Inch (PSI), inches of mercury, and KPA.
 - 09.07 Explain how to use alternating-current meters and instruments in the pipe trades.
- 10.0 Read and interpret construction documents --The student will be able to:
- 10.01 Read and interpret measuring devices.

- 10.02 Draw and interpret basic isometric sketches.
- 10.03 Identify the basic symbols used in the pipe trades.
- 10.04 Read and interpret manufacturers' schematics and specifications.

11.0 Read and interpret basic pipe-trade codes--The student will be able to:

- 11.01 Describe the importance of following the local, state, and national codes for plumbing, gas fitting, and/or pipe fitting.
- 11.02 Read and interpret current standards and codes for plumbing, gas fitting, and/or pipe fitting.
- 11.03 Read and interpret basic building codes in the pipe-trade industry.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 3
Course Number: 8721630
Course Credit: 1

Course Description:

This course is designed to provide students with competencies relating to construction document and job specifications, building codes in the pipe trades, plumbing pipe-cutting-and-joining skills.

- 12.0 Use information technology tools--The students will be able to:
- 12.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 12.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 12.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 12.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 13.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 13.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 13.02 Describe the effect of money management on personal and career goals. FL3.0
 - 13.03 Develop a personal budget and financial goals. FL3.1
 - 13.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 13.05 Maintain financial records. FL3.3
 - 13.06 Read and reconcile financial statements. FL3.4
 - 13.07 Research, compare and contrast investment opportunities.
- 14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 14.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 15.0 Demonstrate knowledge of basic plumbing skills--The student will be able to:
- 15.01 Explain the basic theory and principles of plumbing.
 - 15.02 Identify:
 - a. Pipe and fitting

- b. Pipe-joining methods
- c. Plumbing fixtures, appliances, materials, and equipment
- d. Valves by type, size, materials, and application

16.0 Cut and join pipes--The student will be able to:

16.01 Join different types of pipes (including PVC, galvanized, steel, plastic, copper, and cast-iron pipes) according to plumbing codes and specifications, using various methods, including:

- a. Brazing
- b. Clamping
- c. Compression
- d. Threading
- e. Flange
- f. Flaring
- g. Gasket joint
- h. Gluing
- i. Soldering
- j. Welding

16.02 Measure, mark, and cut different types of pipes, using various pipe cutters, such as:

- a. One-wheel steel-pipe cutter
- b. Four-wheel steel-pipe cutter
- c. Hack saw
- d. Tubing cutter
- e. Cutting torch

16.03 Thread a steel pipe with a power-driven vise stand or a pipe-threading machine.

16.04 Demonstrate proficiency in using the tools, following safety practices and procedures.

17.0 Demonstrate knowledge of plumbing codes--The student will be able to:

17.01 Describe and explain the purpose of plumbing codes.

17.02 Apply the basic theory and principles of plumbing in relation to the codes.

17.03 Read and locate information in the applicable plumbing codes.

17.04 Define and explain the terms used in the plumbing codes.

17.05 Explain why the code may supersede the manufacturer's specifications.

18.0 Read and interpret construction documents and specifications--The student will be able to:

18.01 Recognize and identify plumbing symbols.

18.02 Identify basic plumbing systems from the blueprint.

18.03 From the blueprints and specifications, identify the plumbing fixtures and materials required for the plumbing job.

18.04 Relate the blueprint to all applicable (local, state, and federal) plumbing codes.

18.05 Cross-reference all working drawings to determine the location and elevation of the piping system and duct work.

18.06 Demonstrate trade-related computer skills for blueprints and specifications.

19.0 Lay out and coordinate a job--The student will be able to:

- 19.01 Identify specifications.
- 19.02 Make a list of materials required to lay out a job.
- 19.03 Determine the work aids required and the sequence of installations, according to building plans, specifications, and working drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 4
Course Number: 8721640
Course Credit: 1

Course Description:

This course is designed to provide students with basics to lay out and coordinate a job install the first, second rough and trim out plumbing

20.0 Install the first rough (underground)--The student will be able to:

- 20.01 Lay out a job on site underground and establish a starting point according to codes and specifications, coordinating with other crafts.
- 20.02 Install building drain, waste, vent, storm drainage, and water-heating-and-circulating systems.
- 20.03 Install distribution systems.
- 20.04 Install a temporary water service with backflow prevention.
- 20.05 Test and inspect the first rough.

21.0 Install the second rough (first floor and above)--The student will be able to:

- 21.01 Lay out a job on site for the first floor and above according to codes and specifications, coordinating with other crafts.
- 21.02 Cut openings in walls and floors to accommodate the pipe and fittings.
- 21.03 Install hangers and supports.
- 21.04 Install building-drain, waste vent, storm-drainage; and water-heating-and-circulating systems, including hot-tubs and spas.
- 21.05 Install distribution systems.
- 21.06 Test and inspect the second rough.

22.0 Trim out plumbing--The student will be able to:

- 22.01 Distribute and place fixtures, appliances, and equipment, including safety devices and control.
- 22.02 Trim out and install job-site fixtures, appliances, and equipment, which include:
 - a. Closet flanges
 - b. Supply stops on water pipes
 - c. Lavatory
 - d. Water closets
 - e. Showers
 - f. Kitchen sinks
 - g. Garbage disposal
 - h. Ice makers
 - i. Dishwashers
 - j. Water heaters
- 22.03 Install backflow assemblies as required.
- 22.04 Test and inspect the final installation.

- 23.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment --The student will be able to:
- 23.01 Organize and plan multiple tasks, utilizing various resources such as time, personnel, and materials.
 - 23.02 Analyze problems, identify the causes, and devise plans of action.
 - 23.03 Identify obstacles, generate alternatives, and choose the best alternatives.
 - 23.04 Create new and better ways to perform tasks, applying the latest ideas to putting work in place.
 - 23.05 Explain the nature of the problem(s) and the remedial action(s) needed and advise the customer on preventive maintenance in a professional manner.
 - 23.06 Resolve customer complaints in a positive, professional manner.
 - 23.07 Prepare a job ticket.
 - 23.08 Describe the nature and types of business organizations. SY1.0
 - 23.09 Explain the effect of key organizational systems on performance and quality.
 - 23.10 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 23.11 Explain the impact of the global economy on business organizations.
- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 24.10 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 25.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 25.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 25.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 25.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 25.04 Employ mentoring skills to inspire and teach others. LT5.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 5
Course Number: 8721650
Course Credit: 1

Course Description:

This course is designed to provide students with competencies relating to installing hot water heating, interceptors and separators.

26.0 Demonstrate a knowledge of the process of installing hot-water-heating and circulating systems --the student will be able to:

- 26.01 Explain the basic theory of domestic hot-water-heating.
- 26.02 Design, size, and lay out a system.
- 26.03 Identify the equipment and materials needed for the job in accordance with job specifications and plumbing codes.
- 26.04 Test and inspect the system.

27.0 Demonstrate knowledge of the process of installing interceptors and separators--The student will be able to:

- 27.01 Identify and explain various types of interceptors and separators.
- 27.02 Explain the theory and function of various interceptors and separators.
- 27.03 Install and maintain:
 - a. Lint traps and grease traps
 - b. Gas and oil separators
 - c. Sand and sediment interceptors

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 6
Course Number: 8721660
Course Credit: 1

Course Description:

This course is designed to provide students with competencies in installing storm drainage, backflow and cross connection control.

28.0 Demonstrate knowledge of the process of installing a storm-drainage system--The student will be able to:

- 28.01 Explain the theory of roof drains, leaders, and the storm-drainage system.
- 28.02 Size and lay out a storm-drainage system.
- 28.03 Identify and select the materials needed to install a storm-drainage system in accordance with job specifications and plumbing codes.
- 28.04 Lay out a job on site according to job specifications and plumbing codes, coordinating with other trades.
- 28.05 Install distribution systems.
- 28.06 Illustrate roof drains, leaders, and drainage systems.
- 28.07 Test, and inspect the systems.

29.0 Demonstrate an understanding of the principles of backflow and cross-connection control--The student will be able to:

- 29.01 Define backflow and cross-connection control.
- 29.02 Describe the importance of backflow and cross-connection control to the health of the public.
- 29.03 Identify the proper devices and assemblies for individual applications.
- 29.04 Explain the "degree of hazard" principle and how it relates to the installation of devices and assemblies.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plumbing Technology 7
Course Number: 8721670
Course Credit: 1

Course Description:

This course is designed to provide students with more in-depth study of trimming out plumbing and developing positive customer-relations skills.

30.0 Demonstrate knowledge of the process of installing a medical gas system (optional)--

The student will be able to:

30.01 Describe and/or explain procedures for:

- a. Installing a medical gas system in a health-care facility according to applicable plumbing codes
- b. Connecting medical equipment, safety devices, and controls
- c. Testing and inspecting medical gas systems to make sure there is no cross connection and the system is pure

31.0 Describe a Liquid Propane Gas (LPG) system--The student will be able to:

31.01 Identify materials required for LPG installation.

31.02 Explain how to size, and lay out a job on site according to plumbing codes and specifications codes, coordinating with other trades.

31.03 Explain distribution systems, including equipment, safety devices, and controls.

31.04 Explain how to inspect the systems.

32.0 Repair, service, and maintain plumbing systems--The student will be able to:

32.01 Troubleshoot and diagnose plumbing systems.

32.02 Repair and replace water service and sanitary lines.

32.03 Repair and replace water closets, ball cocks, flush valves, floats, lift rods, ball stoppers, and trip levers.

32.04 Repair leaks in traps and faucets.

32.05 Repair and replace sink strainers.

32.06 Repair and replace water heaters.

32.07 Replace and repair fixture water-supply pipes.

32.08 Reseal water closets to flanges.

32.09 Test and inspect repaired systems.

32.10 Clear obstructions from kitchen sink, water closet, bathtub, lavatory, and sewer lines, using chemicals and tools.

33.0 Demonstrate an understanding of how to connect residential plumbing to a municipal sewer line (optional)--The student will be able to:

33.01 Describe who is allowed, according to municipal codes, to tap into a sewer line.

33.02 Excavate from the house drain to a sewer main.

- 33.03 Connect the house drain to the sewer main.
- 33.04 Test, and inspect the system.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Building Trades and Construction Design Technology
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8722000	C100100
CIP Number	0646040106	0646040106
Grade Level	9-12, 30, 31	30, 31
Standard Length	6 Credits	900 Hours
Teacher Certification	BLDG MAINT @7 7G TROWEL TR @7 7G PLUMBIN @7 7G ELECTRICAL @7 7G AC HEAT MC @7 7G BLDG CONST @7 7G DRAFTING @7 7G SHEETMETAL @7 7G TECH ED 1@2 TEC CONSTR @7 7G CARPENTRY @7 7G TEC DRAFT 7G ROOFING 7G ENG 7G WOODWORKIN @4	BLDG MAINT @7 7G TROWEL TR @7 7G PLUMBIN @7 7G ELECTRICAL @7 7G AC HEAT MC @7 7G BLDG CONST @7 7G DRAFTING @7 7G SHEETMETAL @7 7G TECH ED 1@2 TEC CONSTR @7 7G CARPENTRY @7 7G TEC DRAFT 7G ROOFING 7G ENG 7G WOODWORKIN @4
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-9071 - Maintenance and Repair Workers, General	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	N/A	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in the building construction industry.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at each occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV 0080	Building Construction Assistant	450 Hours	49-9071
B	BCV 0081	Carpentry and Masonry Technician	150 Hours	49-9071
C	BCV 0082	Electrical and Plumbing Technician	150 Hours	49-9071
D	BCV 0083	A/C and Painting Technician	150 Hours	49-9071

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8722010	Building Trades and Construction Design Technology 1	1 Credit	49-9071	2
	8722020	Building Trades and Construction Design Technology 2	1 Credit		2
	8722030	Building Trades and Construction Design Technology 3	1 Credit		2
B	8722040	Building Trades and Construction Design Technology 4	1 Credit		2
C	8722050	Building Trades and Construction Design Technology 5	1 Credit	49-9071	2
D	8722060	Building Trades and Construction Design Technology 6	1 Credit	49-9071	2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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 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 (ESE) will need modifications to meet their special 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.

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. 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>).

Standards

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

- 01.0 Follow safety practices and disaster plans.
- 02.0 Demonstrate an understanding of the built environment.
- 03.0 Demonstrate an understanding of the construction industry and related occupations.
- 04.0 Identify and use basic hand tools.
- 05.0 Identify and use power tools and equipment.
- 06.0 Solve problems using critical thinking skills, creativity and innovation.
- 07.0 Describe the importance of professional ethics and legal responsibilities.
- 08.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 10.0 Use information technology tools.
- 11.0 Research construction components, materials, hardware, and characteristics.
- 12.0 Demonstrate language arts knowledge and skills.
- 13.0 Read blueprints, contract documents and specifications.
- 14.0 Explain the importance of employability and entrepreneurship skills.
- 15.0 Apply building codes and regulations to the preparation of CAD drawings and construction documents.
- 16.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 17.0 Demonstrate rough carpentry skills.
- 18.0 Demonstrate finish carpentry skills.
- 19.0 Demonstrate masonry skills.
- 20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 21.0 Demonstrate electrical rough in skills.
- 22.0 Demonstrate finish electrical skills.
- 23.0 Demonstrate plumbing rough in skills.
- 24.0 Demonstrate finish plumbing skills.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 26.0 Demonstrate air conditioning rough in skills.
- 27.0 Demonstrate finish air conditioning skills.
- 28.0 Demonstrate painting and decorating skills.
- 29.0 Demonstrate science knowledge and skills.
- 30.0 Demonstrate mathematics knowledge and skills.
- 31.0 Demonstrate design technology, building trades, and construction management skills.

Note: Outcomes 09.0, 29.0 and 30.0 are intended to be taught throughout the program and do not need to be taught as discreet lessons. Outcome 31.0 is a capstone project designed to integrate all of the competencies of the previous 30 outcomes.

2013 – 2014

**Florida Department of Education
Student Performance Standard**

Program Title: Building Trades and Construction Design Technology
PSAV Number: C100100

Course Number: BCV 0080
Occupational Completion Point: A
Building Construction Assistant – 450 Hours – SOC Code 49-9071

- 01.0 Follow safety practices and disaster plans--The student will be able to:
 - 01.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
 - 01.02 Examine Material Safety Data Sheets (MSDS) and follow the procedures as necessary.
 - 01.03 Analyze and discuss the “Right-to-Know” Law as recorded in (29 CFR-1910.1200)
 - 01.04 Identify and use safety equipment.
 - 01.05 Analyze and follow disaster plans.

- 02.0 Demonstrate an understanding of the built environment--The student will be able to:
 - 02.01 Assess the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
 - 02.02 Assess the benefits of the construction industry on health and safety, communication, transportation, and the economy.
 - 02.03 Examine the relationship between construction and the environment.
 - 02.04 Debate the role of trade unions in the construction industry.
 - 02.05 Examine the role of apprenticeship in the construction industry.
 - 02.06 Determine the different classifications of construction projects.
 - 02.07 Compare and contrast the roles and responsibilities of the general contractor, specialty contractor, construction management, and design build firms.

- 03.0 Demonstrate an understanding of the construction industry and related occupations--The student will be able to:
 - 03.01 Survey construction trade occupations and the roles and responsibilities of each craft.
 - 03.02 Survey construction management occupations and the roles and responsibilities of each.
 - 03.03 Survey design and engineering occupations and the roles and responsibilities of each.
 - 03.04 Assess the relationship between construction and the economy.
 - 03.05 Examine the process of applying for building permits and variances.
 - 03.06 Assess the need for, and impact of, zoning requirements on construction projects.

- 04.0 Identify and use basic hand tools--The student will be able to:

- 04.01 Select and utilize appropriate hand tools typically used in the construction industry for specific tasks in accordance with safety guidelines.
- 05.0 Identify power tools and describe their proper operation--The student will be able to:
 - 05.01 Select and utilize appropriate power tools and equipment typically used in the construction industry for specific tasks in accordance with safety guidelines.
- 06.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 - 06.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 06.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 06.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 06.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 07.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
 - 07.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 07.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 07.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 07.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 08.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 08.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 08.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 08.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 08.04 Employ mentoring skills to inspire and teach others. LT5.0
- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
 - 09.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 09.02 Locate, organize and reference written information from various sources. CM3.0
 - 09.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 09.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 09.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 09.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 09.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Research construction components, materials, hardware, and characteristics--The student will be able to:
- 11.01 Research the various components; materials and hardware used in residential construction applications.
 - 11.02 Research the various components; materials and hardware used in commercial construction applications.
 - 11.03 Research the various components, materials and hardware used in industrial construction applications.
 - 11.04 Compare and contrast the components, materials and hardware used in residential, commercial and industrial construction applications.
- 12.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 12.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 12.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 12.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 13.0 Read contract blueprints, documents and specifications--The student will be able to:
- 13.01 Determine the purpose and components of contract documents and specifications.
 - 13.02 Analyze the importance of building codes, and zoning regulations on the development of blueprints and specifications.
 - 13.03 Incorporate the following elements in the development of blueprints and specifications:
 - a. Dimensions
 - b. Construction views
 - c. Section views
 - d. Site plans
 - e. Foundation plans
 - f. Floor plans and elevations
 - g. Details and schedules
 - h. Wiring details
 - i. Plumbing details
 - j. Mechanical details
 - 13.04 Utilize building symbols in the development of blueprints.
 - 13.05 Prepare lists of materials and specifications.
 - 13.06 Use architectural and engineering scales.

- 13.07 Demonstrate the basic use of computer-aided design software.
- 14.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 14.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 14.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 14.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 14.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 14.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 14.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 14.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 14.08 Research the benefits of ongoing professional development. ECD9.0
 - 14.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 14.10 Conduct a job search and analyze the requirements of the job.
 - 14.11 Determine the ramifications of a poor-driving record on employability opportunities.
 - 14.12 Assess the importance of confidentiality in the workplace.
- 15.0 Apply building codes and regulations to the preparation of CAD drawings and construction documents--The student will be able to:
- 15.01 Research local, state, and federal codes, regulations, and standards.
 - 15.02 Research local, state, and federal regulatory agencies.
 - 15.03 Research and apply appropriate zoning requirements for a project.
 - 15.04 Research and apply appropriate building codes for a project.
 - 15.05 Demonstrate the use of CAD software to prepare project drawings.
 - 15.06 Write specifications for a project.
 - 15.07 Prepare construction documents for a project.

Course Number: BCV 0081

Occupational Completion Point: B

Carpentry and Masonry Technician – 150 Hours – SOC Code 49-9071

- 16.0 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:
- 16.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 16.02 Explain emergency procedures to follow in response to workplace accidents.
 - 16.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Demonstrate rough carpentry skills--The student will be able to:
- 17.01 Determine boundary lines.
 - 17.02 Determine elevations.
 - 17.03 Determine need to add, remove, or relocate fill.
 - 17.04 Layout and mark building location and elevation.
 - 17.05 Clean and maintain the site.

- 17.06 Construct various types of concrete forms.
- 17.07 Determine the need for and utilize in-beds used in concrete formwork.
- 17.08 Demonstrate appropriate form stripping and handling techniques.
- 17.09 Calculate, layout and install framing members for a structure.
- 17.10 Dry in a structure.
- 17.11 Identify and assess the suitability of different types of roofing systems and their application to various construction projects.
- 17.12 Install various roofing materials and sealers.

18.0 Demonstrate finish carpentry skills--The student will be able to:

- 18.01 Install insulation.
- 18.02 Install interior finish materials.
- 18.03 Install exterior and interior doors.
- 18.04 Install windows.
- 18.05 Install interior trim and hardware.
- 18.06 Install acoustical ceiling systems.
- 18.07 Install cabinets and trim.

19.0 Demonstrate masonry skills--The student will be able to:

- 19.01 Mix various types of concrete, considering application and Pounds per Square Inch (PSI) strength.
- 19.02 Identify and select masonry tools.
- 19.03 Demonstrate the procedures of concrete installation for a project.
- 19.04 Identify and select cleaning materials and equipment.
- 19.05 Demonstrate safe and proper procedures for cleaning equipment, materials, work area, and worker.
- 19.06 Utilize the tools and equipment used for mixing mortar.
- 19.07 Analyze the factors that affect the consistency of mortar.
- 19.08 Determine the common ratios (M, N, S, and O) of mortar mixtures.
- 19.09 Layout and install concrete block for a project.
- 19.10 Implement the methods of putting up the line.
- 19.11 Utilize pointing tools to strike mortar joints.
- 19.12 Identify and use the various types of trowels.
- 19.13 Mix and apply stucco to a project.

20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 20.01 Describe the nature and types of business organizations. SY1.0
- 20.02 Explain the effect of key organizational systems on performance and quality.
- 20.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 20.04 Explain the impact of the global economy on business organizations.

Course Number: BCV 0082

Occupational Completion Point: C

Electrical and Plumbing Technician – 150 Hours – SOC Code 49-9071

21.0 Demonstrate electrical rough in skills--The student will be able to:

- 21.01 Apply basic electrical theory to wiring a project.
- 21.02 Design and install a branch circuit system in a project.
- 21.03 Install Ground Fault Circuit Interrupter (GFCI) circuitry.
- 21.04 Troubleshoot electrical systems, using testing and metering devices.
- 21.05 Install a meter, distribution panel, and breaker panel for a project.
- 21.06 Identify types of wiring raceways.
- 21.07 Install conduit, pipe, shielded electrical cable, and electrical boxes in a project.

22.0 Demonstrate finish electrical skills--The student will be able to:

- 22.01 Install electrical:
 - a. Breakers
 - b. Outlets
 - c. Switches
 - d. Light fixtures
- 22.02 Wire an air conditioning system into an electrical supply.
- 22.03 Test and inspect electrical systems.

23.0 Demonstrate plumbing rough in skills--The student will be able to:

- 23.01 Select and install various pipes, tubing, fittings and connectors used in the plumbing trade for a specific project.
- 23.02 Layout and install a water distribution system for a project.
- 23.03 Layout and install a waste and vent system for a project.
- 23.04 Test and inspect plumbing systems.

24.0 Demonstrate finish plumbing skills--The student will be able to:

- 24.01 Install bathroom fixtures and hardware, such as:
 - a. Lavatory
 - b. Water closet
 - c. Urinal
 - d. Shower
 - e. Bathtub
 - f. Traps
- 24.02 Install kitchen fixtures and hardware, such as:
 - a. Sinks
 - b. Garbage disposals
 - c. Faucets
 - d. Hot-water-heater tanks

Course Number: BCV 0083

Occupational Completion Point: D

A/C and Painting Technician – 150 Hours – SOC Code 49-9071

25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 25.02 Describe the effect of money management on personal and career goals. FL3.0

- 25.03 Develop a personal budget and financial goals. FL3.1
- 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 25.05 Maintain financial records. FL3.3
- 25.06 Read and reconcile financial statements. FL3.4
- 25.07 Research, compare and contrast investment opportunities.
- 26.0 Demonstrate air conditioning rough in skills--The student will be able to:
- 26.01 Explain heating and cooling principles and code requirements.
- 26.02 Perform basic calculations for heating and cooling loads.
- 26.03 Select and install the components of an air conditioning system for a project including:
- Duct work
 - Coolant lines
 - Compressor package
 - Coil package
- 26.04 Identify and select refrigerants according to their properties.
- 27.0 Demonstrate finish air conditioning skills--The student will be able to:
- 27.01 Determine a refrigerant level.
- 27.02 Install a control system for a project.
- 27.03 Install registers for a project.
- 27.04 Examine computer-monitoring systems associated with Heating, Ventilation, and Air-Conditioning (HVAC) control systems and air-quality management.
- 28.0 Demonstrate painting and decorating skills--The student will be able to:
- 28.01 Erect an extension ladder and a scaffold.
- 28.02 Prepare surfaces for application of finishes.
- 28.03 Apply finishes to a project including:
- Paint
 - Stain
 - Wallpaper
- 28.04 Use appropriate techniques and materials for clean up.
- 29.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 29.01 Assess molecular action as a result of temperature extremes, chemical reaction, and moisture content as it relates to the choice of materials and construction techniques.
- 29.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 29.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 29.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
- 29.05 Explain pressure measurement in terms of PSI and inches of mercury.
- 29.06 Explore new technology as it applies to the construction industry in terms of materials, processes and the need for continuing education.

- 30.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 30.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 30.02 Solve job-related problems by adding, subtracting, multiplying, and dividing numbers, using fractions, decimals, and whole numbers.
 - 30.03 Change numbers to percents.
 - 30.04 Solve job-related problems, using a calculator.
 - 30.05 Read a ruler and a tape measure.
 - 30.06 Compute feet, inches, and yards.
 - 30.07 Change hours and minutes to decimals, fractions, and mixed numbers.
 - 30.08 Construct charts/tables/graphs using functions and data. AF3.5
 - 30.09 Determine ratios and proportions.
 - 30.10 Convert measurements from the English to the metric system and from the metric to the English system.
 - 30.11 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 30.12 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
 - 30.13 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 30.14 Calculate the following for a specific job:
 - a. Work hours
 - b. Cost of the workers
 - c. Cost to be charged to the client
 - 30.15 Explain and compute federal, state, and local taxes.
 - 30.16 Calculate the time charged for labor on the job.
- 31.0 Demonstrate design technology, building trades and construction management skills--
The student will be able to:
- 31.01 Apply the skills learned throughout the program to the design, construction, management and presentation of a capstone project.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 1
Course Number: 8722010
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies essential to the building construction industry. These competencies include skills and knowledge related to safety practices, understanding all aspects of the industry, the use of hand and power tools, employability skills, human relations and leadership skills and related construction theory.

01.0 Follow safety practices and disaster plans--The student will be able to:

- 01.01 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations.
- 01.02 Examine Material Safety Data Sheets (MSDS) and follow the procedures as necessary.
- 01.03 Analyze and discuss the “Right-to-Know” Law as recorded in (29 CFR-1910.1200)
- 01.04 Identify and use safety equipment.
- 01.05 Analyze and follow disaster plans.

02.0 Demonstrate an understanding of the built environment--The student will be able to:

- 02.01 Assess the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- 02.02 Assess the benefits of the construction industry on health and safety, communication, transportation, and the economy.
- 02.03 Examine the relationship between construction and the environment.
- 02.04 Debate the role of trade unions in the construction industry.
- 02.05 Examine the role of apprenticeship in the construction industry.
- 02.06 Determine the different classifications of construction projects.
- 02.07 Compare and contrast the roles and responsibilities of the general contractor, specialty contractor, construction management, and design build firms.

03.0 Demonstrate an understanding of the construction industry and related occupations--The student will be able to:

- 03.01 Survey construction trade occupations and the roles and responsibilities of each craft.
- 03.02 Survey construction management occupations and the roles and responsibilities of each.
- 03.03 Survey design and engineering occupations and the roles and responsibilities of each.
- 03.04 Assess the relationship between construction and the economy.
- 03.05 Examine the process of applying for building permits and variances.

- 03.06 Assess the need for, and impact of, zoning requirements on construction projects.
- 04.0 Identify and use basic hand tools--The student will be able to:
 - 04.01 Select and utilize appropriate hand tools typically used in the construction industry for specific tasks in accordance with safety guidelines.
- 05.0 Identify power tools and describe their proper operation--The student will be able to:
 - 05.01 Select and utilize appropriate power tools and equipment typically used in the construction industry for specific tasks in accordance with safety guidelines.
- 06.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 - 06.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 06.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 06.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 06.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 07.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
 - 07.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 07.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 07.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 07.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 08.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 08.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 08.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 08.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 08.04 Employ mentoring skills to inspire and teach others. LT5.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 2
Course Number: 8722020
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies necessary for the building, construction and repair industry. These competencies relate to communication and computer skills; construction components, materials and hardware; and blueprints, specifications, and construction documents.

09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 09.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 09.02 Locate, organize and reference written information from various sources. CM3.0
- 09.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 09.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 09.05 Apply active listening skills to obtain and clarify information. CM7.0
- 09.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 09.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

10.0 Use information technology tools--The students will be able to:

- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

11.0 Research construction components, materials, hardware, and characteristics--The student will be able to:

- 11.01 Research the various components, materials and hardware used in residential construction applications.
- 11.02 Research the various components, materials and hardware used in commercial construction applications.
- 11.03 Research the various components, materials and hardware used in industrial construction applications.
- 11.04 Compare and contrast the components, materials and hardware used in residential, commercial and industrial construction applications.

- 12.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 12.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 12.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 12.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 13.0 Read contract blueprints, documents and specifications--The student will be able to:
- 13.01 Determine the purpose and components of contract documents and specifications.
 - 13.02 Analyze the importance of building codes, and zoning regulations on the development of blueprints and specifications.
 - 13.03 Incorporate the following elements in the development of blueprints and specifications:
 - a. Dimensions
 - b. Construction views
 - c. Section views
 - d. Site plans
 - e. Foundation plans
 - f. Floor plans and elevations
 - g. Details and schedules
 - h. Wiring details
 - i. Plumbing details
 - j. Mechanical details
 - 13.04 Utilize building symbols in the development of blueprints.
 - 13.05 Prepare lists of materials and specifications.
 - 13.06 Use architectural and engineering scales.
 - 13.07 Demonstrate the basic use of computer-aided design software.

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**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 3
Course Number: 8722030
Course Credit: 1

Course Description:

The purpose of this course is to develop the competencies necessary for the building, construction and repair industry. These competencies relate to entrepreneurship, building codes and regulations, and CAD drawings and construction documents.

14.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 14.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 14.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 14.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 14.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 14.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 14.06 Identify and exhibit traits for retaining employment. ECD7.0
- 14.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 14.08 Research the benefits of ongoing professional development. ECD9.0
- 14.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 14.10 Conduct a job search and analyze the requirements of the job.
- 14.11 Determine the ramifications of a poor-driving record on employability opportunities.
- 14.12 Assess the importance of confidentiality in the workplace.

15.0 Apply building codes and regulations to the preparation of CAD drawings and construction documents--The student will be able to:

- 15.01 Research local, state, and federal codes, regulations, and standards.
- 15.02 Research local, state, and federal regulatory agencies.
- 15.03 Research and apply appropriate zoning requirements for a project.
- 15.04 Research and apply appropriate building codes for a project.
- 15.05 Demonstrate the use of CAD software to prepare project drawings.
- 15.06 Write specifications for a project.
- 15.07 Prepare construction documents for a project.

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**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 4
Course Number: 8722040
Course Credit: 1

Course Description:

The purpose of this course is to provide students with hands on skills in the carpentry and masonry trades.

- 16.0 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:
- 16.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 16.02 Explain emergency procedures to follow in response to workplace accidents.
 - 16.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Demonstrate rough carpentry skills--The student will be able to:
- 17.01 Determine boundary lines.
 - 17.02 Determine elevations.
 - 17.03 Determine need to add, remove, or relocate fill.
 - 17.04 Layout and mark building location and elevation.
 - 17.05 Clean and maintain the site.
 - 17.06 Construct various types of concrete forms.
 - 17.07 Determine the need for and utilize in-beds used in concrete formwork.
 - 17.08 Demonstrate appropriate form stripping and handling techniques.
 - 17.09 Calculate, layout and install framing members for a structure.
 - 17.10 Dry in a structure.
 - 17.11 Identify and assess the suitability of different types of roofing systems and their application to various construction projects.
 - 17.12 Install various roofing materials and sealers.
- 18.0 Demonstrate finish carpentry skills--The student will be able to:
- 18.01 Install insulation.
 - 18.02 Install interior finish materials.
 - 18.03 Install exterior and interior doors.
 - 18.04 Install windows.
 - 18.05 Install interior trim and hardware.
 - 18.06 Install acoustical ceiling systems.
 - 18.07 Install cabinets and trim.
- 19.0 Demonstrate masonry skills--The student will be able to:

- 19.01 Mix various types of concrete, considering application and Pounds per Square Inch (PSI) strength.
- 19.02 Identify and select masonry tools.
- 19.03 Demonstrate the procedures of concrete installation for a project.
- 19.04 Identify and select cleaning materials and equipment.
- 19.05 Demonstrate safe and proper procedures for cleaning equipment, materials, work area, and worker.
- 19.06 Utilize the tools and equipment used for mixing mortar.
- 19.07 Analyze the factors that affect the consistency of mortar.
- 19.08 Determine the common ratios (M, N, S, and O) of mortar mixtures.

- 19.09 Layout and install concrete block for a project.
- 19.10 Implement the methods of putting up the line.
- 19.11 Utilize pointing tools to strike mortar joints.
- 19.12 Identify and use the various types of trowels.
- 19.13 Mix and apply stucco to a project.

- 20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 - 20.01 Describe the nature and types of business organizations. SY1.0
 - 20.02 Explain the effect of key organizational systems on performance and quality.
 - 20.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 20.04 Explain the impact of the global economy on business organizations.

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**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 5
Course Number: 8722050
Course Credit: 1

Course Description:

The purpose of this course is to provide students with hands on skills in the electrical and plumbing trades.

21.0 Demonstrate electrical rough in skills--The student will be able to:

- 21.01 Apply basic electrical theory to wiring a project.
- 21.02 Design and install a branch circuit system in a project.
- 21.03 Install Ground Fault Circuit Interrupter (GFCI) circuitry.
- 21.04 Troubleshoot electrical systems, using testing and metering devices.
- 21.05 Install a meter, distribution panel, and breaker panel for a project.
- 21.06 Identify types of wiring raceways.
- 21.07 Install conduit, pipe, shielded electrical cable, and electrical boxes in a project.

22.0 Demonstrate finish electrical skills--The student will be able to:

- 22.01 Install electrical:
 - a. Breakers
 - b. Outlets
 - c. Switches
 - d. Light fixtures
- 22.02 Wire an air conditioning system into an electrical supply.
- 22.03 Test and inspect electrical systems.

23.0 Demonstrate plumbing rough in skills--The student will be able to:

- 23.01 Select and install various pipes, tubing, fittings and connectors used in the plumbing trade for a specific project.
- 23.02 Layout and install a water distribution system for a project.
- 23.03 Layout and install a waste and vent system for a project.
- 23.04 Test and inspect plumbing systems.

24.0 Demonstrate finish plumbing skills--The student will be able to:

- 24.01 Install bathroom fixtures and hardware, such as:
 - a. Lavatory
 - b. Water closet
 - c. Urinal
 - d. Shower
 - e. Bathtub
 - f. Traps
- 24.02 Install kitchen fixtures and hardware, such as

- a. Sinks
- b. Garbage disposals
- c. Faucets
- d. Hot-water-heater tanks

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**Florida Department of Education
Student Performance Standards**

Course Title: Building Trades and Construction Design Technology 6
Course Number: 8722060
Course Credit: 1

Course Description:

This course is designed to provide students with hands on skills in the air conditioning and painting and decorating trades, and to further develop all of the skills acquired throughout the program.

- 25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 25.02 Describe the effect of money management on personal and career goals. FL3.0
 - 25.03 Develop a personal budget and financial goals. FL3.1
 - 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 25.05 Maintain financial records. FL3.3
 - 25.06 Read and reconcile financial statements. FL3.4
 - 25.07 Research, compare and contrast investment opportunities.
- 26.0 Demonstrate air conditioning rough in skills--The student will be able to:
- 26.01 Explain heating and cooling principles and code requirements.
 - 26.02 Perform basic calculations for heating and cooling loads.
 - 26.03 Select and install the components of an air conditioning system for a project including:
 - a. Duct work
 - b. Coolant lines
 - c. Compressor package
 - d. Coil package
 - 26.04 Identify and select refrigerants according to their properties.
- 27.0 Demonstrate finish air conditioning skills--The student will be able to:
- 27.01 Determine a refrigerant level.
 - 27.02 Install a control system for a project.
 - 27.03 Install registers for a project.
 - 27.04 Examine computer-monitoring systems associated with Heating, Ventilation, And Air-Conditioning (HVAC) control systems and air-quality management.
- 28.0 Demonstrate painting and decorating skills--The student will be able to:
- 28.01 Erect an extension ladder and a scaffold.
 - 28.02 Prepare surfaces for application of finishes.
 - 28.03 Apply finishes to a project including:

- a. Paint
 - b. Stain
 - c. Wallpaper
- 28.04 Use appropriate techniques and materials for clean-up.
- 29.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 29.01 Assess molecular action as a result of temperature extremes, chemical reaction, and moisture content as it relates to the choice of materials and construction techniques.
 - 29.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 29.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 29.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
 - 29.05 Explain pressure measurement in terms of PSI and inches of mercury.
 - 29.06 Explore new technology as it applies to the construction industry in terms of materials, processes and the need for continuing education.
- 30.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 30.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 30.02 Solve job-related problems by adding, subtracting, multiplying, and dividing numbers, using fractions, decimals, and whole numbers.
 - 30.03 Change numbers to percents.
 - 30.04 Solve job-related problems, using a calculator.
 - 30.05 Read a ruler and a tape measure.
 - 30.06 Compute feet, inches, and yards.
 - 30.07 Change hours and minutes to decimals, fractions, and mixed numbers.
 - 30.08 Construct charts/tables/graphs using functions and data. AF3.5
 - 30.09 Determine ratios and proportions.
 - 30.10 Convert measurements from the English to the metric system and from the metric to the English system.
 - 30.11 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
 - 30.12 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
 - 30.13 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
 - 30.14 Calculate the following for a specific job:
 - a. Work hours
 - b. Cost of the workers
 - c. Cost to be charged to the client
 - 30.15 Explain and compute federal, state, and local taxes.
 - 30.16 Calculate the time charged for labor on the job.
- 31.0 Demonstrate design technology, building trades and construction management skills--
The student will be able to:

31.01 Apply the skills learned throughout the program to the design, construction, management and presentation of a capstone project.

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**Florida Department of Education
Curriculum Framework**

Program Title: Carpentry
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8722100	I460202
CIP Number	0646020105	0646020105
Grade Level	9-12, 30, 31	30, 31
Standard Length	7 Credits	1200 Hours
Teacher Certification	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONST @7 7G TEC CONSTR @7 7G	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONST @7 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3012 – Helpers--Carpenters 47-2031- Carpenters	47-3012 – Helpers--Carpenters 47-2031- Carpenters
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the carpentry and cabinetmaking industry with a stress on basic carpentry/cabinet making skills.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for additional training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

After completing the core, carpentry students may opt to take either the Trim and Finish Carpentry course or the Frame Carpentry course as exit-point goals. However, in order to proceed to Carpentry, students must first complete both the Trim and Finish Carpentry course and the Frame Carpentry course in addition to the core or demonstrate mastery of the performance standards contained in those courses.

Similarly, after completing the core, cabinetmaking students may opt to take either the Cabinet Finishing course or the Cabinet Assembling and Laminating course. Again, however, in order to proceed to Cabinetmaking, students must first complete both the Cabinet Finishing course and the Cabinet Assembling and Laminating course in addition to the core or demonstrate mastery of the student performance standards contained in those courses.

When offered at the postsecondary level, 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	BCV0107	Carpenter Helper	300 Hours	47-3012
B	BCV0111	Trim And Finish Carpenter	300 Hours	47-2031
C	BCV0122	Carpenter, Rough	450 Hours	47-2031
D	BCV0128	Carpenter	150 Hours	47-2031

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8722110	Carpentry and Cabinetmaking 1	1 Credit	47-3012	2
	8722120	Carpentry and Cabinetmaking 2	1 Credit		2
B	8722130	Carpentry and Cabinetmaking 3	1 Credit	47-2031	3
	8722140	Carpentry 4	1 Credit		3
C	8722150	Carpentry 5	1 Credit	47-2031	3
	8722160	Carpentry 6	1 Credit		3
	8722170	Carpentry 7	1 Credit		3

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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 (I460202) has a statewide articulation agreement approved by the Florida State Board of Education:

Building Construction Technology AAS/AS (0615.100101/1615.100101) – 3 credits

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. 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>).

Standards

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

- 01.0 Apply shop safety skills.
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field.
- 04.0 Create basic construction drawings.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Recommend appropriate building materials for specific scenarios.
- 07.0 Select appropriate fasteners and hardware for specific scenarios.
- 08.0 Demonstrate science knowledge and skills.
- 09.0 Apply occupational safety skills.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession.
- 12.0 Fasten stock and joints.
- 13.0 Construct millwork from a set of drawings.
- 14.0 Demonstrate language arts knowledge and skills.
- 15.0 Read and design construction documents.
- 16.0 Assemble and install cabinets and components.
- 17.0 Solve problems using critical thinking skills, creativity and innovation.
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions.
- 19.0 Assemble and install cabinetry.
- 20.0 Install interior and exterior doors (wood and/or metal).
- 21.0 Use information technology tools.
- 22.0 Install trim and finish carpentry using plans and specifications.
- 23.0 Cut and install framing members for a floor (wood and/or metal).
- 24.0 Cut and install a wall and partition framing (wood and/or metal).
- 25.0 Install an interior wall and ceiling materials.
- 26.0 Describe the importance of professional ethics and legal responsibilities.
- 27.0 Lay out and construct an interior-stair system.
- 28.0 Demonstrate personal money-management concepts, procedures and strategies.
- 29.0 Comply with hurricane codes.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 31.0 Demonstrate knowledge of roof framing.
- 32.0 Demonstrate knowledge of roofing applications.
- 33.0 Apply thermal and moisture protection.

- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 35.0 Frame walls using cold-formed steel.
- 36.0 Perform site-preparation and layout activities.
- 37.0 Explain the importance of employability and entrepreneurship skills.
- 38.0 Perform concrete tests.
- 39.0 Lay foundations.
- 40.0 Construct vertical formwork.
- 41.0 Construct horizontal formwork.
- 42.0 Erect and properly align tilt-up wall panels.
- 43.0 Install drywall .
- 44.0 Install a suspended ceiling.
- 45.0 Interpret door and door hardware requirements based on plans and specifications.
- 46.0 Install windows and exterior doors.
- 47.0 Apply interior trim.
- 48.0 Lay out and construct an exterior stair system.
- 49.0 Apply exterior finishing.
- 50.0 Set up and install basic rigging and scaffolding.
- 51.0 Erect, plumb and brace a simple concrete form with reinforcement.
- 52.0 Explain and demonstrate how to place reinforcing bars in walls, columns, beams, girders, joists and slabs.
- 53.0 Explain the transport and placement of concrete.
- 54.0 Demonstrate an understanding of trenching and excavation.
- 55.0 Identify structural timber.
- 56.0 Use plans and specifications for form carpentry.
- 57.0 Explain or identify various forms.

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**Florida Department of Education
Student Performance Standards**

Program Title: Carpentry
PSAV Number: I460202

Course Number: BCV0107
Occupational Completion Point: A
Carpenter Helper – 300 Hours – SOC Code 47-3012

- 01.0 Apply shop safety skills--The student will be able to:
- 01.01 Maintain a clean, orderly and safe work area.
 - 01.02 Transport, handle and store materials safely.
 - 01.03 Operate a fire extinguisher.
 - 01.04 Qualify in basic first-aid procedures.
 - 01.05 Identify safety hazards.
 - 01.06 Demonstrate the use and care of personal protective equipment (PPE).
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions--The student will be able to:
- 02.01 Identify various hand and power tools.
 - 02.02 Select correct tools for specific jobs.
 - 02.03 Clean and care for tools and equipment.
 - 02.04 Demonstrate proficiency in the safe use of hand and power tools.
 - 02.05 Read and use carpenter's measuring tools.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field--The student will be able to: AF3.0
- 03.01 Apply geometry and algebra skills to solve math problems related to carpentry and/or cabinetmaking with and without a calculator.
 - 03.02 Demonstrate knowledge of arithmetic operations. AF3.2
 - 03.03 Solve problems for distance, area and volume.
 - 03.04 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 03.05 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Create basic construction drawings--The student will be able to:
- 04.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 04.02 Relate information on construction drawings to actual locations on the print.
 - 04.03 Recognize different classifications of construction drawings.
 - 04.04 Interpret and use drawing dimensions and scales.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:

- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 05.02 Locate, organize and reference written information from various sources. CM3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.0 Recommend appropriate building materials for specific scenarios--The student will be able to:
- 06.01 Identify the grades and species of lumber and their appropriate uses.
- 06.02 Identify the actual and nominal sizes of lumber.
- 06.03 Identify the grades of plywood and wood products.
- 06.04 Identify defects and blemishes that affect the durability and strength of lumber.
- 06.05 Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
- 06.06 Explain the uses of various types of engineered lumber.
- 07.0 Select appropriate fasteners and hardware for specific scenarios--The student will be able to:
- 07.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
- 07.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 08.0 Demonstrate science knowledge and skills--The student will be able to: AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3
- 09.0 Apply occupational safety skills--The student will be able to:
- 09.01 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 09.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 09.03 Identify health-related problems that may result from exposure to hazardous materials.
- 09.04 Describe the proper precautions for handling hazardous materials.
- 09.05 Explain eligibility and the procedures for obtaining worker's compensation.
- 09.06 Explain the importance of complying with the Americans with Disabilities Act (ADA) requirements.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE2.0

- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession--The student will be able to:
- 11.01 Identify the hand tools commonly used by carpenters and describe their uses.
 - 11.02 Use hand tools in a safe and appropriate manner.
 - 11.03 State the general safety rules for operating all power tools, regardless of type.
 - 11.04 State the general rules for properly maintaining all power tools, regardless of type.
 - 11.05 Identify the portable power tools commonly used by carpenters and describe their uses.
 - 11.06 Use portable power tools in a safe and appropriate manner.
- 12.0 Fasten stock and joints--The student will be able to:
- 12.01 Identify types of glues and fasteners and describe their applications.
 - 12.02 Fasten stock with glue and clamps.
 - 12.03 Fasten stock and joints with appropriate fasteners, such as:
 - a. nails
 - b. staples
 - c. screws
 - d. bolts
 - 12.04 Fill and finish nail and screw holes with fillers and plugs.
 - 12.05 Glue and clamp stock, using various techniques.
- 13.0 Construct millwork from a set of drawings--The student will be able to:
- 13.01 Recognize the common types of woods used to make cabinets.
 - 13.02 Use stationary power tools.
 - 13.03 Identify and cut the various types of joints used in cabinetmaking.
 - 13.04 Build a cabinet from a set of drawings.
 - 13.05 Install plastic laminate on a countertop core.
- 14.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0
- 14.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 14.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 14.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 15.0 Read and design construction documents--The student will be able to:
- 15.01 Explain the types of drawings usually included in a set of plans and list the information found on each type.
 - 15.02 Identify the different types of lines used on construction drawings.
 - 15.03 Identify selected abbreviations commonly used on plans.
 - 15.04 Read and interpret plans, elevations, schedules, sections and details contained in basic construction drawings.
 - 15.05 State the purpose of written specifications.
 - 15.06 Identify and describe the parts of a specification.
 - 15.07 Conduct quantity takeoff for materials.
 - 15.08 Design millwork and draw details in construction documents for a given scenario.

- 16.0 Assemble and install cabinets and components--The student will be able to:
- 16.01 Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
 - 16.02 Install fasteners.
 - 16.03 Install drawers.
 - 16.04 Install various types of doors, including:
 - a. overlay
 - b. lipped
 - c. flush
 - 16.05 Install adjustable shelving.
 - 16.06 Install glass panels and metal grills.
 - 16.07 Install specialty hardware, such as a lazy Susan, wire racks and "pull-outs".
 - 16.08 Install sliding doors and track.
- 17.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 17.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 17.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 17.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 17.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions--The student will be able to:
- 18.01 Describe the impact of the construction industry on the natural environment.
 - 18.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 18.03 Recommend sustainable alternatives to conventional carpentry and cabinetmaking practices.
 - 18.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 18.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 18.06 Assess construction activities pertaining to the carpentry and cabinetmaking profession that contribute to a project's overall sustainability.

Course Number: BCV0111

Occupational Completion Point: B

Trim And Finish Carpenter – 300 Hours – SOC Code 47-2031

- 19.0 Assemble and install cabinetry--The student will be able to:
- 19.01 Recognize the common types of woods used to make cabinets.
 - 19.02 Correctly and safely use stationary power tools.
 - 19.03 Identify and cut the various types of joints used in cabinetmaking.
 - 19.04 Build a cabinet from a set of drawings.
 - 19.05 Install plastic laminate on a countertop core.

- 20.0 Install interior and exterior doors (wood and/or metal)--The student will be able to:
 - 20.01 Identify the types and parts of door systems.
 - 20.02 Install a door jamb and hang a door.
 - 20.03 Identify and install door hardware.

- 21.0 Use information technology tools--The student will be able to:
 - 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, and email and internet applications. IT2.0
 - 21.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
 - 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

- 22.0 Install trim and finish carpentry using plans and specifications--The student will be able to:
 - 22.01 Read an architect's scale for a trim and finish carpentry job.
 - 22.02 Determine dimensions from plans.
 - 22.03 Relate information on plans and specifications to real parts, locations, hardware and fasteners.

- 23.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:
 - 23.01 Identify and describe floor-framing members, including subfloor.
 - 23.02 Lay out, cut and install supports for structures (e.g., sills, columns, beams and girders).
 - 23.03 Lay out and install various types of joists and openings, including joists for a cantilevered floor.
 - 23.04 Install various types of bridging.
 - 23.05 Install various types of subfloors, applying fastening techniques.

- 24.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
 - 24.01 Identify framing members used in wall and partition construction.
 - 24.02 Lay out wall lines and partition locations on a floor.
 - 24.03 Lay out walls for studs, doors and windows.
 - 24.04 Cut studs, trimmers, cripples, headers and fire stops to length.
 - 24.05 Build T's, corners and headers.
 - 24.06 Lay out and assemble wall sections.
 - 24.07 Install wall sheathing and/or diagonal bracing.
 - 24.08 Install insulation material and a vapor barrier.

- 25.0 Install an interior wall and ceiling materials--The student will be able to:

- 25.01 Install furring strips
 - 25.02 Install drywall.
 - 25.03 Identify and install paneling and trim.
 - 25.04 Identify and install ceiling materials and systems.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 27.0 Lay out and construct an interior-stair system--The student will be able to:
- 27.01 Identify the types and styles of interior-stair systems.
 - 27.02 Identify the components of an interior-stair system.
 - 27.03 Calculate the number of risers and treads for an interior-stair system.
 - 27.04 Lay out, cut and assemble an interior-stair system (rough and finish).
- 28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
- 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 28.02 Describe the effect of money management on personal and career goals. FL3.0
 - 28.03 Develop a personal budget and financial goals. FL3.1
 - 28.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 28.05 Maintain financial records. FL3.3
 - 28.06 Read and reconcile financial statements. FL3.4
 - 28.07 Research, compare and contrast investment opportunities.
- 29.0 Comply with hurricane codes--the student will be able to:
- 29.01 Install hurricane anchors.
 - 29.02 Install hurricane clips.
 - 29.03 Install hurricane straps.
 - 29.04 Explain the purpose and importance of the codes relating to hurricanes.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 30.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 30.04 Employ mentoring skills to inspire and teach others. LT5.0

31.0 Demonstrate knowledge of roof framing--The student will be able to:

- 31.01 Understand the terms associated with roof framing.
- 31.02 Identify the roof framing members used in gable and hip roofs.
- 31.03 Identify the methods used to calculate the length of a rafter.
- 31.04 Identify the various types of trusses used in roof framing.
- 31.05 Use a rafter framing square, speed square and calculator in laying out a roof.
- 31.06 Identify various types of sheathing used in roof construction.
- 31.07 Frame a gable roof with vent openings.
- 31.08 Frame a roof opening.
- 31.09 Erect a gable roof using trusses.
- 31.10 Estimate the materials used in framing and sheathing a roof.

32.0 Demonstrate knowledge of roofing applications--The student will be able to:

- 32.01 Identify the materials and methods used in roofing.
- 32.02 Explain the safety requirements for roof jobs.
- 32.03 Install fiberglass shingles on gable and hip roofs.
- 32.04 Close up a valley using fiberglass shingles.
- 32.05 Explain how to make various roof projections watertight when using fiberglass shingles.
- 32.06 Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
- 32.07 Lay out, cut and install a cricket or saddle.
- 32.08 Install wood shingles and shakes on roofs.
- 32.09 Describe how to close up a valley using wood shingles and shakes.
- 32.10 Explain how to make roof projections watertight when using wood shakes and shingles.
- 32.11 Complete the cuts and install the main and hip ridge caps using wood shakes/shingles.
- 32.12 Demonstrate the techniques for installing other selected types of roofing materials.

33.0 Apply thermal and moisture protection--The student will be able to:

- 33.01 Describe the requirements for insulation.
- 33.02 Describe the characteristics of various types of insulation material.
- 33.03 Calculate the required amounts of insulation for a structure.
- 33.04 Install selected insulation materials.
- 33.05 Describe the requirements for moisture control and ventilation.
- 33.06 Install selected vapor barriers.
- 33.07 Describe various methods of waterproofing.
- 33.08 Describe air infiltration control requirements.
- 33.09 Install selected building wraps.

34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:

- 34.01 Describe the nature and types of business organizations. SY1.0
- 34.02 Explain the effect of key organizational systems on performance and quality.

- 34.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 34.04 Explain the impact of the global economy on business organizations.
- 35.0 Frame walls using cold-formed steel--The student will be able to:
- 35.01 Identify the components of a steel framing system.
- 35.02 Identify and select the tools and fasteners used in a steel framing system.
- 35.03 Identify applications for steel framing systems.
- 35.04 Demonstrate the ability to build back-to-back, box and L-headers.
- 35.05 Lay out and install a steel stud structural wall with openings to include bracing and blocking.
- 35.06 Lay out and install a steel stud non-structural wall with openings to include blocking and bracing.
- 36.0 Perform site-preparation and layout activities--The student will be able to:
- 36.01 Identify building layout from plans and specifications using math skills.
- 36.02 Set up and adjust a transit and builder's level over one point and establish lines over two points.
- 36.03 Erect batter boards and locate building lines.
- 36.04 Locate building line points on batter boards using a builder's level.
- 36.05 Locate building lines on a plot plan.
- 36.06 Square a building, using the 3-4-5-triangle method and the diagonal method.
- 37.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 37.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 37.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
- 37.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
- 37.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
- 37.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 37.06 Identify and exhibit traits for retaining employment. ECD7.0
- 37.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 37.08 Research the benefits of ongoing professional development. ECD9.0
- 37.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

Course Number: BCV0122
Occupational Completion Point: C
Carpenter Rough – 450 Hours – SOC Code 47-2031

- 38.0 Perform concrete tests--The student will be able to:
- 38.01 Identify various types of cement and describe their uses.
- 38.02 Identify types and sizes of concrete aggregates.
- 38.03 Identify types of concrete admixtures and describe their uses.
- 38.04 Identify special types of concrete and describe their uses.

- 38.05 Calculate concrete volume requirements for rectangular, cylindrical, or other geometric structures using formulas, concrete tables and/or concrete calculators, as applicable.
 - 38.06 Use concrete curing methods and materials.
 - 38.07 Apply concrete testing methods.
 - 38.08 Mix concrete using different aggregates and admixtures.
 - 38.09 Sample concrete using a test cylinder.
 - 38.10 Perform slump testing of concrete.
 - 38.11 Demonstrate how to properly set up a curing box.
- 39.0 Lay foundations--The student will be able to:
- 39.01 Establish elevations.
 - 39.02 Identify various types of footing and foundations.
 - 39.03 Select the appropriate footing for a foundation.
 - 39.04 Lay out and construct a selected footing and foundation using an established gridline.
 - 39.05 Install templates, keyways and embedments.
 - 39.06 Form and strip pier foundation forms and prepare for resetting at another location.
 - 39.07 Identify the different classes of slabs-on-grade.
 - 39.08 Identify edge forms and explain their purpose.
 - 39.09 Construct and disassemble edge forms.
 - 39.10 Install vapor barrier, reinforcement and control joints.
 - 39.11 Establish finish grade and fill requirements.
- 40.0 Construct vertical formwork--The student will be able to:
- 40.01 Explain safety procedures associated with using concrete wall forms.
 - 40.02 Identify the various types of concrete wall forms.
 - 40.03 Identify the components of each type of vertical forming system.
 - 40.04 Erect, plumb and brace a selected wall.
 - 40.05 Recognize various types of manufactured forms.
 - 40.06 State the differences in construction and use among different types of forms.
 - 40.07 Erect, plumb and brace a column form.
 - 40.08 Erect, plumb and brace a stair form.
 - 40.09 Locate and install bulkheads and embedded forms.
- 41.0 Construct horizontal formwork--The student will be able to:
- 41.01 Identify the safety hazards associated with elevated deck formwork and explain how to eliminate them.
 - 41.02 Identify the different types of elevated decks.
 - 41.03 Identify the different types of flying form systems.
 - 41.04 Identify different types of handset form systems.
 - 41.05 Erect, plumb, brace and level different types of handset deck form systems.
 - 41.06 Install edge forms, blockouts, embedments and construction joints.
 - 41.07 Identify typical bridge and culvert form systems.
- 42.0 Erect and properly align tilt-up wall panels--The student will be able to:

- 42.01 Describe the different processes used in installing tilt-up wall panels.
 - 42.02 Explain the importance of the casting bed.
 - 42.03 Identify and install the various types of lifting eyes used in forming tilt-up panels.
 - 42.04 Identify the special rigging requirements for tilt-up wall panels.
 - 42.05 Identify the different methods of forming tilt-up wall panels.
 - 42.06 Demonstrate the different methods of forming tilt-up wall panels.
 - 42.07 Prepare for the erection of tilt-up wall panels.
 - 42.08 Install proper bracing for tilt-up wall panels.
 - 42.09 Install embedments, blockouts, architectural finishes, lifting devices and reinforcing materials using a set of construction drawings.
 - 42.10 Describe the final grouting procedure.
- 43.0 Install drywall --The student will be able to:
- 43.01 Identify the different types of drywall and their uses.
 - 43.02 Select the type and thickness of drywall required for specific installations.
 - 43.03 Select fasteners for drywall installation.
 - 43.04 Explain the fastener schedules for different types of drywall installations.
 - 43.05 Perform single-layer and multi-layer drywall installations using different types of fastening systems, including:
 - a. Nails
 - b. Drywall screws
 - c. Adhesives
 - 43.06 Install gypsum drywall on steel studs.
 - 43.07 Explain how soundproofing is achieved in drywall installations.
 - 43.08 Estimate material quantities for a drywall installation.
- 44.0 Install a suspended ceiling--The student will be able to:
- 44.01 Establish a level line.
 - 44.02 Explain the common terms related to sound waves and acoustical ceiling materials.
 - 44.03 Identify the different types of suspended ceilings.
 - 44.04 Interpret plans related to ceiling layout.
 - 44.05 Sketch the ceiling layout for a basic suspended ceiling.
 - 44.06 Perform a material takeoff for a suspended ceiling.
 - 44.07 Install selected suspended ceilings.
- 45.0 Interpret door and door hardware requirements based on plans and specifications--The student will be able to:
- 45.01 Identify various types of door jambs and frames and demonstrate the installation procedures for placing selected door jambs and frames in different types of interior partitions.
 - 45.02 Identify different types of interior doors.
 - 45.03 Identify different types of interior door hardware and demonstrate the installation procedures for selected types.
 - 45.04 List and identify specific items included on a typical door schedule.
 - 45.05 Explain the procedure for placing and hanging a specified door.
- 46.0 Install windows and exterior doors--The student will be able to:

- 46.01 Identify various types of fixed, sliding and swinging windows.
 - 46.02 Identify the parts of a window installation.
 - 46.03 State the requirements for a proper window installation.
 - 46.04 Install a pre-hung window.
 - 46.05 Identify the common types of exterior doors and explain how they are constructed.
 - 46.06 Identify the parts of a door installation.
 - 46.07 Identify the types of thresholds used with exterior doors.
 - 46.08 Install a pre-hung exterior door.
 - 46.09 Identify the various types of locksets used on exterior doors and explain how they are installed.
 - 46.10 Install a lockset.
- 47.0 Apply interior trim--The student will be able to:
- 47.01 Identify the different types of standard moldings and describe their uses.
 - 47.02 Make square and miter cuts using a miter box or power miter saw.
 - 47.03 Make coped joint cuts using a coping saw.
 - 47.04 Select and properly use fasteners to install trim.
 - 47.05 Install interior trim, including:
 - a. Door trim
 - b. Window trim
 - c. Base trim
 - d. Ceiling trim
 - 47.06 Estimate the quantities of different trim materials required for selected rooms.
- 48.0 Lay out and construct an exterior stair system--The student will be able to:
- 48.01 Identify the types of exterior stair systems.
 - 48.02 Identify the parts of an exterior stair system.
 - 48.03 Calculate the number of treads and risers for an exterior stair system.
 - 48.04 Lay out, cut and assemble an exterior stair system.
- 49.0 Apply exterior finishing--The student will be able to:
- 49.01 Describe the purpose of wall insulation and flashing.
 - 49.02 Install selected common cornices.
 - 49.03 Demonstrate lap and panel siding estimating methods.
 - 49.04 Describe the types and applications of common wood siding.
 - 49.05 Describe fiber-cement siding and its uses.
 - 49.06 Describe the types and styles of vinyl and metal siding.
 - 49.07 Describe the types and applications of stucco and masonry veneer finishes.
 - 49.08 Describe the types and applications of special exterior finish systems.
 - 49.09 Install three types of siding commonly used in your area.
- 50.0 Set up and install basic rigging and scaffolding--The student will be able to:
- 50.01 Identify and explain rigging equipment.
 - 50.02 Inspect rigging equipment, following safety precautions.
 - 50.03 Estimate size, weight and center of gravity.

- 50.04 Tie knots.
 - 50.05 Identify and explain types of cranes.
 - 50.06 Rig and move materials and equipment, following safety precautions.
 - 50.07 Set up and install scaffolds, following safety precautions.
 - 50.08 Inspect various types of ladders and scaffolds, following safety precautions.
- 51.0 Erect, plumb and brace a simple concrete form with reinforcement--The student will be able to:
- 51.01 Identify the properties of cement.
 - 51.02 Describe the composition of concrete.
 - 51.03 Perform volume estimates for concrete quantity requirements.
 - 51.04 Identify types of concrete reinforcement materials and describe their uses.
 - 51.05 Identify various types of footings and explain their uses.
 - 51.06 Identify the parts of various types of forms.
 - 51.07 Explain the safety procedures associated with the construction and use of concrete forms.
- 52.0 Explain and demonstrate how to place reinforcing bars in walls, columns, beams, girders, joists and slabs--The student will be able to:
- 52.01 Describe the applications of reinforcing bars, the uses of reinforced structural concrete and the basic processes involved in placing reinforcing bars.
 - 52.02 Recognize and identify the bar bends standardized by the American Concrete Institution (ACI).
 - 52.03 Read and interpret bar lists and describe the information found on a bar list.
 - 52.04 List the types of ties used in securing reinforcing bars.
 - 52.05 State the tolerances allowed in the fabrication of reinforcing bars.
 - 52.06 Demonstrate the proper use of common ties for reinforcing bars.
 - 52.07 Describe methods by which reinforcing bars may be cut and bent in the field.
 - 52.08 Use the tools and equipment needed for installing reinforcing bars.
 - 52.09 Safely use selected tools and equipment to cut, bend and install reinforcing materials.
 - 52.10 Explain the necessity of concrete cover in placing reinforcing bars.
 - 52.11 Identify lapped splices.
- 53.0 Explain the transport and placement of concrete--The student will be able to:
- 53.01 List various types of equipment used to transport and place concrete.
 - 53.02 Describe the factors that contribute to the quality of concrete placement.
 - 53.03 Demonstrate the correct methods for placing and consolidating concrete into forms.
 - 53.04 Use a screed to strike off and level concrete to the proper grade in a form.
 - 53.05 Use tools for placing, floating and finishing concrete.
 - 53.06 Determine when conditions permit the concrete finishing operation to start.
 - 53.07 Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
 - 53.08 Properly care for and safely use hand and power tools used when working with concrete.
- 54.0 Demonstrate an understanding of trenching and excavation--The student will be able to:

- 54.01 Identify the different types, bearing capacities and classifications of soils.
- 54.02 Identify ways to increase soil density.
- 54.03 State the purpose of soil density (compaction) tests.
- 54.04 Explain the safety considerations for trenches and deep excavations.
- 54.05 Identify and describe groundwater mitigation methods.
- 54.06 Identify and describe rock mitigation techniques.

Course Number: BCV0128
Occupational Completion Point: D
Carpenter Rough – 150 Hours – SOC Code 47-2031

55.0 Identify structural timber--The student will be able to:

- 55.01 Identify structural-timber components and heavy structural timber.

56.0 Use plans and specifications for form carpentry--The student will be able to:

- 56.01 Read an architect's scale for form carpentry job.
- 56.02 Determine dimensions from plans.
- 56.03 Relate information on plans and specifications to real parts, locations, hardware, and fasteners.

57.0 Explain or identify various forms--The student will be able to:

- 57.01 Identify styles of footings.
- 57.02 Explain and settings a pier footing form.
- 57.03 Explain how to strip a form for reuse.
- 57.04 Explain edge forms for a floor with or without foundation walls and for a stoop.
- 57.05 Explain various types of curb and gutter forms.
- 57.06 Identify various types of beams, columns, and slabs with various form systems (Burke, Symons, plywood, and 2'x 4').
- 57.07 Identify and explain the different types and uses of flying forms for decks and shear walls.
- 57.08 Explain concrete pressure and its implications for form work routines.
- 57.09 Identify form-work accessories such as snap-ties, wedges, pigs-feet, whalers, and stiffbacks for forming walls, beams, and columns with plywood and 2'x 4' material.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry and Cabinetmaking 1
Course Number: 8722110
Course Credit: 1

Course Description:

The purpose of this course is for the student to develop competencies essential to the carpentry and cabinetmaking industry. These competencies include safety, use of manual and power tools, applied math, plan reading, building materials, fasteners and hardware.

01.0 Apply shop safety skills--The student will be able to:

- 01.01 Maintain a clean, orderly and safe work area.
- 01.02 Transport, handle and store materials safely.
- 01.03 Operate a fire extinguisher.
- 01.04 Qualify in basic first-aid procedures.
- 01.05 Identify safety hazards.
- 01.06 Demonstrate the use and care of personal protective equipment (PPE).

02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions--The student will be able to:

- 02.01 Identify various hand and power tools.
- 02.02 Select correct tools for specific jobs.
- 02.03 Clean and care for tools and equipment.
- 02.04 Demonstrate proficiency in the safe use of hand and power tools.
- 02.05 Read and use carpenter's measuring tools.

03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field--The student will be able to: AF3.0

- 03.01 Apply geometry and algebra skills to solve math problems related to carpentry and/or cabinetmaking with and without a calculator.
- 03.02 Demonstrate knowledge of arithmetic operations. AF3.2
- 03.03 Solve problems for distance, area and volume.
- 03.04 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 03.05 Construct charts/tables/graphs using functions and data. AF3.5

04.0 Create basic construction drawings--The student will be able to:

- 04.01 Recognize and identify basic construction drawing terms, components and symbols.
- 04.02 Relate information on construction drawings to actual locations on the print.
- 04.03 Recognize different classifications of construction drawings.
- 04.04 Interpret and use drawing dimensions and scales.

- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 05.02 Locate, organize and reference written information from various sources. CM3.0
 - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.0 Recommend appropriate building materials for specific scenarios --The student will be able to:
- 06.01 Identify the grades and species of lumber and their appropriate uses.
 - 06.02 Identify the actual and nominal sizes of lumber.
 - 06.03 Identify the grades of plywood and wood products.
 - 06.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 06.05 Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
 - 06.06 Explain the uses of various types of engineered lumber.
- 07.0 Select appropriate fasteners and hardware for specific scenarios --The student will be able to:
- 07.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 07.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 08.0 Demonstrate science knowledge and skills--The student will be able to:
AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry and Cabinetmaking 2
Course Number: 8722120
Course Credit: 1

Course Description:

The purpose of this course is for the student to continue developing competencies essential to the carpentry and cabinetmaking professions. These competencies include safety, hand and power tools, fastening methods, cabinet assembly and plan reading.

09.0 Apply occupational safety skills--The student will be able to:

- 09.01 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 09.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
- 09.03 Identify health-related problems that may result from exposure to hazardous materials.
- 09.04 Describe the proper precautions for handling hazardous materials.
- 09.05 Explain eligibility and the procedures for obtaining worker's compensation.
- 09.06 Explain the importance of complying with the Americans with Disabilities Act (ADA) requirements.

10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE2.0

11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession--The student will be able to:

- 11.01 Identify the hand tools commonly used by carpenters and describe their uses.
- 11.02 Use hand tools in a safe and appropriate manner.
- 11.03 State the general safety rules for operating all power tools, regardless of type.
- 11.04 State the general rules for properly maintaining all power tools, regardless of type.
- 11.05 Identify the portable power tools commonly used by carpenters and describe their uses.
- 11.06 Use portable power tools in a safe and appropriate manner.

12.0 Fasten stock and joints--The student will be able to:

- 12.01 Identify types of glues and fasteners and describe their applications.
- 12.02 Fasten stock with glue and clamps.

- 12.03 Fasten stock and joints with appropriate fasteners, such as:
 - a. nails
 - b. staples
 - c. screws
 - d. bolts
- 12.04 Fill and finish nail and screw holes with fillers and plugs.
- 12.05 Glue and clamp stock, using various techniques.

- 13.0 Construct millwork from a set of drawings--The student will be able to:
 - 13.01 Recognize the common types of woods used to make cabinets.
 - 13.02 Use stationary power tools.
 - 13.03 Identify and cut the various types of joints used in cabinetmaking.
 - 13.04 Build a cabinet from a set of drawings.
 - 13.05 Install plastic laminate on a countertop core.

- 14.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0
 - 14.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 14.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 14.03 Present information formally and informally for specific purposes and audiences. AF2.9

- 15.0 Read and design construction documents--The student will be able to:
 - 15.01 Explain the types of drawings usually included in a set of plans and list the information found on each type.
 - 15.02 Identify the different types of lines used on construction drawings.
 - 15.03 Identify selected abbreviations commonly used on plans.
 - 15.04 Read and interpret plans, elevations, schedules, sections and details contained in basic construction drawings.
 - 15.05 State the purpose of written specifications.
 - 15.06 Identify and describe the parts of a specification.
 - 15.07 Conduct quantity takeoff for materials.
 - 15.08 Design millwork and draw details in construction documents for a given scenario.

- 16.0 Assemble and install cabinets and components--The student will be able to:
 - 16.01 Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
 - 16.02 Install fasteners.
 - 16.03 Install drawers.
 - 16.04 Install various types of doors, including:
 - a. overlay
 - b. lipped
 - c. Flush
 - 16.05 Install adjustable shelving.
 - 16.06 Install glass panels and metal grills.
 - 16.07 Install specialty hardware, such as a lazy Susan, wire racks and "pull-outs".
 - 16.08 Install sliding doors and track.

- 17.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 17.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 17.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 17.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 17.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions--The student will be able to:
- 18.01 Describe the impact of the construction industry on the natural environment.
 - 18.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 18.03 Recommend sustainable alternatives to conventional carpentry and cabinetmaking practices.
 - 18.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 18.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 18.06 Assess construction activities pertaining to the carpentry and cabinetmaking profession that contribute to a project's overall sustainability.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry and Cabinetmaking 3
Course Number: 8722130
Course Credit: 1

Course Description:

This course provides students with a more in-depth knowledge of trim and finish carpentry, as well as an introduction to rough carpentry. Students will further their understanding of plan and specifications, assemble and install cabinetry, install doors, frame floors and walls and construct stairs.

19.0 Assemble and install cabinetry--The student will be able to:

- 19.01 Recognize the common types of woods used to make cabinets.
- 19.02 Use stationary power tools.
- 19.03 Identify and cut the various types of joints used in cabinetmaking.
- 19.04 Build a cabinet from a set of drawings.
- 19.05 Install plastic laminate on a countertop core.

20.0 Install interior and exterior doors (wood and/or metal)--The student will be able to:

- 20.01 Identify the types and parts of door systems.
- 20.02 Install a door jamb and hang a door.
- 20.03 Identify and install door hardware.

21.0 Use information technology tools--The student will be able to:

- 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, and email and internet applications. IT2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

22.0 Install trim and finish carpentry using plans and specifications --The student will be able to:

- 22.01 Read an architect's scale for a trim and finish carpentry job.
- 22.02 Determine dimensions from plans.
- 22.03 Relate information on plans and specifications to real parts, locations, hardware and fasteners.

23.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:

- 23.01 Identify and describe floor-framing members, including subfloor.
 - 23.02 Lay out, cut and install supports for structures (e.g., sills, columns, beams and girders).
 - 23.03 Lay out and install various types of joists and openings, including joists for a cantilevered floor.
 - 23.04 Install various types of bridging.
 - 23.05 Install various types of subfloors, applying fastening techniques.
- 24.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
- 24.01 Identify framing members used in wall and partition construction.
 - 24.02 Lay out wall lines and partition locations on a floor.
 - 24.03 Lay out walls for studs, doors and windows.
 - 24.04 Cut studs, trimmers, cripples, headers and fire stops to length.
 - 24.05 Build T's, corners and headers.
 - 24.06 Lay out and assemble wall sections.
 - 24.07 Install wall sheathing and/or diagonal bracing.
 - 24.08 Install insulation material and a vapor barrier.
- 25.0 Install an interior wall and ceiling materials--The student will be able to:
- 25.01 Install furring strips
 - 25.02 Install drywall.
 - 25.03 Identify and install paneling and trim.
 - 25.04 Identify and install ceiling materials and systems.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 27.0 Lay out and construct an interior-stair system--The student will be able to:
- 27.01 Identify the types and styles of interior-stair systems.
 - 27.02 Identify the components of an interior-stair system.
 - 27.03 Calculate the number of risers and treads for an interior-stair system.
 - 27.04 Lay out, cut and assemble an interior-stair system (rough and finish).
- 28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
- 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 28.02 Describe the effect of money management on personal and career goals. FL3.0

- | | | |
|-------|---|-------|
| 28.03 | Develop a personal budget and financial goals. | FL3.1 |
| 28.04 | Complete financial instruments for making deposits and withdrawals. | FL3.2 |
| 28.05 | Maintain financial records. | FL3.3 |
| 28.06 | Read and reconcile financial statements. | FL3.4 |
| 28.07 | Research, compare and contrast investment opportunities. | |

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Carpentry 4**
Course Number: **8722140**
Course Credit: **1**

Course Description:

29.0 Comply with hurricane codes--the student will be able to:

- 29.01 Install hurricane anchors.
- 29.02 Install hurricane clips.
- 29.03 Install hurricane straps.
- 29.04 Explain the purpose and importance of the codes relating to hurricanes.

30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:

- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 30.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 30.04 Employ mentoring skills to inspire and teach others. LT5.0

31.0 Demonstrate knowledge of roof framing--The student will be able to:

- 31.01 Understand the terms associated with roof framing.
- 31.02 Identify the roof framing members used in gable and hip roofs.
- 31.03 Identify the methods used to calculate the length of a rafter.
- 31.04 Identify the various types of trusses used in roof framing.
- 31.05 Use a rafter framing square, speed square and calculator in laying out a roof.
- 31.06 Identify various types of sheathing used in roof construction.
- 31.07 Frame a gable roof with vent openings.
- 31.08 Frame a roof opening.
- 31.09 Erect a gable roof using trusses.
- 31.10 Estimate the materials used in framing and sheathing a roof.

32.0 Demonstrate knowledge of roofing applications--The student will be able to:

- 32.01 Identify the materials and methods used in roofing.
- 32.02 Explain the safety requirements for roof jobs.
- 32.03 Install fiberglass shingles on gable and hip roofs.
- 32.04 Close up a valley using fiberglass shingles.
- 32.05 Explain how to make various roof projections watertight when using fiberglass shingles.
- 32.06 Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
- 32.07 Lay out, cut and install a cricket or saddle.
- 32.08 Install wood shingles and shakes on roofs.

- 32.09 Describe how to close up a valley using wood shingles and shakes.
 - 32.10 Explain how to make roof projections watertight when using wood shakes and shingles.
 - 32.11 Complete the cuts and install the main and hip ridge caps using wood shakes/shingles.
 - 32.12 Demonstrate the techniques for installing other selected types of roofing materials.
- 33.0 Apply thermal and moisture protection--The student will be able to:
- 33.01 Describe the requirements for insulation.
 - 33.02 Describe the characteristics of various types of insulation material.
 - 33.03 Calculate the required amounts of insulation for a structure.
 - 33.04 Install selected insulation materials.
 - 33.05 Describe the requirements for moisture control and ventilation.
 - 33.06 Install selected vapor barriers.
 - 33.07 Describe various methods of waterproofing.
 - 33.08 Describe air infiltration control requirements.
 - 33.09 Install selected building wraps.
- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 34.01 Describe the nature and types of business organizations. SY1.0
 - 34.02 Explain the effect of key organizational systems on performance and quality.
 - 34.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 34.04 Explain the impact of the global economy on business organizations.
- 35.0 Frame walls using cold-formed steel--The student will be able to:
- 35.01 Identify the components of a steel framing system.
 - 35.02 Identify and select the tools and fasteners used in a steel framing system.
 - 35.03 Identify applications for steel framing systems.
 - 35.04 Demonstrate the ability to build back-to-back, box and L-headers.
 - 35.05 Lay out and install a steel stud structural wall with openings to include bracing and blocking.
 - 35.06 Lay out and install a steel stud non-structural wall with openings to include blocking and bracing.
- 36.0 Perform site-preparation and layout activities--The student will be able to:
- 36.01 Identify building layout from plans and specifications using math skills.
 - 36.02 Set up and adjust a transit and builder's level over one point and establish lines over two points.
 - 36.03 Erect batter boards and locate building lines.
 - 36.04 Locate building line points on batter boards using a builder's level.
 - 36.05 Locate building lines on a plot plan.
 - 36.06 Square a building, using the 3-4-5-triangle method and the diagonal method.

37.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:

- 37.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 37.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
- 37.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
- 37.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
- 37.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 37.06 Identify and exhibit traits for retaining employment. ECD7.0
- 37.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 37.08 Research the benefits of ongoing professional development. ECD9.0
- 37.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry 5
Course Number: 8722150
Course Credit: 1

Course Description:

This course provides students with knowledge and skills pertaining to concrete, foundations, forms and tilt-up construction.

38.0 Perform concrete tests--The student will be able to:

- 38.01 Identify various types of cement and describe their uses.
- 38.02 Identify types and sizes of concrete aggregates.
- 38.03 Identify types of concrete admixtures and describe their uses.
- 38.04 Identify special types of concrete and describe their uses.
- 38.05 Calculate concrete volume requirements for rectangular, cylindrical, or other geometric structures using formulas, concrete tables and/or concrete calculators, as applicable.
- 38.06 Identify concrete curing methods and materials.
- 38.07 Identify concrete testing methods.
- 38.08 Mix concrete using different aggregates and admixtures.
- 38.09 Sample concrete using a test cylinder.
- 38.10 Perform slump testing of concrete.
- 38.11 Demonstrate how to properly set up a curing box.

39.0 Lay foundations--The student will be able to:

- 39.01 Establish elevations.
- 39.02 Identify various types of footing and foundations.
- 39.03 Select the appropriate footing for a foundation.
- 39.04 Lay out and construct a selected footing and foundation using an established gridline.
- 39.05 Install templates, keyways and embedments.
- 39.06 Form and strip pier foundation forms and prepare for resetting at another location.
- 39.07 Identify the different classes of slabs-on-grade.
- 39.08 Identify edge forms and explain their purpose.
- 39.09 Construct and disassemble edge forms.
- 39.10 Install vapor barrier, reinforcement and control joints.
- 39.11 Establish finish grade and fill requirements.

40.0 Construct vertical formwork--The student will be able to:

- 40.01 Explain safety procedures associated with using concrete wall forms.
- 40.02 Identify the various types of concrete wall forms.
- 40.03 Identify the components of each type of vertical forming system.
- 40.04 Erect, plumb and brace a selected wall.

- 40.05 Recognize various types of manufactured forms.
- 40.06 State the differences in construction and use among different types of forms.
- 40.07 Erect, plumb and brace a column form.
- 40.08 Erect, plumb and brace a stair form.
- 40.09 Locate and install bulkheads and embedded forms.

41.0 Construct horizontal formwork--The student will be able to:

- 41.01 Identify the safety hazards associated with elevated deck formwork and explain how to eliminate them.
- 41.02 Identify the different types of elevated decks.
- 41.03 Identify the different types of flying form systems.
- 41.04 Identify different types of handset form systems.
- 41.05 Erect, plumb, brace and level different types of handset deck form systems.
- 41.06 Install edge forms, blockouts, embedments and construction joints.
- 41.07 Identify typical bridge and culvert form systems.

42.0 Erect and properly align tilt-up wall panels--The student will be able to:

- 42.01 Describe the different processes used in installing tilt-up wall panels.
- 42.02 Explain the importance of the casting bed.
- 42.03 Identify and install the various types of lifting eyes used in forming tilt-up panels.
- 42.04 Identify the special rigging requirements for tilt-up wall panels.
- 42.05 Identify the different methods of forming tilt-up wall panels.
- 42.06 Demonstrate the different methods of forming tilt-up wall panels.
- 42.07 Prepare for the erection of tilt-up wall panels.
- 42.08 Install proper bracing for tilt-up wall panels.
- 42.09 Install embedments, blockouts, architectural finishes, lifting devices and reinforcing materials using a set of construction drawings.
- 42.10 Describe the final grouting procedure.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Carpentry 6
Course Number: 8722160
Course Credit: 1

Course Description:

This course provides students interior and exterior finish carpentry skills. The content deals with the installation of drywall, doors and hardware, windows, trim, exterior stairs and exterior finishes.

43.0 Install drywall --The student will be able to:

- 43.01 Identify the different types of drywall and their uses.
- 43.02 Select the type and thickness of drywall required for specific installations.
- 43.03 Select fasteners for drywall installation.
- 43.04 Explain the fastener schedules for different types of drywall installations.
- 43.05 Perform single-layer and multi-layer drywall installations using different types of fastening systems, including:
 - d. Nails
 - e. Drywall screws
 - f. Adhesives
- 43.06 Install gypsum drywall on steel studs.
- 43.07 Explain how soundproofing is achieved in drywall installations.
- 43.08 Estimate material quantities for a drywall installation.

44.0 Install a suspended ceiling--The student will be able to:

- 44.01 Establish a level line.
- 44.02 Explain the common terms related to sound waves and acoustical ceiling materials.
- 44.03 Identify the different types of suspended ceilings.
- 44.04 Interpret plans related to ceiling layout.
- 44.05 Sketch the ceiling layout for a basic suspended ceiling.
- 44.06 Perform a material takeoff for a suspended ceiling.
- 44.07 Install selected suspended ceilings.

45.0 Interpret door and door hardware requirements based on plans and specifications--The student will be able to:

- 45.01 Identify various types of door jambs and frames and demonstrate the installation procedures for placing selected door jambs and frames in different types of interior partitions.
- 45.02 Identify different types of interior doors.
- 45.03 Identify different types of interior door hardware and demonstrate the installation procedures for selected types.
- 45.04 List and identify specific items included on a typical door schedule.
- 45.05 Explain the procedure for placing and hanging a specified door.

46.0 Install windows and exterior doors--The student will be able to:

- 46.01 Identify various types of fixed, sliding and swinging windows.
- 46.02 Identify the parts of a window installation.
- 46.03 State the requirements for a proper window installation.
- 46.04 Install a pre-hung window.
- 46.05 Identify the common types of exterior doors and explain how they are constructed.
- 46.06 Identify the parts of a door installation.
- 46.07 Identify the types of thresholds used with exterior doors.
- 46.08 Install a pre-hung exterior door.
- 46.09 Identify the various types of locksets used on exterior doors and explain how they are installed.
- 46.10 Install a lockset.

47.0 Apply interior trim--The student will be able to:

- 47.01 Identify the different types of standard moldings and describe their uses.
- 47.02 Make square and miter cuts using a miter box or power miter saw.
- 47.03 Make coped joint cuts using a coping saw.
- 47.04 Select and properly use fasteners to install trim.
- 47.05 Install interior trim, including:
 - e. Door trim
 - f. Window trim
 - g. Base trim
 - h. Ceiling trim
- 47.06 Estimate the quantities of different trim materials required for selected rooms.

48.0 Lay out and construct an exterior stair system--The student will be able to:

- 48.01 Identify the types of exterior stair systems.
- 48.02 Identify the parts of an exterior stair system.
- 48.03 Calculate the number of treads and risers for an exterior stair system.
- 48.04 Lay out, cut and assemble an exterior stair system.

49.0 Apply exterior finishing--The student will be able to:

- 49.01 Describe the purpose of wall insulation and flashing.
- 49.02 Install selected common cornices.
- 49.03 Demonstrate lap and panel siding estimating methods.
- 49.04 Describe the types and applications of common wood siding.
- 49.05 Describe fiber-cement siding and its uses.
- 49.06 Describe the types and styles of vinyl and metal siding.
- 49.07 Describe the types and applications of stucco and masonry veneer finishes.
- 49.08 Describe the types and applications of special exterior finish systems.
- 49.09 Install three types of siding commonly used in your area.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Carpentry 7**
Course Number: **8722170**
Course Credit: **1**

Course Description:

This course provides students with knowledge of rigging, scaffolding, concrete and trenching and excavation.

50.0 Set up and install basic rigging and scaffolding--The student will be able to:

- 50.01 Identify and explain rigging equipment.
- 50.02 Inspect rigging equipment, following safety precautions.
- 50.03 Estimate size, weight and center of gravity.
- 50.04 Tie knots.
- 50.05 Identify and explain types of cranes.
- 50.06 Rig and move materials and equipment, following safety precautions.
- 50.07 Set up and install scaffolds, following safety precautions.
- 50.08 Inspect various types of ladders and scaffolds, following safety precautions.

51.0 Erect, plumb and brace a simple concrete form with reinforcement--The student will be able to:

- 51.01 Identify the properties of cement.
- 51.02 Describe the composition of concrete.
- 51.03 Perform volume estimates for concrete quantity requirements.
- 51.04 Identify types of concrete reinforcement materials and describe their uses.
- 51.05 Identify various types of footings and explain their uses.
- 51.06 Identify the parts of various types of forms.
- 51.07 Explain the safety procedures associated with the construction and use of concrete forms.

52.0 Explain and demonstrate how to place reinforcing bars in walls, columns, beams, girders, joists and slabs--The student will be able to:

- 52.01 Describe the applications of reinforcing bars, the uses of reinforced structural concrete and the basic processes involved in placing reinforcing bars.
- 52.02 Recognize and identify the bar bends standardized by the American Concrete Institution (ACI).
- 52.03 Read and interpret bar lists and describe the information found on a bar list.
- 52.04 List the types of ties used in securing reinforcing bars.
- 52.05 State the tolerances allowed in the fabrication of reinforcing bars.
- 52.06 Demonstrate the proper use of common ties for reinforcing bars.
- 52.07 Describe methods by which reinforcing bars may be cut and bent in the field.
- 52.08 Use the tools and equipment needed for installing reinforcing bars.
- 52.09 Safely use selected tools and equipment to cut, bend and install reinforcing materials.

- 52.10 Explain the necessity of concrete cover in placing reinforcing bars.
- 52.11 Identify lapped splices.

53.0 Explain the transport and placement of concrete--The student will be able to:

- 53.01 List various types of equipment used to transport and place concrete.
- 53.02 Describe the factors that contribute to the quality of concrete placement.
- 53.03 Demonstrate the correct methods for placing and consolidating concrete into forms.
- 53.04 Use a screed to strike off and level concrete to the proper grade in a form.
- 53.05 Use tools for placing, floating and finishing concrete.
- 53.06 Determine when conditions permit the concrete finishing operation to start.
- 53.07 Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
- 53.08 Properly care for and safely use hand and power tools used when working with concrete.

54.0 Demonstrate an understanding of trenching and excavation--The student will be able to:

- 54.01 Identify the different types, bearing capacities and classifications of soils.
- 54.02 Identify ways to increase soil density.
- 54.03 State the purpose of soil density (compaction) tests.
- 54.04 Explain the safety considerations for trenches and deep excavations.
- 54.05 Identify and describe groundwater mitigation methods.
- 54.06 Identify and describe rock mitigation techniques.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Concrete Masonry
Program Type: Career Preparatory
Career Cluster: Architectural and Construction

	Secondary	PSAV
Program Number	8722600	I463113
CIP Number	0646010104	0646010104
Grade Level	9-12, 30, 31	30, 31
Standard Length	6 Credits	900 Hours
Teacher Certification	BLDG CONST ¶ 7 ¶ G TEC CONSTR ¶ 7 ¶ G TROWEL TR @7 7G	BLDG CONST ¶ 7 ¶ G TEC CONSTR ¶ 7 ¶ G TROWEL TR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3011- Helpers—Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters 47-2051- Cement Masons and Concrete Finishers	47-3011- Helpers—Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters 47-2051- Cement Masons and Concrete Finishers
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	Mathematics: 9 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 Architectural and Construction 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 Architectural and Construction career cluster.

The purpose this program is to prepare students for employment in the concrete masonry industry. This program focuses on broad, transferable skills, stresses the understanding of all aspects of the masonry 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.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0330	Masonry Tender	450 Hours	47-3011
B	BCV0360	Bricklayer Helper	300 Hours	47-3011
C	BCV0300	Concrete Finisher	150 Hours	47-2051

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8722610	Masonry 1	1 Credit	47-3011	2
	8722620	Masonry 2	1 Credit		2
	8722630	Masonry 3	1 Credit		2
B	8722640	Masonry 4	1 Credit	47-3011	2
	8722650	Masonry 5	1 Credit		2
C	8722660	Masonry 6	1 Credit	47-2051	2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 8, and Reading 8. 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.

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. 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>).

Standards

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

- 01.0 Characterize the masonry industry.
- 02.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 03.0 Follow safety practices relevant to the masonry industry.
- 04.0 Describe the properties, characteristics, and uses of brick.
- 05.0 Describe the properties, characteristics, and uses of concrete block.
- 06.0 Use hand tools relevant to the masonry industry.
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 08.0 Read measurements, drawings and specifications.
- 09.0 Demonstrate mathematics knowledge and skills.
- 10.0 Lay brick and/or block to the line.
- 11.0 Describe the various types and uses of bonding.
- 12.0 Select and mix mortars and concrete.
- 13.0 Demonstrate science knowledge and skills.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Clean masonry.
- 16.0 Identify the various methods of masonry practices.
- 17.0 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills.
- 19.0 Develop an understanding of sustainability issues related to the masonry profession.
- 20.0 Read construction drawings and specifications.
- 21.0 Use information technology tools.
- 22.0 Demonstrate understanding of residential masonry.
- 23.0 Apply grout and other reinforcement.
- 24.0 Install metals used in masonry.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 26.0 Describe the importance of professional ethics and legal responsibilities.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Perform building layout.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Demonstrate advanced laying techniques.
- 31.0 Apply construction techniques and moisture control.
- 32.0 Apply quality control measures.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 34.0 Build foundations.
- 35.0 Estimate materials and cost.
- 36.0 Operate and maintain power equipment.
- 37.0 Select, use, and maintain hand and power tools.
- 38.0 Prepare a site for concrete pouring.
- 39.0 Pour and finish a concrete slab.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Concrete Masonry
PSAV Number: I463113

Course Number: BCV0330
Occupational Completion Point: A
Masonry Tender – 450 Hours – SOC Code 47-3011

01.0 Characterize the masonry industry--The student will be able to:

- 01.01 Summarize the history of the masonry industry.
- 01.02 Explain the importance of the masonry industry to the local, state, and national economy.
- 01.03 Identify employment and advancement opportunities in the masonry industry.
- 01.04 Explain the factors involved in good-quality work.
- 01.05 Describe modern masonry materials.

02.0 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:

- 02.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 02.02 Explain emergency procedures to follow in response to workplace accidents.
- 02.03 Create a disaster and/or emergency response plan. SHE2.0

03.0 Follow safety practices relevant to the masonry industry--The student will be able to:

- 03.01 Identify causes and types of accidents.
- 03.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA) in jobsite safety.
- 03.03 Describe the OSHA "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 03.04 Recognize jobsite hazards and risk assessment techniques.
- 03.05 Describe first-aid procedures.
- 03.06 Follow safety practices when using tools and equipment.
- 03.07 Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDSs).
- 03.08 Demonstrate the use of and care of appropriate personal protective equipment (PPE).

04.0 Describe the properties, characteristics, and uses of brick--The student will be able to:

- 04.01 Explain the brick-manufacturing process.
- 04.02 Identify the properties and characteristics of brick.
- 04.03 Distinguish between standard and modular bricks.
- 04.04 Describe the different types of bricks and their principal uses.
- 04.05 Identify brick positioning in a wall.
- 04.06 Build 4" corner return leads and a wall 4 feet high and 12 feet long.

05.0 Describe the properties, characteristics, and uses of concrete block--The student will be able to:

- 05.01 Explain the manufacturing process of concrete block.
- 05.02 Identify the properties and characteristics of concrete block.
- 05.03 Describe the different types, including shapes and sizes, of concrete blocks and their principal uses.
- 05.04 Build an 8" block corner return lead 7 courses high.

06.0 Use hand tools relevant to the masonry industry--The student will be able to:

- 06.01 Identify, care for, and use basic hand tools.
- 06.02 Select hand tools for specific jobs.
- 06.03 Identify power tools.
- 06.04 Read English rules to the 1/16".
- 06.05 Read brick-spacing rules and brick modular rules.
- 06.06 Course brick to a given height with the brick spacing rule and the modular rule.

07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 07.02 Locate, organize and reference written information from various sources. CM3.0
- 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 07.05 Apply active listening skills to obtain and clarify information. CM7.0
- 07.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

08.0 Read measurements, drawings and specifications--The student will be able to:

- 08.01 Work with denominate numbers.
- 08.02 Identify the ingredients and properties of mortars.
- 08.03 Read a mason's measure.
- 08.04 Convert measurements in the U.S. Customary (English) system into metric equivalents.
- 08.05 Read construction documents and identify basic parts of a drawing set.
- 08.06 Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.

09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.03 Construct charts/tables/graphs using functions and data. AF3.5

- 10.0 Lay brick and/or block to the line--The student will be able to:
- 10.01 Spread mortar for brick and/or block.
 - 10.02 Butter head joints.
 - 10.03 Set up masonry materials.
 - 10.04 Pull a line.
 - 10.05 Cut bricks and/or blocks with a hammer, a brick set, and a trowel.
 - 10.06 Temper mortar.
 - 10.07 Maintain proper spacing of head and bed joints.
 - 10.08 Point and tool joints in brick and/or block walls.
 - 10.09 Lay brick and/or block to the line.
 - 10.10 Repeat the above nine tasks with 8" block.
- 11.0 Describe the various types and uses of bonding--The student will be able to:
- 11.01 Define and describe pattern, structural, and adhesive bonding.
 - 11.02 Differentiate among and use stretcher, common, English, English cross, Flemish, and stack bonds.
- 12.0 Select and mix mortars and concrete--The student will be able to:
- 12.01 Identify types of mortars.
 - 12.02 Identify the ingredients and properties of mortars.
 - 12.03 Identify the properties and characteristics of concrete.
 - 12.04 Identify colored mortars (admix and factory-blended).
 - 12.05 Identify the types and purposes of grouts.
 - 12.06 Store and place materials.
 - 12.07 Select mortars and concrete.
 - 12.08 Mix mortars by hand and by machine.
 - 12.09 Mix concrete by hand and by machine.
 - 12.10 Clean up tools, equipment, and the work site.
 - 12.11 Build a brick 4" corner return lead.
 - 12.12 Identify common problems found in mortar application and their uses.
- 13.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 13.01 Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 13.02 Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury.
 - 13.03 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 13.04 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 13.05 Identify health-related problems caused by exposure to work-related chemicals and hazardous materials.
 - 13.06 Describe proper precautions for handling work-related chemicals and hazardous materials.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Clean masonry--The student will be able to:
- 15.01 Follow safety practices when cleaning masonry.
 - 15.02 Identify reasons for cleaning.
 - 15.03 Identify and select cleaning materials and equipment.
 - 15.04 Prepare cleaning solutions.
 - 15.05 Point new and old work.
 - 15.06 Prepare the area.
 - 15.07 Clean the wall, using different methods.
- 16.0 Identify the various methods of masonry practices--The student will be able to:
- 16.01 Identify the methods of basic building layouts.
 - 16.02 Identify the methods of digging and pouring footings.
 - 16.03 Identify the methods of forming, grading, and pouring concrete slabs.
 - 16.04 Identify the different types of reinforced masonry, flashing, wall reinforcement, and ties.
 - 16.05 Identify measuring tools.
 - 16.06 Identify power equipment.
- 17.0 Erect and disassemble basic scaffolds--The student will be able to:
- 17.01 Follow safety practices when working with ladders and scaffolds.
 - 17.02 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 18.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 18.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 18.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 19.0 Develop an understanding of sustainability issues related to the masonry profession--
The student will be able to:
- 19.01 Describe the impact of the construction industry on the natural environment.
 - 19.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 19.03 Identify and analyze sustainable alternatives to conventional masonry practices.
 - 19.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 19.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.

- 19.06 Identify construction activities pertaining to the masonry profession that contribute to a project's overall sustainability.
- 20.0 Read construction drawings and specifications- The student will be able to:
 - 20.01 Identify types of drawings.
 - 20.02 Identify symbols on the drawings.
 - 20.03 Read and interpret simple drawings.
 - 20.04 Read and interpret specifications.
 - 20.05 Explain the importance of following local, state, and national codes and standards.
 - 20.06 Interpret a finished schedule.
 - 20.07 Use an architect's scale.
 - 20.08 Use construction documents to estimate material quantities.
- 21.0 Use information technology tools--The students will be able to:
 - 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 22.0 Demonstrate understanding of residential masonry--The students will be able to:
 - 22.01 Explain the requirements for construction of various types of residential foundations.
 - 22.02 Identify and explain the characteristics, uses and installation techniques for brick pavers.
 - 22.03 Lay out and build steps, patios and decks made from masonry units.
 - 22.04 Lay out and build chimneys and fireplaces.
- 23.0 Apply grout and other reinforcement--The students will be able to:
 - 23.01 Name and describe the primary ingredients in grout and their properties.
 - 23.02 Identify the different types of grout used in masonry work.
 - 23.03 Describe common admixtures and their uses.
 - 23.04 Describe the use of steel bar reinforcement in masonry construction.
 - 23.05 Apply grout in low and high lifts using the proper techniques.
 - 23.06 Place grout in a hollow block wall and rod it into place.
- 24.0 Install metals used in masonry--The students will be able to:
 - 24.01 Describe the uses and installation of vertical reinforcement.
 - 24.02 Describe the uses and installation of different types of horizontal joint reinforcement and ties.
 - 24.03 Describe the uses and installation of different anchors, fasteners, and embedded items.

- 24.04 Install hollow metal frames.
- 24.05 Describe the functions of sills and lintels.
- 24.06 Install sills and lintels.
- 24.07 Install metal hardware.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 25.02 Describe the effect of money management on personal and career goals. FL3.0
- 25.03 Develop a personal budget and financial goals. FL3.1
- 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 25.05 Maintain financial records. FL3.3
- 25.06 Read and reconcile financial statements. FL3.4
- 25.07 Research, compare and contrast investment opportunities.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 26.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: BCV0360

Occupational Completion Point: B

Bricklayer Helper, Firebrick and Refractory Tile – 300 Hours -- SOC Code 47-3011

- 27.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 27.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 27.02 Develop personal career plan that includes goals, objectives, and strategies.ECD 2.0
- 27.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 27.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 27.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 27.06 Identify and exhibit traits for retaining employment. ECD7.0
- 27.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 27.08 Research the benefits of ongoing professional development. ECD9.0
- 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 28.0 Perform building layout--The student will be able to:
- 28.01 Read and interpret plot plans.
- 28.02 Establish building corners.
- 28.03 Check and/or establish 90-degree angles using the 3-4-5 rule.
- 28.04 Build batter boards and establish building lines and elevations.

- 28.05 Dig, prepare, and pour footings to local codes and standards.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Demonstrate advanced laying techniques—The student will be able to:
- 30.01 Recognize the structural principles and fundamental uses of basic types of walls.
 30.02 Recognize the requirement for, and function of, control joints and expansion joints.
 30.03 Build various types of walls using proper reinforcement, jointing, and bonding techniques.
 30.04 Lay out specialty structures such as maintenance holes, segmented block walls, and screens.
 30.05 Identify and explain the different types of masonry arches used today.
 30.06 Lay out a semicircular arch and a jack arch.
- 31.0 Apply construction techniques and moisture control—The student will be able to:
- 31.01 Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.
 31.02 Explain the requirements for wall bracing, and demonstrate the techniques used to construct pilasters and other types of bracing.
 31.03 Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.
 31.04 Identify the need for moisture control in various types of masonry construction, and demonstrate the techniques used to eliminate moisture problems.
 31.05 Construct corbelling in a double-wythe wall.
 31.06 Join intersecting walls.
 31.07 Install flashing.
- 32.0 Apply quality control measures—The student will be able to:
- 32.01 Describe industry standards for quality control.
 32.02 Describe how to build masonry sample panels and prisms.
 32.03 Perform a slump test.
 32.04 Describe and perform field inspections.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 33.01 Describe the nature and types of business organizations. SY1.0
 33.02 Explain the effect of key organizational systems on performance and quality.
 33.03 List and describe quality control systems and/or practices common to the workplace. SY2.0

33.04 Explain the impact of the global economy on business organizations.

34.0 Build foundations--The student will be able to:

34.01 Build an 8" block corner 7 courses high.

34.02 Build an 8" block corner to the correct height and range of a given foundation batter board line.

34.03 Bond and build an 8" block corner to the correct height and range on the opposite corner of a given foundation batter board line.

34.04 Pull a line and build an 8" block wall between the block corners.

34.05 Establish and build the other corner leads.

34.06 Build foundation walls to floor elevations.

34.07 Make foundation walls waterproof, if required.

34.08 Install flashing, anchor bolts, termite shields, and weep holes; install vents if a wooden floor system is used.

35.0 Estimate materials and cost--The student will be able to:

35.01 Estimate the materials needed for a specific job.

35.02 Estimate the cost of the materials, including the sales tax.

36.0 Operate and maintain power equipment--The student will be able to:

36.01 Follow safety practices when using and maintaining power equipment.

36.02 Use masonry saw with an abrasive blade to cut masonry units.

36.03 Use masonry saw with a diamond blade to cut masonry units.

36.04 Set up, operate, and maintain power tools and equipment.

Course Number: BCV0300

Occupational Completion Point: C

Concrete Finisher – 150 hours – SOC Code 47-2051

37.0 Select, use, and maintain hand and power tools--The student will be able to:

37.01 Select, use, and maintain the hand tools required for concrete masonry jobs.

37.02 Select, use, and maintain the power tools required for concrete masonry jobs.

38.0 Prepare a site for concrete pouring--The student will be able to:

38.01 Excavate and grade the site.

38.02 Erect forms.

38.03 Install a vapor barrier.

38.04 Install reinforcement and expansion materials.

38.05 Install and grade stakes.

39.0 Pour and finish a concrete slab--The student will be able to:

39.01 Pour, place, and vibrate (if necessary) concrete.

39.02 Screed to grade.

39.03 Finish concrete.

39.04 Saw control joints, if necessary.

39.05 Protect the slab.

39.06 Clean up tools, equipment, and work area.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 1
Course Number: 8722610
Course Credit: 1

Course Description:

This course provides students with the competencies essential to the masonry industry. These competencies include knowledge and skills related to safety practices, the masonry industry in America, the use of hand tools, the selection and mixing of mortars and concrete, and brick and block laying.

01.0 Characterize the masonry industry--The student will be able to:

- 01.01 Summarize the history of the masonry industry.
- 01.02 Explain the importance of the masonry industry to the local, state, and national economy.
- 01.03 Identify employment and advancement opportunities in the masonry industry.
- 01.04 Explain the factors involved in good-quality work.
- 01.05 Describe modern masonry and materials.

02.0 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:

- 02.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 02.02 Explain emergency procedures to follow in response to workplace accidents.
- 02.03 Create a disaster and/or emergency response plan. SHE2.0

03.0 Follow safety practices relevant to the masonry industry--The student will be able to:

- 03.01 Identify causes and types of accidents.
- 03.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA) in jobsite safety.
- 03.03 Describe the OSHA "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 03.04 Recognize jobsite hazards and risk assessment techniques.
- 03.05 Describe first-aid procedures.
- 03.06 Follow safety practices when using tools and equipment.
- 03.07 Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDSs).
- 03.08 Demonstrate the use of and care of appropriate personal protective equipment (PPE).

04.0 Describe the properties, characteristics, and uses of brick--The student will be able to:

- 04.01 Explain the brick-manufacturing process.
- 04.02 Identify the properties and characteristics of brick.

- 04.03 Distinguish between standard and modular bricks.
 - 04.04 Describe the different types of bricks and their principal uses.
 - 04.05 Identify brick positioning in a wall.
 - 04.06 Build 4" corner return leads and a wall 4 feet high and 12 feet long.
- 05.0 Describe the properties, characteristics, and uses of concrete block--The student will be able to:
- 05.01 Explain the manufacturing process of concrete block.
 - 05.02 Identify the properties and characteristics of concrete block.
 - 05.03 Describe the different types, including shapes and sizes, of concrete blocks and their principal uses.
 - 05.04 Build an 8" block corner return lead 7 courses high.
- 06.0 Identify and use hand tools relevant to the masonry industry--The student will be able to:
- 06.01 Identify, care for, and use basic hand tools.
 - 06.02 Select hand tools for specific jobs.
 - 06.03 Identify power tools.
 - 06.04 Read English rules to the 1/16".
 - 06.05 Read brick-spacing rules and brick modular rules.
 - 06.06 Course brick to a given height with the brick spacing rule and the modular rule.
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 07.02 Locate, organize and reference written information from various sources. CM3.0
 - 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 07.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 07.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 08.0 Demonstrate understanding of measurements, drawings and specifications--The student will be able to:
- 08.01 Work with denominate numbers.
 - 08.02 Identify the ingredients and properties of mortars.
 - 08.03 Read a mason's measure.
 - 08.04 Convert measurements in the U.S. Customary (English) system into metric equivalents.
 - 08.05 Read construction documents and identify basic parts of a drawing set.
 - 08.06 Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.03 Construct charts/tables/graphs using functions and data. AF3.5

10.0 Lay brick and/or block to the line--The student will be able to:

- 10.01 Set up masonry materials.
- 10.02 Temper mortar.
- 10.03 Spread mortar for brick.
- 10.04 Pull a line from established leads.
- 10.05 Butter head joints.
- 10.06 Lay brick to the line.
- 10.07 Maintain proper spacing of head and bed joints.
- 10.08 Cut brick with a hammer, a brick set, and a trowel.
- 10.09 Point and tool joints in brick walls.
- 10.10 Repeat the above nine tasks with 8" concrete block.

11.0 Describe the various types and uses of bonding--The student will be able to:

- 11.01 Define and describe pattern, structural, layout, and adhesive bonding.
- 11.02 Differentiate among and use stretcher, common, English, English cross, Flemish, and stack bonds.

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**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 2
Course Number: 8722620
Course Credit: 1

Course Description:

This course is to develop the competencies necessary to the masonry industry. These competencies include knowledge and skills related to the properties, characteristics, and uses of brick and concrete block; bonding; methods of masonry practices; masonry cleaning; scaffolding; communication; and computer use.

12.0 Select and mix mortars and concrete--The student will be able to:

- 12.01 Identify types of mortars.
- 12.02 Identify the ingredients and properties of mortars.
- 12.03 Identify the properties and characteristics of concrete.
- 12.04 Identify common admixtures and their uses.
- 12.05 Identify the types and purposes of grouts.
- 12.06 Store and place materials.
- 12.07 Select mortars and concrete.
- 12.08 Mix mortars by hand and by machine.
- 12.09 Mix concrete by hand and by machine.
- 12.10 Clean up tools, equipment, and the work site.
- 12.11 Build a brick 4" corner return lead.
- 12.12 Identify common problems found in mortar application and their uses.

13.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 13.01 Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 13.02 Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury.
- 13.03 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 13.04 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 13.05 Identify health-related problems caused by exposure to work-related chemicals and hazardous materials.
- 13.06 Describe proper precautions for handling work-related chemicals and hazardous materials.

14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0

- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Clean masonry--The student will be able to:
 - 15.01 Follow safety practices when cleaning masonry.
 - 15.02 Identify reasons for cleaning.
 - 15.03 Identify and select cleaning materials and equipment for brick and concrete block.
 - 15.04 Prepare cleaning solutions.
 - 15.05 Point new and old work.
 - 15.06 Prepare the area.
 - 15.07 Clean the wall, using different methods.
- 16.0 Identify the various methods of masonry practices--The student will be able to:
 - 16.01 Identify the methods of basic building layouts.
 - 16.02 Identify the methods of digging and pouring footings.
 - 16.03 Identify the methods of forming, grading, and pouring concrete slabs.
 - 16.04 Identify the different types of reinforced masonry, flashing, wall reinforcement, and ties.
 - 16.05 Identify measuring tools.
 - 16.06 Identify power equipment.
- 17.0 Erect and disassemble basic scaffolds--The student will be able to:
 - 17.01 Follow safety practices when working with ladders and scaffolds.
 - 17.02 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
 - 18.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 18.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 18.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 19.0 Develop an understanding of sustainability issues related to the masonry profession--The student will be able to:
 - 19.01 Describe the impact of the construction industry on the natural environment.
 - 19.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 19.03 Identify and analyze sustainable alternatives to conventional masonry practices.
 - 19.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 19.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 19.06 Identify construction activities pertaining to the masonry profession that contribute to a project's overall sustainability.

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**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 3
Course Number: 8722630
Course Credit: 1

Course Description:

This course provides students with competencies plan reading, residential masonry, masonry reinforcement and metals used in masonry.

20.0 Read construction drawings and specifications--The student will be able to:

- 20.01 Identify types of drawings.
- 20.02 Identify symbols on the drawings.
- 20.03 Read and interpret simple drawings.
- 20.04 Read and interpret specifications.
- 20.05 Explain the importance of following local, state, and national codes and standards.
- 20.06 Interpret a finished schedule.
- 20.07 Use an architect's scale.
- 20.08 Use construction drawings to estimate material quantities.

21.0 Use information technology tools--The students will be able to:

- 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

22.0 Demonstrate understanding of residential masonry--The students will be able to:

- 22.01 Explain the requirements for construction of various types of residential foundations.
- 22.02 Identify and explain the characteristics, uses and installation techniques for brick pavers.
- 22.03 Lay out and build steps, patios and decks made from masonry units.
- 22.04 Lay out and build chimneys and fireplaces.

23.0 Apply grout and other reinforcement--The students will be able to:

- 23.01 Name and describe the primary ingredients in grout and their properties.
- 23.02 Identify the different types of grout used in masonry work.

- 23.03 Describe common admixtures and their uses.
- 23.04 Describe the use of steel bar reinforcement in masonry construction.
- 23.05 Apply grout in low and high lifts using the proper techniques.
- 23.06 Place grout in a hollow block wall and rod it into place.

- 24.0 Install metals used in masonry--The students will be able to:
 - 24.01 Describe the uses and installation of vertical reinforcement.
 - 24.02 Describe the uses and installation of different types of horizontal joint reinforcement and ties.
 - 24.03 Describe the uses and installation of different anchors, fasteners, and embedded items.
 - 24.04 Install hollow metal frames.
 - 24.05 Describe the functions of sills and lintels.
 - 24.06 Install sills and lintels.
 - 24.07 Install metal hardware.

- 25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
 - 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 25.02 Describe the effect of money management on personal and career goals. FL3.0
 - 25.03 Develop a personal budget and financial goals. FL3.1
 - 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 25.05 Maintain financial records. FL3.3
 - 25.06 Read and reconcile financial statements. FL3.4
 - 25.07 Research, compare and contrast investment opportunities.

- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
 - 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0

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**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 4
Course Number: 8722640
Course Credit: 1

Course Description:

This course is designed to provide students with competencies in building layout, advanced laying techniques, moisture control and quality control.

27.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 27.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 27.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 27.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 27.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 27.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 27.06 Identify and exhibit traits for retaining employment. ECD7.0
- 27.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 27.08 Research the benefits of ongoing professional development. ECD9.0
- 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

28.0 Perform building layout--The student will be able to:

- 28.01 Read and interpret plot plans.
- 28.02 Establish building corners.
- 28.03 Check and/or establish 90-degree angles using the 3-4-5 rule.
- 28.04 Build batter boards and establish building lines and elevations.
- 28.05 Dig, prepare and pour footings to local codes and standards.

29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 29.04 Employ mentoring skills to inspire and teach others. LT5.0

30.0 Demonstrate advanced laying techniques—The student will be able to:

- 30.01 Recognize the structural principles and fundamental uses of basic types of walls.
 - 30.02 Recognize the requirement for, and function of, control joints and expansion joints.
 - 30.03 Build various types of walls using proper reinforcement, jointing, and bonding techniques.
 - 30.04 Lay out specialty structures such as maintenance holes, segmented block walls, and screens.
 - 30.05 Identify and explain the different types of masonry arches used today.
 - 30.06 Lay out a semicircular arch and a jack arch.
- 31.0 Apply construction techniques and moisture control—The student will be able to:
- 31.01 Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.
 - 31.02 Explain the requirements for wall bracing, and demonstrate the techniques used to construct pilasters and other types of bracing.
 - 31.03 Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.
 - 31.04 Identify the need for moisture control in various types of masonry construction, and demonstrate the techniques used to eliminate moisture problems.
 - 31.05 Construct corbelling in a double-wythe wall.
 - 31.06 Join intersecting walls.
 - 31.07 Install flashing.
- 32.0 Apply quality control measures—The student will be able to:
- 32.01 Describe industry standards for quality control.
 - 32.02 Describe how to build masonry sample panels and prisms.
 - 32.03 Perform a slump test.
 - 32.04 Describe and perform field inspections.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 33.01 Describe the nature and types of business organizations. SY1.0
 - 33.02 Explain the effect of key organizational systems on performance and quality.
 - 33.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 33.04 Explain the impact of the global economy on business organizations.

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**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 5
Course Number: 8722650
Course Credit: 1

Course Description:

This course provides students with an in-depth study of foundation building, materials and cost estimations, and power-equipment operation.

34.0 Build foundations--The student will be able to:

- 34.01 Build an 8" block corner 7 courses high.
- 34.02 Build an 8" block corner to the correct height and range of a given foundation batter board line.
- 34.03 Bond and build an 8" block corner to the correct height and range on the opposite corner of a given foundation batter board line.
- 34.04 Pull a line and build an 8" block wall between the block corners.
- 34.05 Establish and build the other corner leads.
- 34.06 Build foundation walls to floor elevations.
- 34.07 Make foundation walls waterproof, if required.
- 34.08 Install flashing, anchor bolts, termite shields, and weep holes; install vents if a wooden floor system is used.

35.0 Estimate materials and cost--The student will be able to:

- 35.01 Estimate the materials needed for a specific job.
- 35.02 Estimate the cost of the materials, including the sales tax.

36.0 Operate and maintain power equipment--The student will be able to:

- 36.01 Follow safety practices when using and maintaining power equipment.
- 36.02 Use masonry saw with an abrasive blade to cut masonry units.
- 36.03 Use masonry saw with a diamond blade to cut masonry units.
- 36.04 Set up, operate, and maintain power tools and equipment.

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**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 6
Course Number: 8722660
Course Credit: 1

Course Description:

This course is designed to provide students with an in-depth knowledge of concrete masonry. The competencies in this course relate to the use and maintenance of hand and power tools, the preparation of a site, and concrete pouring.

37.0 Select, use, and maintain hand and power tools--The student will be able to:

- 37.01 Select, use, and maintain the hand tools required for concrete masonry jobs.
- 37.02 Select, use, and maintain the power tools required for concrete masonry jobs.

38.0 Prepare a site for concrete pouring--The student will be able to:

- 38.01 Excavate and grade the site.
- 38.02 Erect forms.
- 38.03 Install a vapor barrier.
- 38.04 Install reinforcement and expansion materials.
- 38.05 Install and grade stakes.

39.0 Pour and finish a concrete slab--The student will be able to:

- 39.01 Pour, place, and vibrate (if necessary) concrete.
- 39.02 Screed to grade.
- 39.03 Finish concrete.
- 39.04 Saw control joints, if necessary.
- 39.05 Protect the slab.
- 39.06 Clean up tools, equipment, and work area.

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**Florida Department of Education
Curriculum Framework**

Program Title: Brick and Block Masonry
Program Type: Career Preparatory
Career Cluster: Architectural and Construction

	Secondary	PSAV
Program Number	8722900	I463112
CIP Number	0646010103	0646010103
Grade Level	9-12, 30, 31	30,31
Standard Length	5 Credits	1650 Hours
Teacher Certification	BLDG CONST ¶ 7 ¶G TEC CONSTR ¶ 7 ¶ G TROWEL TR @7 7G	BLDG CONST ¶ 7 ¶G TEC CONSTR ¶ 7 ¶ G TROWEL TR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3011- Helpers—Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters 47-2021- Brickmasons and Blockmasons	47-3011- Helpers—Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters 47-2021- Brickmasons and Blockmasons
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	Mathematics: 9 Language: 8 Reading: 8

Purpose

The purpose of this program is to prepare students for employment in the brick, block, and concrete masonry industry.

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 Architectural and Construction 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 Architectural and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

It is recommended that students complete the core or demonstrate a mastery of the student performance standards contained in the core before advancing to the course(s) in the next level.

When offered at the postsecondary level, 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	BCV0330	Masonry Tender	450 Hours	47-3011
B	BCV0360	Bricklayer Helper	300 Hours	47-3011
C	BCV0362	Brickmason 1	450 Hours	47-2021
	BCV0363	Brickmason 2	450 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8722610	Masonry 1	1 Credit	47-3011	2
	8722620	Masonry 2	1 Credit		2
	8722630	Masonry 3	1 Credit		2
B	8722640	Masonry 4	1 Credit	47-3011	2
	8722650	Masonry 5	1 Credit		2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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 (I463112) has a statewide articulation agreement approved by the Florida State Board of Education:

Building Construction Technology AAS/AS (0615.100101/1615.100101) – 3 credits

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. 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>).

Standards

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

- 01.0 Characterize the masonry industry.
- 02.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 03.0 Follow safety practices relevant to the masonry industry.
- 04.0 Describe the properties, characteristics, and uses of brick.
- 05.0 Describe the properties, characteristics, and uses of concrete block.
- 06.0 Use hand tools relevant to the masonry industry.
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 08.0 Read measurements, drawings and specifications.
- 09.0 Demonstrate mathematics knowledge and skills.
- 10.0 Lay brick and/or block to the line.
- 11.0 Describe the various types and uses of bonding.
- 12.0 Select and mix mortars and concrete.
- 13.0 Demonstrate science knowledge and skills.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Clean masonry.
- 16.0 Identify the various methods of masonry practices.
- 17.0 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills.
- 19.0 Develop an understanding of sustainability issues related to the masonry profession.
- 20.0 Read construction drawings and specifications.
- 21.0 Use information technology tools.
- 22.0 Demonstrate understanding of residential masonry.
- 23.0 Apply grout and other reinforcement.
- 24.0 Install metals used in masonry.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 26.0 Describe the importance of professional ethics and legal responsibilities.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Perform building layout.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Demonstrate advanced laying techniques.
- 31.0 Apply construction techniques and moisture control.
- 32.0 Apply quality control measures.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 34.0 Build foundations.
- 35.0 Estimate materials and cost.
- 36.0 Operate and maintain power equipment.
- 37.0 Perform construction details.
- 38.0 Demonstrate knowledge of masonry repair and restoration.
- 39.0 Demonstrate productivity skills.
- 40.0 Demonstrate understanding of masonry in high-rise construction.
- 41.0 Demonstrate knowledge of specialized materials and techniques.

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**Florida Department of Education
Student Performance Standards**

Program Title: Brick and Block Masonry
PSAV Number: I463112

Course Number: BCV0330
Occupational Completion Point: A
Masonry Tender – 450 Hours – SOC Code 47-3011

- 01.0 Characterize the masonry industry--The student will be able to:
- 01.01 Summarize the history of the masonry industry.
 - 01.02 Explain the importance of the masonry industry to the local, state, and national economy.
 - 01.03 Identify employment and advancement opportunities in the masonry industry.
 - 01.04 Explain the factors involved in good-quality work.
 - 01.05 Describe modern masonry materials.
- 02.0 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:
- 02.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 02.02 Explain emergency procedures to follow in response to workplace accidents.
 - 02.03 Create a disaster and/or emergency response plan. SHE2.0
- 03.0 Follow safety practices relevant to the masonry industry--The student will be able to:
- 03.01 Identify causes and types of accidents.
 - 03.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA) in jobsite safety.
 - 03.03 Describe the OSHA "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
 - 03.04 Recognize jobsite hazards and risk assessment techniques.
 - 03.05 Describe first-aid procedures.
 - 03.06 Follow safety practices when using tools and equipment.
 - 03.07 Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDSs).
 - 03.08 Demonstrate the use of and care of appropriate personal protective equipment (PPE).
- 04.0 Describe the properties, characteristics, and uses of brick--The student will be able to:
- 04.01 Explain the brick-manufacturing process.
 - 04.02 Identify the properties and characteristics of brick.
 - 04.03 Distinguish between standard and modular bricks.
 - 04.04 Describe the different types of bricks and their principal uses.
 - 04.05 Identify brick positioning in a wall.
 - 04.06 Build 4" corner return leads and a wall 4 feet high and 12 feet long.

05.0 Describe the properties, characteristics, and uses of concrete block--The student will be able to:

- 05.01 Explain the manufacturing process of concrete block.
- 05.02 Identify the properties and characteristics of concrete block.
- 05.03 Describe the different types, including shapes and sizes, of concrete blocks and their principal uses.
- 05.04 Build an 8" block corner return lead 7 courses high.

06.0 Use hand tools relevant to the masonry industry--The student will be able to:

- 06.01 Identify, care for, and use basic hand tools.
- 06.02 Select hand tools for specific jobs.
- 06.03 Identify power tools.
- 06.04 Read English rules to the 1/16".
- 06.05 Read brick-spacing rules and brick modular rules.
- 06.06 Course brick to a given height with the brick spacing rule and the modular rule.

07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 07.02 Locate, organize and reference written information from various sources. CM3.0
- 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 07.05 Apply active listening skills to obtain and clarify information. CM7.0
- 07.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

08.0 Read measurements, drawings and specifications--The student will be able to:

- 08.01 Work with denominate numbers.
- 08.02 Identify the ingredients and properties of mortars.
- 08.03 Read a mason's measure.
- 08.04 Convert measurements in the U.S. Customary (English) system into metric equivalents.
- 08.05 Read construction documents and identify basic parts of a drawing set.
- 08.06 Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.

09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.03 Construct charts/tables/graphs using functions and data. AF3.5

- 10.0 Lay brick and/or block to the line--The student will be able to:
- 10.01 Spread mortar for brick and/or block.
 - 10.02 Butter head joints.
 - 10.03 Set up masonry materials.
 - 10.04 Pull a line.
 - 10.05 Cut bricks and/or blocks with a hammer, a brick set, and a trowel.
 - 10.06 Temper mortar.
 - 10.07 Maintain proper spacing of head and bed joints.
 - 10.08 Point and tool joints in brick and/or block walls.
 - 10.09 Lay brick and/or block to the line.
 - 10.10 Repeat the above nine tasks with 8" block.
- 11.0 Describe the various types and uses of bonding--The student will be able to:
- 11.01 Define and describe pattern, structural, and adhesive bonding.
 - 11.02 Differentiate among and use stretcher, common, English, English cross, Flemish, and stack bonds.
- 12.0 Select and mix mortars and concrete--The student will be able to:
- 12.01 Identify types of mortars.
 - 12.02 Identify the ingredients and properties of mortars.
 - 12.03 Identify the properties and characteristics of concrete.
 - 12.04 Identify colored mortars (admix and factory-blended).
 - 12.05 Identify the types and purposes of grouts.
 - 12.06 Store and place materials.
 - 12.07 Select mortars and concrete.
 - 12.08 Mix mortars by hand and by machine.
 - 12.09 Mix concrete by hand and by machine.
 - 12.10 Clean up tools, equipment, and the work site.
 - 12.11 Build a brick 4" corner return lead.
 - 12.12 Identify common problems found in mortar application and their uses.
- 13.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 13.01 Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 13.02 Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury.
 - 13.03 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 13.04 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 13.05 Identify health-related problems caused by exposure to work-related chemicals and hazardous materials.
 - 13.06 Describe proper precautions for handling work-related chemicals and hazardous materials.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Clean masonry--The student will be able to:
- 15.01 Follow safety practices when cleaning masonry.
 - 15.02 Identify reasons for cleaning.
 - 15.03 Identify and select cleaning materials and equipment.
 - 15.04 Prepare cleaning solutions.
 - 15.05 Point new and old work.
 - 15.06 Prepare the area.
 - 15.07 Clean the wall, using different methods.
- 16.0 Identify the various methods of masonry practices--The student will be able to:
- 16.01 Identify the methods of basic building layouts.
 - 16.02 Identify the methods of digging and pouring footings.
 - 16.03 Identify the methods of forming, grading, and pouring concrete slabs.
 - 16.04 Identify the different types of reinforced masonry, flashing, wall reinforcement, and ties.
 - 16.05 Identify measuring tools.
 - 16.06 Identify power equipment.
- 17.0 Erect and disassemble basic scaffolds--The student will be able to:
- 17.01 Follow safety practices when working with ladders and scaffolds.
 - 17.02 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 18.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 18.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 18.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 19.0 Develop an understanding of sustainability issues related to the masonry profession--
The student will be able to:
- 19.01 Describe the impact of the construction industry on the natural environment.
 - 19.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 19.03 Identify and analyze sustainable alternatives to conventional masonry practices.
 - 19.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 19.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.

- 19.06 Identify construction activities pertaining to the masonry profession that contribute to a project's overall sustainability.
- 20.0 Read construction drawings and specifications- The student will be able to:
 - 20.01 Identify types of drawings.
 - 20.02 Identify symbols on the drawings.
 - 20.03 Read and interpret simple drawings.
 - 20.04 Read and interpret specifications.
 - 20.05 Explain the importance of following local, state, and national codes and standards.
 - 20.06 Interpret a finished schedule.
 - 20.07 Use an architect's scale.
 - 20.08 Use construction documents to estimate material quantities.
- 21.0 Use information technology tools--The students will be able to:
 - 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 22.0 Demonstrate understanding of residential masonry--The students will be able to:
 - 22.01 Explain the requirements for construction of various types of residential foundations.
 - 22.02 Identify and explain the characteristics, uses and installation techniques for brick pavers.
 - 22.03 Lay out and build steps, patios and decks made from masonry units.
 - 22.04 Lay out and build chimneys and fireplaces.
- 23.0 Apply grout and other reinforcement--The students will be able to:
 - 23.01 Name and describe the primary ingredients in grout and their properties.
 - 23.02 Identify the different types of grout used in masonry work.
 - 23.03 Describe common admixtures and their uses.
 - 23.04 Describe the use of steel bar reinforcement in masonry construction.
 - 23.05 Apply grout in low and high lifts using the proper techniques.
 - 23.06 Place grout in a hollow block wall and rod it into place.
- 24.0 Install metals used in masonry--The students will be able to:
 - 24.01 Describe the uses and installation of vertical reinforcement.
 - 24.02 Describe the uses and installation of different types of horizontal joint reinforcement and ties.
 - 24.03 Describe the uses and installation of different anchors, fasteners, and embedded items.

- 24.04 Install hollow metal frames.
 - 24.05 Describe the functions of sills and lintels.
 - 24.06 Install sills and lintels.
 - 24.07 Install metal hardware.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 25.02 Describe the effect of money management on personal and career goals. FL3.0
 - 25.03 Develop a personal budget and financial goals. FL3.1
 - 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 25.05 Maintain financial records. FL3.3
 - 25.06 Read and reconcile financial statements. FL3.4
 - 25.07 Research, compare and contrast investment opportunities.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: BCV0360

Occupational Completion Point: B

Bricklayer Helper, Firebrick and Refractory – 300 Hours – SOC Code 47-3011

- 27.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 27.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 27.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 27.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 27.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 27.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 27.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 27.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 27.08 Research the benefits of ongoing professional development. ECD9.0
 - 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 28.0 Perform building layout--The student will be able to:
- 28.01 Read and interpret plot plans.
 - 28.02 Establish building corners.
 - 28.03 Check and/or establish 90-degree angles using the 3-4-5 rule.
 - 28.04 Build batter boards and establish building lines and elevations.

- 28.05 Dig, prepare, and pour footings to local codes and standards.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Demonstrate advanced laying techniques—The student will be able to:
- 30.01 Recognize the structural principles and fundamental uses of basic types of walls.
- 30.02 Recognize the requirement for, and function of, control joints and expansion joints.
- 30.03 Build various types of walls using proper reinforcement, jointing, and bonding techniques.
- 30.04 Lay out specialty structures such as maintenance holes, segmented block walls, and screens.
- 30.05 Identify and explain the different types of masonry arches used today.
- 30.06 Lay out a semicircular arch and a jack arch.
- 31.0 Apply construction techniques and moisture control—The student will be able to:
- 31.01 Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.
- 31.02 Explain the requirements for wall bracing, and demonstrate the techniques used to construct pilasters and other types of bracing.
- 31.03 Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.
- 31.04 Identify the need for moisture control in various types of masonry construction, and demonstrate the techniques used to eliminate moisture problems.
- 31.05 Construct corbelling in a double-wythe wall.
- 31.06 Join intersecting walls.
- 31.07 Install flashing.
- 32.0 Apply quality control measures—The student will be able to:
- 32.01 Describe industry standards for quality control.
- 32.02 Describe how to build masonry sample panels and prisms.
- 32.03 Perform a slump test.
- 32.04 Describe and perform field inspections.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 33.01 Describe the nature and types of business organizations. SY1.0
- 33.02 Explain the effect of key organizational systems on performance and quality.
- 33.03 List and describe quality control systems and/or practices common to the workplace. SY2.0

33.04 Explain the impact of the global economy on business organizations.

34.0 Build foundations--The student will be able to:

34.01 Build an 8" block corner 7 courses high.

34.02 Build an 8" block corner to the correct height and range of a given foundation batter board line.

34.03 Bond and build an 8" block corner to the correct height and range on the opposite corner of a given foundation batter board line.

34.04 Pull a line and build an 8" block wall between the block corners.

34.05 Establish and build the other corner leads.

34.06 Build foundation walls to floor elevations.

34.07 Make foundation walls waterproof, if required.

34.08 Install flashing, anchor bolts, termite shields, and weep holes; install vents if a wooden floor system is used.

35.0 Estimate materials and cost--The student will be able to:

35.01 Estimate the materials needed for a specific job.

35.02 Estimate the cost of the materials, including the sales tax.

36.0 Operate and maintain power equipment--The student will be able to:

36.01 Follow safety practices when using and maintaining power equipment.

36.02 Use masonry saw with an abrasive blade to cut masonry units.

36.03 Use masonry saw with a diamond blade to cut masonry units.

36.04 Set up, operate, and maintain power tools and equipment.

Course Number: BCV0362

Occupational Completion Point:

Brickmason – 450 Hours – SOC Code 47-2021

37.0 Perform construction details--The student will be able to:

37.01 Build 4" and 8" brick corners.

37.02 Build 4", 6", 8", and 12" block corners.

37.03 Build reinforced masonry walls, composite walls, and cavity walls.

37.04 Erect corner poles.

37.05 Course brick heights.

37.06 Build brick and/or block sills, steps, piers, pilasters, columns, brick chase, flue, paving, BBQ pits, and planters.

37.07 Construct a brick-veneer wall.

37.08 Set precast and built-in lintels.

37.09 Build modular brick walls.

37.10 Lay glass blocks.

37.11 Set door jams.

37.12 Reinforce masonry walls.

38.0 Demonstrate knowledge of masonry repair and restoration--The student will be able to:

38.01 Recognize signs of deterioration in masonry structures.

- 38.02 Describe the causes of efflorescence, cracking and faulty mortar joints.
- 38.03 Describe the procedures for preventing and correcting efflorescence, cracking, and faulty mortar joints.
- 38.04 Describe the procedures for preventing and correcting water damage in basements.

Course Number: BCV0363
Occupational Completion Point: C
Brickmason – 450 Hours – SOC Code 47-2021

39.0 Demonstrate productivity skills--The student will be able to:

- 39.01 Lay and joint standard brick on a straight brick-veneer wall, with established leads, at an average daily rate of:
 - a. 100-200
 - b. 200-300
 - c. 300-400
 - d. 400-500
 - e. 500-600
 - f. 600-700
 - g. 700-800
 - h. over 800
- 39.02 Lay and joint 8" block on a straight block wall, with established leads, at an average daily rate of:
 - a. 50-100
 - b. 100-150
 - c. 150-200
 - d. 200-250
 - e. 250-300
 - f. 300-350
 - g. 350-400
 - h. over 400

40.0 Demonstrate understanding of masonry in high-rise construction--The student will be able to:

- 40.1 Recognize and explain the use of high-rise construction equipment.
- 40.2 Identify construction sequence in high-rise construction.
- 40.3 State the safety procedures in high-rise construction.
- 40.4 Safely work with materials handling equipment in high-rise construction.
- 40.5 Properly put on a safety harness, lanyard, and lifeline.
- 40.6 Demonstrate hand signals used for lifting materials.

41.0 Demonstrate knowledge of specialized materials and techniques--The student will be able to:

- 41.1 Explain the various techniques used to provide adequate protection during hot- and cold-weather masonry construction.
- 41.2 Describe all-weather construction techniques.
- 41.3 Describe techniques for surface-bonding mortar.

- 41.4 Demonstrate techniques for construction of stone walls and other stone building surfaces.
- 41.5 Demonstrate basic knowledge of various building materials such as glass block and refractory brick.

- 41.6 Describe the procedures for rebuilding fireplaces.
- 41.7 Replace a damaged brick in a wall.
- 41.8 Repair mortar joints.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 1
Course Number: 8722610
Course Credit: 1

Course Description:

This course provides students with the competencies essential to the masonry industry. These competencies include knowledge and skills related to safety practices, the use of hand tools, the selection and mixing of mortars and concrete, and brick and block laying.

01.0 Characterize the masonry industry--The student will be able to:

- 01.01 Summarize the history of the masonry industry.
- 01.02 Explain the importance of the masonry industry to the local, state, and national economy.
- 01.03 Identify employment and advancement opportunities in the masonry industry.
- 01.04 Explain the factors involved in good-quality work.
- 01.05 Describe modern masonry and materials.

02.0 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:

- 02.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 02.02 Explain emergency procedures to follow in response to workplace accidents.
- 02.03 Create a disaster and/or emergency response plan. SHE2.0

03.0 Follow safety practices relevant to the masonry industry--The student will be able to:

- 03.01 Identify causes and types of accidents.
- 03.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA) in jobsite safety.
- 03.03 Describe the OSHA "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- 03.04 Recognize jobsite hazards and risk assessment techniques.
- 03.05 Describe first-aid procedures.
- 03.06 Follow safety practices when using tools and equipment.
- 03.07 Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDSs).
- 03.08 Demonstrate the use of and care of appropriate personal protective equipment (PPE).

04.0 Describe the properties, characteristics, and uses of brick--The student will be able to:

- 04.01 Explain the brick-manufacturing process.
- 04.02 Identify the properties and characteristics of brick.
- 04.03 Distinguish between standard and modular bricks.

- 04.04 Describe the different types of bricks and their principal uses.
- 04.05 Identify brick positioning in a wall.
- 04.06 Build 4" corner return leads and a wall 4 feet high and 12 feet long.
- 05.0 Describe the properties, characteristics, and uses of concrete block--The student will be able to:
- 05.01 Explain the manufacturing process of concrete block.
- 05.02 Identify the properties and characteristics of concrete block.
- 05.03 Describe the different types, including shapes and sizes, of concrete blocks and their principal uses.
- 05.04 Build an 8" block corner return lead 7 courses high.
- 06.0 Identify and use hand tools relevant to the masonry industry--The student will be able to:
- 06.01 Identify, care for, and use basic hand tools.
- 06.02 Select hand tools for specific jobs.
- 06.03 Identify power tools.
- 06.04 Read English rules to the 1/16".
- 06.05 Read brick-spacing rules and brick modular rules.
- 06.06 Course brick to a given height with the brick spacing rule and the modular rule.
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 07.02 Locate, organize and reference written information from various sources. CM3.0
- 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 07.05 Apply active listening skills to obtain and clarify information. CM7.0
- 07.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 08.0 Demonstrate understanding of measurements, drawings and specifications--The student will be able to:
- 08.01 Work with denominate numbers.
- 08.02 Identify the ingredients and properties of mortars.
- 08.03 Read a mason's measure.
- 08.04 Convert measurements in the U.S. Customary (English) system into metric equivalents.
- 08.05 Read construction documents and identify basic parts of a drawing set.
- 08.06 Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.
- 09.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2

- 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.03 Construct charts/tables/graphs using functions and data. AF3.5

10.0 Lay brick and/or block to the line--The student will be able to:

- 10.01 Set up masonry materials.
- 10.02 Temper mortar.
- 10.03 Spread mortar for brick.
- 10.04 Pull a line from established leads.
- 10.05 Butter head joints.
- 10.06 Lay brick to the line.
- 10.07 Maintain proper spacing of head and bed joints.
- 10.08 Cut brick with a hammer, a brick set, and a trowel.
- 10.09 Point and tool joints in brick walls.
- 10.10 Repeat the above nine tasks with 8" concrete block.

11.0 Describe the various types and uses of bonding--The student will be able to:

- 11.01 Define and describe pattern, structural, layout, and adhesive bonding.
- 11.02 Differentiate among and use stretcher, common, English, English cross, Flemish, and stack bonds.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 2
Course Number: 8722620
Course Credit: 1

Course Description:

This course is to develop the competencies necessary to the masonry industry. These competencies include knowledge and skills related to the properties, characteristics, and uses of brick and concrete block; bonding; methods of masonry practices; masonry cleaning; scaffolding; communication; and computer use.

12.0 Select and mix mortars and concrete--The student will be able to:

- 12.01 Identify types of mortars.
- 12.02 Identify the ingredients and properties of mortars.
- 12.03 Identify the properties and characteristics of concrete.
- 12.04 Identify common admixtures and their uses.
- 12.05 Identify the types and purposes of grouts.
- 12.06 Store and place materials.
- 12.07 Select mortars and concrete.
- 12.08 Mix mortars by hand and by machine.
- 12.09 Mix concrete by hand and by machine.
- 12.10 Clean up tools, equipment, and the work site.
- 12.11 Build a brick 4" corner return lead.
- 12.12 Identify common problems found in mortar application and their uses.

13.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 13.01 Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 13.02 Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury.
- 13.03 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 13.04 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 13.05 Identify health-related problems caused by exposure to work-related chemicals and hazardous materials.
- 13.06 Describe proper precautions for handling work-related chemicals and hazardous materials.

14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0

- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Clean masonry--The student will be able to:
 - 15.01 Follow safety practices when cleaning masonry.
 - 15.02 Identify reasons for cleaning.
 - 15.03 Identify and select cleaning materials and equipment for brick and concrete block.
 - 15.04 Prepare cleaning solutions.
 - 15.05 Point new and old work.
 - 15.06 Prepare the area.
 - 15.07 Clean the wall, using different methods.
- 16.0 Identify the various methods of masonry practices--The student will be able to:
 - 16.01 Identify the methods of basic building layouts.
 - 16.02 Identify the methods of digging and pouring footings.
 - 16.03 Identify the methods of forming, grading, and pouring concrete slabs.
 - 16.04 Identify the different types of reinforced masonry, flashing, wall reinforcement, and ties.
 - 16.05 Identify measuring tools.
 - 16.06 Identify power equipment.
- 17.0 Erect and disassemble basic scaffolds--The student will be able to:
 - 17.01 Follow safety practices when working with ladders and scaffolds.
 - 17.02 Erect and disassemble basic scaffolds.
- 18.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
 - 18.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 18.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 18.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 19.0 Develop an understanding of sustainability issues related to the masonry profession--The student will be able to:
 - 19.01 Describe the impact of the construction industry on the natural environment.
 - 19.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 19.03 Identify and analyze sustainable alternatives to conventional masonry practices.
 - 19.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 19.05 Describe the building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 19.06 Identify construction activities pertaining to the masonry profession that contribute to a project's overall sustainability.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 3
Course Number: 8722630
Course Credit: 1

Course Description:

This course provides students with competencies plan reading, residential masonry, masonry reinforcement and metals used in masonry.

20.0 Read construction drawings and specifications--The student will be able to:

- 20.01 Identify types of drawings.
- 20.02 Identify symbols on the drawings.
- 20.03 Read and interpret simple drawings.
- 20.04 Read and interpret specifications.
- 20.05 Explain the importance of following local, state, and national codes and standards.
- 20.06 Interpret a finished schedule.
- 20.07 Use an architect's scale.
- 20.08 Use construction drawings to estimate material quantities.

21.0 Use information technology tools--The students will be able to:

- 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

22.0 Demonstrate understanding of residential masonry--The students will be able to:

- 22.01 Explain the requirements for construction of various types of residential foundations.
- 22.02 Identify and explain the characteristics, uses and installation techniques for brick pavers.
- 22.03 Lay out and build steps, patios and decks made from masonry units.
- 22.04 Lay out and build chimneys and fireplaces.

23.0 Apply grout and other reinforcement--The students will be able to:

- 23.01 Name and describe the primary ingredients in grout and their properties.
- 23.02 Identify the different types of grout used in masonry work.
- 23.03 Describe common admixtures and their uses.
- 23.04 Describe the use of steel bar reinforcement in masonry construction.
- 23.05 Apply grout in low and high lifts using the proper techniques.

- 23.06 Place grout in a hollow block wall and rod it into place.
- 24.0 Install metals used in masonry--The students will be able to:
- 24.01 Describe the uses and installation of vertical reinforcement.
 - 24.02 Describe the uses and installation of different types of horizontal joint reinforcement and ties.
 - 24.03 Describe the uses and installation of different anchors, fasteners, and embedded items.
 - 24.04 Install hollow metal frames.
 - 24.05 Describe the functions of sills and lintels.
 - 24.06 Install sills and lintels.
 - 24.07 Install metal hardware.
- 25.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 25.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 25.02 Describe the effect of money management on personal and career goals. FL3.0
 - 25.03 Develop a personal budget and financial goals. FL3.1
 - 25.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 25.05 Maintain financial records. FL3.3
 - 25.06 Read and reconcile financial statements. FL3.4
 - 25.07 Research, compare and contrast investment opportunities.
- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Masonry 4
Course Number: 8722640
Course Credit: 1

Course Description:

This course is designed to provide students with competencies in building layout, advanced laying techniques, moisture control and quality control.

27.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 27.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 27.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 27.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 27.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 27.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 27.06 Identify and exhibit traits for retaining employment. ECD7.0
- 27.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 27.08 Research the benefits of ongoing professional development. ECD9.0
- 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

28.0 Perform building layout--The student will be able to:

- 28.01 Read and interpret plot plans.
- 28.02 Establish building corners.
- 28.03 Check and/or establish 90-degree angles using the 3-4-5 rule.
- 28.04 Build batter boards and establish building lines and elevations.
- 28.05 Dig, prepare and pour footings to local codes and standards.

29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 29.04 Employ mentoring skills to inspire and teach others. LT5.0

30.0 Demonstrate advanced laying techniques—The student will be able to:

- 30.01 Recognize the structural principles and fundamental uses of basic types of walls.
 - 30.02 Recognize the requirement for, and function of, control joints and expansion joints.
 - 30.03 Build various types of walls using proper reinforcement, jointing, and bonding techniques.
 - 30.04 Lay out specialty structures such as maintenance holes, segmented block walls, and screens.
 - 30.05 Identify and explain the different types of masonry arches used today.
 - 30.06 Lay out a semicircular arch and a jack arch.
- 31.0 Apply construction techniques and moisture control—The student will be able to:
- 31.01 Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.
 - 31.02 Explain the requirements for wall bracing, and demonstrate the techniques used to construct pilasters and other types of bracing.
 - 31.03 Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.
 - 31.04 Identify the need for moisture control in various types of masonry construction, and demonstrate the techniques used to eliminate moisture problems.
 - 31.05 Construct corbelling in a double-wythe wall.
 - 31.06 Join intersecting walls.
 - 31.07 Install flashing.
- 32.0 Apply quality control measures—The student will be able to:
- 32.01 Describe industry standards for quality control.
 - 32.02 Describe how to build masonry sample panels and prisms.
 - 32.03 Perform a slump test.
 - 32.04 Describe and perform field inspections.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 33.01 Describe the nature and types of business organizations. SY1.0
 - 33.02 Explain the effect of key organizational systems on performance and quality.
 - 33.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 33.04 Explain the impact of the global economy on business organizations.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: 8722650
Course Number: Masonry 5
Course Credit: 1

Course Description:

This course provides students with an in-depth study of foundation building, materials and cost estimations, and power-equipment operation.

34.0 Build foundations--The student will be able to:

- 34.01 Build an 8" block corner 7 courses high.
- 34.02 Build an 8" block corner to the correct height and range of a given foundation batter board line.
- 34.03 Bond and build an 8" block corner to the correct height and range on the opposite corner of a given foundation batter board line.
- 34.04 Pull a line and build an 8" block wall between the block corners.
- 34.05 Establish and build the other corner leads.
- 34.06 Build foundation walls to floor elevations.
- 34.07 Make foundation walls waterproof, if required.
- 34.08 Install flashing, anchor bolts, termite shields, and weep holes; install vents if a wooden floor system is used.

35.0 Estimate materials and cost--The student will be able to:

- 35.01 Estimate the materials needed for a specific job.
- 35.02 Estimate the cost of the materials, including the sales tax.

36.0 Operate and maintain power equipment--The student will be able to:

- 36.01 Follow safety practices when using and maintaining power equipment.
- 36.02 Use masonry saw with an abrasive blade to cut masonry units.
- 36.03 Use masonry saw with a diamond blade to cut masonry units.
- 36.04 Set up, operate, and maintain power tools and equipment.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Air Conditioning, Refrigeration and Heating Technology
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

Secondary – Career Preparatory	
Program Number	8723000
CIP Number	0647020303
Grade Level	9-12, 30, 31
Standard Length	7 Credits
Teacher Certification	AC HEAT ME @7 7G REFRG MECH 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
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 or advanced training in the heating, air-conditioning (A/C), and refrigeration and ventilation industry. This program prepares students for employment as A/C, Refrigeration and Heating Helper, A/C, Refrigeration and Heating Mechanic Assistant, A/C, Refrigeration and Heating Mechanic, A/C, Refrigeration and Heating Technician, and Refrigeration Technician (SOC 49-9021).

The student should obtain EPA certification prior to leaving school in order to be employed in any job that requires work with refrigerants.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8713010	Air Conditioning, Refrigeration & Heating Technology 1	1 Credit	49-9021	2
	8713020	Air Conditioning, Refrigeration & Heating Technology 2	1 Credit		2
B	8713030	Air Conditioning, Refrigeration & Heating Technology 3	1 Credit	49-9021	2
	8713040	Air Conditioning, Refrigeration & Heating Technology 4	1 Credit		2
C	8713050	Air Conditioning, Refrigeration & Heating Technology 5	1 Credit	49-9021	2
	8713060	Air Conditioning, Refrigeration & Heating Technology 6	1 Credit		2
	8713070	Air Conditioning, Refrigeration & Heating Technology 7	1 Credit		2

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific math and science core academic courses. This alignment resulted from a collaborative review by Career and Technical Education (CTE) teachers and core academic teachers. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Course #1	0/36 0%	0/41 0%	0/45 0%	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%
Course #2	0/36 0%	0/41 0%	0/45 0%	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%
Course #3	0/36 0%	0/41 0%	0/45 0%	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%
Course #4	#	**	0/45 0%	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%
Course #5	#	**	0/45 0%	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

Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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 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 (ESE) will need modifications to meet their special 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(s)/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. 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>).

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment.
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 09.0 Troubleshoot and wire electrical motors and their components.
- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems .
- 12.0 Explain the function of basic electronics.
- 13.0 Demonstrate language arts knowledge and skills.
- 14.0 Use information technology tools.
- 15.0 Solve problems using critical thinking skills, creativity and innovation.
- 16.0 Read construction documents.
- 17.0 Demonstrate science knowledge and skills.
- 18.0 Explain the properties of matter and heat behavior.
- 19.0 Analyze fluids, pressures, refrigerants, and related codes.
- 20.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 23.0 Select appropriate commercial compressors.
- 24.0 Test and adjust commercial evaporative condensers.
- 25.0 Maintain, test, and troubleshoot commercial evaporators.
- 26.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 30.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 31.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 32.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 33.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 34.0 Demonstrate a working knowledge of refrigerants and oils.

- 35.0 Interpret, use and modify construction drawings and specifications.
- 36.0 Conduct system startup and shutdown.
- 37.0 Design heating and cooling systems.
- 38.0 Use combustion-type heating servicing and testing equipment.
- 39.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 40.0 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 41.0 Maintain, troubleshoot, and repair commercial heating systems.
- 42.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems.
- 43.0 Demonstrate knowledge of retail refrigeration systems.
- 44.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 45.0 Develop an understanding of hydronic systems.
- 46.0 Develop an understanding of steam systems.
- 47.0 Determine the properties of air.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 1
Course Number: 8713010
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to safety practices, history and concepts, materials and tools, understand and knowledge as listed.

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan. SHE 2.0
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 02.01 Identify and use
 - a. Basic hand tools and tool accessories
 - b. Power tools (electric, mechanical, and pneumatic, if available)
 - c. Pipe and tube-working tools of the trade
 - d. Specialized tools of the trade

- 02.02 Apply appropriate care and maintenance procedures for tools and tool accessories, following the directions in the tool-equipment manufacturer's manual.
- 03.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF 3.0
- 03.01 Demonstrate knowledge of arithmetic operations. AF 3.2
- 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
- 03.03 Construct charts/tables/graphs using functions and data. AF 3.5
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 04.02 Locate, organize and reference written information from various sources. CM 3.0
- 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment--The student will be able to:
- 05.01 Explain the principles of electricity.
- 05.02 Explain single- and three-phase power distribution.
- 05.03 Define and explain watts, ohms, volts, and amps.
- 05.04 Identify and explain electrical measuring tools and devices.
- 05.05 Explain the standards for and ways to measure watts, resistance, voltage, and amperage, using appropriate instruments or devices.
- 05.06 Identify and explain appropriate electrical wiring symbols.
- 05.07 Draw and explain a wiring schematic diagram for a control system.
- 05.08 Create a wiring schematic for each of the following, using all components and symbols for safe and effective operation and interpretation:
- a. An air-conditioner
 - b. An electric furnace
 - c. A heat pump
 - d. An oil furnace (optional)
 - e. A gas furnace
- 05.09 Explain codes and standards and safety requirements for working with the electrical components used in heating, air conditioning, and refrigeration.
- 05.10 Troubleshoot protection devices, such as fuses and breakers.
- 05.11 Interpret tables and charts from the National Electrical Codes (NEC).
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components--The student will be able to:

- 06.01 Identify and explain the operations of electrical control systems and their components (zone damper motors, dual fuel lock out controls, outdoor thermostats/low ambient controls, defrost controls/timers, and auxiliary heating controls).
 - 06.02 Identify, install, and troubleshoot controls for heating, air-conditioning, and refrigeration systems.
 - 06.03 Explain the operation of different types of electromechanical thermostats.
 - 06.04 Wire basic heating, air-conditioning, and refrigeration systems.
 - 06.05 Troubleshoot operational problems for different types of electromechanical thermostats.
 - 06.06 Explain the electrical and mechanical operations of the basic heat pump.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
- 07.01 Determine wire sizes and voltage drops.
 - 07.02 Describe the operation of various types of transformers.
 - 07.03 Draw and identify various power-transformers.
 - 07.04 Test, size, and replace protection devices such as fuses and breakers, motor starters, and overloads.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 2
Course Number: 8713020
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to fabrication and service, working knowledge as listed. Apply appropriate communication and computer skills, understanding of entrepreneurship, and employability skills.

- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems--The student will be able to:
- 08.01 Explain how alternating current is developed and draw a sine wave.
 - 08.02 Identify single-phase and three-phase wiring arrangements.
 - 08.03 Explain how phase shift occurs in inductors and capacitors.
 - 08.04 Describe the types of capacitors and their applications.
 - 08.05 Explain the operation of single-phase and three-phase induction motors.
 - 08.06 Identify the various types of single-phase motors and their applications.
 - 08.07 State and demonstrate the safety precautions, such as lock out / tag out, which must be followed when working with electrical equipment.
 - 08.08 Explain how the electric company uses a demand meter.
 - 08.09 Identify and explain the operations and applications of various types of electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.10 Maintain, test, and troubleshoot various types of commercial electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.11 Demonstrate the proper use of motor testing equipment.
- 09.0 Troubleshoot and wire electrical motors and their components--The student will be able to:
- 09.01 Identify and explain the functions of various types of motors and their components.
 - 09.02 Troubleshoot, test, and analyze motors, using various methods.
 - 09.03 Identify, troubleshoot, and wire various types of electric motors.
 - 09.04 Reverse the rotation of a motor.
- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems--The student will be able to:
- 10.01 Explain the basic principles and functions of Direct Digital Control (DDC).
 - 10.02 Explain basic solid-state circuits and boards.
 - 10.03 Identify, test, and replace circuits and boards.
 - 10.04 Identify and explain the functions of a building-management system.

- 10.05 Program a programmable thermostat.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems --The student will be able to:
- 11.01 Explain how the principles of designing an electrical system for residential heating and air-conditioning systems apply to commercial heating and air-conditioning systems.
 - 11.02 Define and compare single- and multiphase voltage and current related to commercial heating and air-conditioning systems.
 - 11.03 Calculate various circuit loads in commercial heating and air-conditioning applications using Ohm's law.
 - 11.04 Troubleshoot electrical circuits for commercial heating and air-conditioning systems
- 12.0 Explain the function of basic electronics--The student will be able to:
- 12.01 Explain the basic theory of electronics and semiconductors.
 - 12.02 Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.
 - 12.03 Identify different types of resistors and explain how their resistance values can be determined.
 - 12.04 Describe the operation and function of thermistors and cad cells.
 - 12.05 Test semiconductor components.
 - 12.06 Identify the connectors on a personal computer.
- 13.0 Demonstrate language arts knowledge and skills--The student will be able to: ECD10.0
AF 2.0
- 13.01 Locate, comprehend and evaluate key elements of oral and written information. AF 2.4
 - 13.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF 2.5
 - 13.03 Present information formally and informally for specific purposes and audiences. AF 2.9
- 14.0 Use information technology tools--The student will be able to:
- 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT 1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
 - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
 - 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 15.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS 1.0
 - 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0

- 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 15.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 3
Course Number: 8713030
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to electrical components, troubleshooting as listed.

16.0 Read construction documents--The student will be able to:

- 16.01 Recognize and identify basic construction drawing terms, components and symbols.
- 16.02 Relate information on construction drawings to actual locations on the print.
- 16.03 Recognize different classifications of construction drawings.
- 16.04 Interpret and use drawing dimensions.

17.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:

- 17.01 Explain the basic principles of heating, ventilation and air-conditioning.
- 17.02 Identify educational paths to career opportunities in the HVAC profession.
- 17.03 Identify and explain the four major refrigeration components.
- 17.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
- 17.05 Differentiate between air-conditioning and refrigeration.
- 17.06 Differentiate between split systems and package systems.
- 17.07 Describe the benefits of conditioned air and environments.
- 17.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
- 17.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
- 17.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
- 17.11 Identify various professional organizations, associations, and societies, and explain their purposes.

18.0 Demonstrate science knowledge and skills--The student will be able to: AF 4.0

- 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF 4.1
- 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF 4.3

19.0 Explain the properties of matter and heat behavior--The student will be able to:

- 19.01 Describe and explain freezing point, critical temperature, and absolute zero.
 - 19.02 Describe matter, heat, and heat transfer.
 - 19.03 Differentiate between heat and temperature.
 - 19.04 Explain and distinguish among the characteristics of the three states of matter.
 - 19.05 Explain the relationship between temperature and humidity.
 - 19.06 Differentiate between latent heat and sensible heat.
- 20.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:
- 20.01 Identify the refrigeration cycle.
 - 20.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
 - 20.03 Define and explain "pressure," "fluid," and "temperature."
 - 20.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
 - 20.05 Identify and explain the classifications, properties, and uses of different refrigerants.
 - 20.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
 - 20.07 Define and identify "color-coding" of refrigerant cylinders.
 - 20.08 Compare Pressure and Temperature (P/T) charts.
 - 20.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
 - 20.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 21.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 21.01 Explain the types, operation, use, and maintenance requirements of
 - a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
 - 21.02 Evaluate metering-device performance.
 - 21.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
 - 21.04 Analyze the operating condition of a compressor.
 - 21.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
 - 21.06 Identify the location and explain the uses of refrigerant flow accessories.
 - 21.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
 - 21.08 Evaluate system performance.
- 22.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:

- 22.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
 - 22.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR 1.1
 - 22.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
 - 22.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The student will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
 - 23.02 Describe the effect of money management on personal and career goals. FL 3.0
 - 23.03 Develop a personal budget and financial goals. FL 3.1
 - 23.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
 - 23.05 Maintain financial records. FL 3.3
 - 23.06 Read and reconcile financial statements. FL 3.4
 - 23.07 Research, compare and contrast investment opportunities.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 4
Course Number: 8713040
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to installation, start-up, and check-out procedures as listed.

24.0 Select appropriate commercial compressors--The student will be able to:

- 24.01 Compare commercial-compressor requirements with those for residential and light commercial heating and air-conditioning systems.
- 24.02 Select appropriate commercial compressors for cooling requirements.
- 24.03 Describe the mechanical operation for each type of compressor.
- 24.04 Explain compressor lubrication methods.
- 24.05 Explain methods used to control compressor capacity.
- 24.06 Describe how compressor protection devices operate.
- 24.07 Perform the common procedures used when field servicing open and semi-hermetic compressors.

25.0 Test and adjust commercial evaporative condensers--The student will be able to:

- 25.01 Determine the proper air and fluid flow for commercial evaporative condensers.
- 25.02 Test and adjust the airflow for proper temperature difference.
- 25.03 Test and adjust the water flow for proper GPM and temperature difference.
- 25.04 Check for proper water treatment.

26.0 Maintain, test, and troubleshoot commercial evaporators--The student will be able to:

- 26.01 Determine the operational requirements for evaporators used in commercial heating and air-conditioning applications.
- 26.02 Select appropriate evaporators for commercial heating and air-conditioning systems.
- 26.03 Maintain, test, and adjust various commercial heating and air-conditioning accessories.

27.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:

- 27.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.02 Bend tubing, using tube benders.
- 27.03 Connect tubing, using

- a. Flared fittings
 - b. Compression fittings
 - 27.04 Connect tubing, using solderless connectors.
 - 27.05 Connect tubing, using a swaged-joint connection.
 - 27.06 Identify and use various types of torches.
 - 27.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 27.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 27.09 Braze tubing.
 - 27.10 Silver-braze brass, steels, and copper.
 - 27.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 27.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 27.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 27.14 Maintain project time and materials lists.
 - 27.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 28.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 28.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD 7.0
 - 28.07 Identify opportunities and research requirements for career advancement. ECD 8.0
 - 28.08 Research the benefits of ongoing professional development. ECD 9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 30.01 Describe the nature and types of business organizations. SY1.0
 - 30.02 Explain the effect of key organizational systems on performance and quality.

- 30.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 30.04 Explain the impact of the global economy on business organizations.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 5
Course Number: 8713050
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to solid-state electronics, mechanical refrigeration and testing equipment, and combustion-type heating service and test equipment as listed.

31.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:

- 31.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
- 31.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
- 31.03 Explain pressure and temperature drops.

32.0 Utilize and operate mechanical refrigeration servicing and testing equipment--The student will be able to:

- 32.01 Identify the effects of superheat and sub-cooling on a system.
- 32.02 Identify and explain the functions of servicing and testing equipment (such as vacuum pumps, micron gauges, EPA-approved equipment, leak detectors, and charging systems).
- 32.03 Operate a refrigerant recovery system.
- 32.04 Explain the standards for and ways to measure, test, maintain, and evacuate a mechanical heating, air-conditioning, and refrigeration system.
- 32.05 Evacuate the refrigerant system with various vacuum methods.
- 32.06 Demonstrate compliance with Environmental Protection Agency (EPA) rules and regulations and, if possible, take the EPA test.
- 32.07 Charge various air-conditioning and mechanical refrigeration systems by various methods.
- 32.08 Demonstrate the effects of superheat and sub-cooling on a system utilizing test equipment (such as thermometers and gages)

33.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures--The student will be able to:

- 33.01 Read and comply with dispatch orders.
- 33.02 Explain local codes and ordinances.
- 33.03 Select and use appropriate tools and safety practices to test equipment.
- 33.04 Determine the electrical requirements of equipment.

- 33.05 Assist in the installation of a heating and air-conditioning system to the manufacturer's installation and operation specifications, using a practical knowledge of duct fabrication methods.
 - 33.06 Determine the proper charge in a residential air-conditioning unit and adjust superheat.
 - 33.07 Determine the temperature drop across the evaporator.
 - 33.08 Determine the temperature rise across the condenser.
 - 33.09 Write a service report.
 - 33.10 Apply good customer-relations skills.
- 34.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:
- 34.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
 - 34.02 Determine the start-up and checkout procedures recommended by different manufacturers.
 - 34.03 Determine the electrical requirements of equipment.
 - 34.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
 - 34.05 Determine the temperature drop across the outdoor coil on a heat pump.
 - 34.06 Determine the temperature rise across the indoor coil on a heat pump.
 - 34.07 Test for a proper refrigerant charge in a residential heat pump.
 - 34.08 Apply good customer-relations skills.
- 35.0 Demonstrate a working knowledge of refrigerants and oils--The student will be able to:
- 35.01 Identify the refrigerants in common use and state the types of applications in which each is used.
 - 35.02 Explain the effects of releasing refrigerants into the atmosphere.
 - 35.03 Explain how refrigerants are classified by their chemical composition.
 - 35.04 Describe the color-coding scheme used to identify refrigerant cylinders.
 - 35.05 Describe how azeotropes and near-azeotropes differ from each other and from so-called pure refrigerants.
 - 35.06 Interpret a P-T chart for an azeotrope refrigerant.
 - 35.07 Calculate superheat and subcooling.
 - 35.08 Demonstrate refrigerant leak detecting methods.
 - 35.09 Identify the different types of oils used in refrigeration systems and explain their relationships to the various refrigerants.
 - 35.10 Explain how to add and remove oil from a system.
 - 35.11 Describe how to test oil for contamination.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 6
Course Number: 8713060
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to troubleshooting, determining properties, and use of pressure enthalpy chart to diagram cycles as listed below.

36.0 Interpret, use and modify construction drawings and specifications--The student will be able to:

- 36.01 Read mechanical plans within a set of construction drawings explain their relationship.
- 36.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
- 36.03 Interpret specification documents and apply them to the plans.
- 36.04 Interpret shop drawings and apply them to the plans and specifications.
- 36.05 Develop a field set of as-built drawings.
- 36.06 Identify the steps required for transferring design information to component production.
- 36.07 List and classify materials most commonly used in HVAC systems.

37.0 Conduct system startup and shutdown--The student will be able to:

- 37.01 Start up and shut down an air handler and related forced-air distribution system.
- 37.02 Test compressor oil for acid contamination.
- 37.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.

38.0 Design heating and cooling systems--The student will be able to:

- 38.01 Identify and describe the steps in the system design process.
- 38.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
- 38.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
- 38.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
- 38.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
- 38.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
- 38.07 Identify the various types of duct systems and explain why and where each type is used.
- 38.08 Demonstrate the effect of fittings and transitions on duct system design.

- 38.09 Use a friction loss chart and duct sizing table to size duct.
- 38.10 Install insulation and vapor barriers used in duct systems.
- 38.11 Following proper design principles select and install refrigerant and condensate piping.
- 39.0 Use combustion-type heating servicing and testing equipment--The student will be able to:
- 39.01 Explain combustion theory and the safety precautions for using combustion-type heating servicing and testing equipment.
- 39.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
- 39.03 Use the servicing and testing equipment.
- 39.04 Test, analyze, and troubleshoot combustion-type-heating systems.
- 40.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems--The student will be able to:
- 40.01 Identify and discuss the safety and regulation issues and concerns.
- 40.02 Explain the operations of various types of gas valves and regulators (such as low-voltage, line-voltage, pneumatic, solenoid, and gas and pressure regulators).
- 40.03 Identify and size various types of gas valves and regulators.
- 40.04 Determine the application of gas valves and regulators.
- 40.05 Troubleshoot gas valves and regulators.
- 41.0 Maintain, test, and adjust commercial heating and air-conditioning accessories--The student will be able to
- 41.01 Compare commercial accessories with residential and light- commercial-heating and air-conditioning accessories.
- 41.02 Select the heating and air-conditioning accessories appropriate for various commercial applications.
- 41.03 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 42.0 Maintain, troubleshoot, and repair commercial heating systems--The student will be able to:
- 42.01 Identify the components of various commercial heating systems.
- 42.02 Explain the operational principles of various commercial heating systems.
- 42.03 Test and analyze heating air-distribution systems.
- 42.04 Maintain, troubleshoot, and repair various commercial heating systems, such as:
- A gas furnace and boiler
 - An oil furnace and boiler
 - An electric furnace
 - Electric heaters
 - A heat pump
 - Solar-heating systems
- 43.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems--The student will be able to:

- 43.01 Follow safety precautions.
- 43.02 Describe new technologies in heating, air-conditioning, and refrigeration installation, including
 - a. Variable-speed motors
 - b. Heat-pipe systems
 - c. Desiccant systems
 - d. Gas-driven heating systems
- 43.03 Lay out, construct, and troubleshoot comfort systems.
- 43.04 Test and analyze systems.
- 43.05 Test and analyze heat-recovery systems.

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**Florida Department of Education
Student Performance Standards**

Course Title: Air Conditioning, Refrigeration and Heating Technology 7
Course Number: 8713070
Course Credit: 1

Course Description:

This course provides students with competencies essential to the air Conditioning, refrigeration and heating industry. These competencies include knowledge and skills related to measuring indoor-air quality, installation, maintenance and repair as listed below.

- 44.0 Demonstrate knowledge of retail refrigeration systems--The student will be able to:
- 44.01 Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
 - 44.02 Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
 - 44.03 Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.
 - 44.04 Identify and describe the supporting components and accessories used in retail refrigeration systems.
 - 44.05 Describe the various methods of defrost used in retail refrigeration systems.
 - 44.06 Identify and describe the applications for the various types of retail refrigeration systems.
 - 44.07 Describe the control system components used in retail refrigeration systems.
 - 44.08 Explain the operating sequence of a retail refrigeration system.
 - 44.09 Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.
- 45.0 Demonstrate knowledge of commercial and industrial refrigeration systems--The student will be able to:
- 45.01 Identify different types of refrigerated coolers and display cases and describe each one's common application.
 - 45.02 Compare the basic components used in commercial/industrial refrigeration systems with those used in retail refrigeration systems.
 - 45.03 Identify single, multiple, and satellite compressor systems. Describe the applications, installation considerations, and advantages and disadvantages of each type.
 - 45.04 Identify packaged condensing units and unit coolers. Describe their applications, operation, and installation considerations.
 - 45.05 Identify two-stage compressors and explain their operation and applications.
 - 45.06 Identify the various accessories used in commercial refrigeration systems. Explain why each is used and where it should be installed in the system.
 - 45.07 Identify the various refrigeration control devices. Explain the purpose of each type and how it works.
 - 45.08 Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.

46.0 Develop an understanding of hydronic systems--The student will be able to:

- 46.01 Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
- 46.02 Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
- 46.03 Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual-temperature water systems.
- 46.04 Describe the safety precautions used when working with hot-water/chilled-water systems.
- 46.05 Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
- 46.06 Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.
- 46.07 Explain the principles involved, and describe the procedures used, in balancing hydronic systems.
- 46.08 Select, calibrate, and properly use the tools and instruments needed to balance hydronic systems.
- 46.09 Read the pressure across a water system circulating pump.

47.0 Develop an understanding of steam systems--The student will be able to:

- 47.01 Explain the terms and concepts used when working with steam-heating systems.
- 47.02 Identify major components of steam heating systems and explain the purpose of each.
- 47.03 Describe the basic steam-heating cycle.
- 47.04 Safely perform selected operating procedures on low-pressure steam boilers and systems.
- 47.05 Install and maintain selected steam traps.
- 47.06 Identify the common piping configurations used with steam-heating systems.

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**Florida Department of Education
Curriculum Framework**

Program Title: Tile Setting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8723100	I460103
CIP Number	0646010106	0646010106
Grade Level	9-12,30,31	30,31
Standard Length	3 Credits	500 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G TILE SET 7G	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G TILE SET 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-2044 - Tile and Marble Setters	47-2044 - Tile and Marble Setters
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	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 Architecture and Construction 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 Architecture and Construction career cluster.

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, proper care and use of hand tools and equipment, tile setting materials, basic blueprint reading, trade math and estimating materials for tile setting.

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

Program Structure

This program is a planned sequence of instruction consisting of three programs with one Occupational Completion Point.

The recommended sequence allows students to complete specified portions of a program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0392	Hard Tile Setter 1	250 Hours	47-2044
	BCV0393	Hard Tile Setter 2	250 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8723110	Tile Setting 1	1 Credit	47-2044	2
	8723120	Tile Setting 2	1 Credit		2
	8723130	Tile Setting 3	1 Credit		2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fl DOE.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.fl DOE.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.fl DOE.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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Prepare walls for drywall application of ceramic tile.
- 03.0 Use information technology tools.
- 04.0 Prepare walls using wire lathe, scratch coat and screed coat for wet wall application of ceramic tile.
- 05.0 Apply tile and grout utilizing drywall techniques.
- 06.0 Apply tile and grout utilizing wet wall techniques.
- 07.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 08.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 09.0 Layout, cut and install ceramic tile on walls and floors, plumb, level, and with straight joints.
- 10.0 Demonstrate science knowledge and skills.
- 11.0 Interpret blueprints and estimate materials for tile work.
- 12.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 13.0 Describe the importance of professional ethics and legal responsibilities.
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 15.0 Demonstrate language arts knowledge and skills.
- 16.0 Demonstrate mathematics knowledge and skills.
- 17.0 Proportion and mix mortar for tile installation.
- 18.0 Demonstrate appropriate understanding of basic science.
- 19.0 Solve problems using critical thinking skills, creativity and innovation.
- 20.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Tile Setting
PSAV Number: I460103

Course Number: BCV0392
Occupational Completion Point:
Hard Tile Setter 1 – 250 Hours – SOC Code 47-2044

- 01.0 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:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.02 Explain emergency procedures to follow in response to workplace accidents.
 - 01.03 Create a disaster and/or emergency response plan. SHE2.0
- 02.0 Prepare walls for drywall application of ceramic tile--The student will be able to:
- 02.01 Determine readiness of subsurface for tile installation.
 - 02.02 Repair damaged drywall.
 - 02.03 Sand and finish drywall for application of tile.
- 03.0 Use information technology tools--The students will be able to:
- 03.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 03.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 03.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 03.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 04.0 Prepare walls using wire lath, scratch coat and screed coat for wet wall application of ceramic tile--The student will be able to:
- 04.01 Install screed mud over concrete slab to install shower floor.
 - 04.02 Measure and cut metal lath to size for walls and ceilings with tin snips.
 - 04.03 Tack lath to wall and ceiling surfaces with staple gun or hammer.
 - 04.04 Spread plaster base over lath with trowel and level plaster to specified thickness, using screed.
 - 04.05 Spread concrete on subfloor with trowel and level it with screed.
 - 04.06 Remove and replace existing backing materials in wet area.
- 05.0 Apply tile and grout utilizing drywall techniques--The student will be able to:
- 05.01 Set tile on drywall with thinset.

- 05.02 Set tile using mastic adhesives.
- 05.03 Position tile and tap it with trowel handle to affix tile to plaster or adhesive.
- 05.04 Install tile over wire mesh and concrete masonry units.
- 05.05 Install tile over wood counter top.
- 05.06 Install counter top backsplash designs.
- 05.07 Layout countertop and backsplash designs.
- 05.08 Grout counter top and backsplash.
- 05.09 Grout floor tile.

06.0 Apply tile and grout utilizing wet wall techniques--The student will be able to:

- 06.01 Grout tile on walls and floors.
- 06.02 Install tile floor over concrete slab using thinset.
- 06.03 Replace grout.
- 06.04 Grout wet area installation.
- 06.05 Install tile in shower stall.
- 06.06 Lay out shower.
- 06.07 Build a shower curb.
- 06.08 Prepare shower floor for tile installation.
- 06.09 Install wire mesh mortar units in a shower.
- 06.10 Install wire mesh mortar units in a tub surround.

07.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 07.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 07.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 07.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 07.04 Employ mentoring skills to inspire and teach others. LT5.0

08.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 08.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 08.02 Describe the effect of money management on personal and career goals. FL3.0
- 08.03 Develop a personal budget and financial goals. FL3.1
- 08.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 08.05 Maintain financial records. FL3.3
- 08.06 Read and reconcile financial statements. FL3.4
- 08.07 Research, compare and contrast investment opportunities.

Course Number: BCV0393
Occupational Completion Point: A
Hard Tile Setter 2 – 250 Hours – SOC Code 47-2044

09.0 Layout, cut and install ceramic tile on walls and floors, plumb, level, and with straight joints--The student will be able to:

- 09.01 Select and use tile setting tools.

- 09.02 Use tile nippers to nip different types of tile.
 - 09.03 Cut and shape tile with tile cutters and biters.
 - 09.04 Cut different types of tile with tile hand cutters.
 - 09.05 Cut tile with rod saw.
 - 09.06 Use a level.
 - 09.07 Use electric drill.
 - 09.08 Use tile saw.
 - 09.09 Use tile cutter.
 - 09.10 Cut tile with electric saw.
 - 09.11 Clean tools and maintain in working order.
 - 09.12 Smooth cut tile edges with grinding stone.
 - 09.13 Select and use measurement tools.
 - 09.14 Install tile plumb and level using level.
 - 09.15 Square tile layouts using a steel square.
 - 09.16 Maintain true and correct tile work with square.
 - 09.17 Maintain clean, neat, and safe work area.
 - 09.18 Practice personal and general job safety procedures of tile setters.
 - 09.19 Miter base tile to fit angles.
 - 09.20 Miter cap tile to fit angles.
 - 09.21 Draw level starting and field lines, and level curbs and door jambs using a level.
 - 09.22 Lay down working, finish, plumb, and level lines using a chalk line.
 - 09.23 Butt tile rows using straightedge on starting line.
 - 09.24 Figure layout.
 - 09.25 Measure, cut, and install metal lath for shower pan.
 - 09.26 Chisel tile and setting related substances.
 - 09.27 Lay out tile setting jobs.
 - 09.28 Lay out floor.
 - 09.29 Install tile over previously poured interior concrete floor.
 - 09.30 Install tile over wood floor.
 - 09.31 Install ceramic tile over existing floor covering.
 - 09.32 Install tile over existing tile.
 - 09.33 Install tile floor over wood floor using mastic adhesive.
 - 09.34 Install floor tile over wire mesh mortar units.
 - 09.35 Install tile on exterior floor.
 - 09.36 Install ceramic tile over laminated counter top and backsplash.
 - 09.37 Install ceramic tile over ceramic tile on tub surround
 - 09.38 Install marble window sills.
 - 09.39 Install tile window sills.
 - 09.40 Install a complete shower floor.
 - 09.41 Clean aged tile.
 - 09.42 Replace loose or damaged tile.
 - 09.43 Measure and cut marble window sills.
 - 09.44 Remove and replace shower floor and base.
 - 09.45 Install fixtures.
- 10.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 10.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 10.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

- 11.0 Interpret blueprints and estimate materials for tile work--The student will be able to:
- 11.01 Apply basic math skills to tile setting.
 - 11.02 Measure floors, and walls using steel measuring tapes.
 - 11.03 Measure tile cuts using wood folding rule.
 - 11.04 Figure total tile amounts needed for job.
 - 11.05 Estimate how many square feet of tile needed for bathroom walls.
 - 11.06 Estimate how many square feet of tile needed for floor areas.
 - 11.07 Calculate costs.
 - 11.08 Maintain records of materials used.
 - 11.09 Read blueprints and specification sheets that apply to tile setting.
 - 11.10 Examine blueprints, measure and mark surfaces to be covered and lay out work.
 - 11.11 Prepare list of supplies and tools needed to complete a job.
- 12.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 12.01 Describe the nature and types of business organizations. SY1.0
 - 12.02 Explain the effect of key organizational systems on performance and quality.
 - 12.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 12.04 Explain the impact of the global economy on business organizations.
- 13.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 13.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 13.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 13.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 13.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 14.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 14.02 Locate, organize and reference written information from various sources. CM3.0
 - 14.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 14.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 14.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 14.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 15.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 15.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4

- 15.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 15.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 16.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 16.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 16.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 16.03 Construct charts/tables/graphs using functions and data. AF3.5
- 16.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 16.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 16.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 16.07 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 16.08 Demonstrate an understanding of federal, state and local taxes and their computation.
- 17.0 Proportion and mix mortar for tile installation--The student will be able to:
- 17.01 Mix setting materials manually with hand tools and equipment.
- 17.02 Mix setting materials with a power mixer.
- 17.03 Follow safety practices when mixing setting materials.
- 17.04 Follow manufacturer directions.
- 17.05 Select and mix adhesives to set tile.
- 17.06 Determine quantity and type of setting materials needed.
- 17.07 Proportion setting materials ingredients for specific uses.
- 18.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 18.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 18.02 Draw conclusions or make inferences from data.
- 18.03 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.
- 18.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 19.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 19.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 19.04 Conduct technical research to gather information necessary for decision-making. PS4.0

20.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 20.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 20.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 20.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 20.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 20.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 20.06 Identify and exhibit traits for retaining employment. ECD7.0
- 20.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 20.08 Research the benefits of ongoing professional development. ECD9.0
- 20.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Tile Setting 1
Course Number: 8723110
Course Credit: 1

Course Description:

This course is designed to provide instruction in adhesives, bedding materials, clay wall applications, masonry bed application, layout, setting, cutting, and grouting of ceramic tile.

- 01.0 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:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.02 Explain emergency procedures to follow in response to workplace accidents.
 - 01.03 Create a disaster and/or emergency response plan. SHE2.0
- 02.0 Prepare walls for drywall application of ceramic tile--The student will be able to:
- 02.01 Determine readiness of subsurface for tile installation.
 - 02.02 Repair damaged drywall.
 - 02.03 Sand and finish drywall for application of tile.
- 03.0 Use information technology tools--The students will be able to:
- 03.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 03.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 03.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 03.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 04.0 Prepare walls using wire lath, scratch coat and screed coat for wet wall application of ceramic tile--The student will be able to:
- 04.01 Install screed mud over concrete slab to install shower floor.
 - 04.02 Measure and cut metal lath to size for walls and ceilings with tin snips.
 - 04.03 Tack lath to wall and ceiling surfaces with staple gun or hammer.
 - 04.04 Spread plaster base over lath with trowel and level plaster to specified thickness, using screed.
 - 04.05 Spread concrete on subfloor with trowel and level it with screed.
 - 04.06 Remove and replace existing backing materials in wet area.
- 05.0 Apply tile and grout utilizing drywall techniques--The student will be able to:

- 05.01 Set tile on drywall with thinset.
- 05.02 Set tile using mastic adhesives.
- 05.03 Position tile and tap it with trowel handle to affix tile to plaster or adhesive.
- 05.04 Install tile over wire mesh and concrete masonry units.
- 05.05 Install tile over wood counter top.
- 05.06 Install counter top backsplash designs.
- 05.07 Layout countertop and backsplash designs.
- 05.08 Grout counter top and backsplash.
- 05.09 Grout floor tile.

06.0 Apply tile and grout utilizing wet wall techniques--The student will be able to:

- 06.01 Grout tile on walls and floors.
- 06.02 Install tile floor over concrete slab using thinset.
- 06.03 Replace grout.
- 06.04 Grout wet area installation.
- 06.05 Install tile in shower stall.
- 06.06 Lay out shower.
- 06.07 Build a shower curb.
- 06.08 Prepare shower floor for tile installation.
- 06.09 Install wire mesh mortar units in a shower.
- 06.10 Install wire mesh mortar units in a tub surround.

07.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 07.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 07.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 07.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 07.04 Employ mentoring skills to inspire and teach others. LT5.0

08.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 08.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 08.02 Describe the effect of money management on personal and career goals. FL3.0
- 08.03 Develop a personal budget and financial goals. FL3.1
- 08.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 08.05 Maintain financial records. FL3.3
- 08.06 Read and reconcile financial statements. FL3.4
- 08.07 Research, compare and contrast investment opportunities.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Tile Setting 2
Course Number: 8723120
Course Credit: 1

Course Description:

This course is designed to provide instruction in adhesives, bedding materials, clay wall applications, masonry bed application, layout, setting, cutting, and grouting of ceramic tile.

09.0 Layout, cut and install ceramic tile on walls and floors, plumb, level, and with straight joints--The student will be able to:

- 09.01 Select and use tile setting tools.
- 09.02 Use tile nippers to nip different types of tile.
- 09.03 Cut and shape tile with tile cutters and biters.
- 09.04 Cut different types of tile with tile hand cutters.
- 09.05 Cut tile with rod saw.
- 09.06 Use a level.
- 09.07 Use electric drill.
- 09.08 Use tile saw.
- 09.09 Use tile cutter.
- 09.10 Cut tile with electric saw.
- 09.11 Clean tools and maintain in working order.
- 09.12 Smooth cut tile edges with grinding stone.
- 09.13 Select and use measurement tools.
- 09.14 Install tile plumb and level using level.
- 09.15 Square tile layouts using a steel square.
- 09.16 Maintain true and correct tile work with square.
- 09.17 Maintain clean, neat, and safe work area.
- 09.18 Practice personal and general job safety procedures of tile setters.
- 09.19 Miter base tile to fit angles.
- 09.20 Miter cap tile to fit angles.
- 09.21 Draw level starting and field lines, and level curbs and door jambs using a level.
- 09.22 Lay down working, finish, plumb, and level lines using a chalk line.
- 09.23 Butt tile rows using straightedge on starting line.
- 09.24 Figure layout.
- 09.25 Measure, cut, and install metal lath for shower pan.
- 09.26 Chisel tile and setting related substances.
- 09.27 Lay out tile setting jobs.
- 09.28 Lay out floor.
- 09.29 Install tile over previously poured interior concrete floor.
- 09.30 Install tile over wood floor.
- 09.31 Install ceramic tile over existing floor covering.
- 09.32 Install tile over existing tile.
- 09.33 Install tile floor over wood floor using mastic adhesive.
- 09.34 Install floor tile over wire mesh mortar units.
- 09.35 Install tile on exterior floor.

- 09.36 Install ceramic tile over laminated counter top and backsplash.
 - 09.37 Install ceramic tile over ceramic tile on tub surround
 - 09.38 Install marble window sills.
 - 09.39 Install tile window sills.
 - 09.40 Install a complete shower floor.
 - 09.41 Clean aged tile.
 - 09.42 Replace loose or damaged tile.
 - 09.43 Measure and cut marble window sills.
 - 09.44 Remove and replace shower floor and base.
 - 09.45 Install fixtures.
- 10.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 10.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 10.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 11.0 Interpret blueprints and estimate materials for tile work--The student will be able to:
- 11.01 Apply basic math skills to tile setting.
 - 11.02 Measure floors, and walls using steel measuring tapes.
 - 11.03 Measure tile cuts using wood folding rule.
 - 11.04 Figure total tile amounts needed for job.
 - 11.05 Estimate how many square feet of tile needed for bathroom walls.
 - 11.06 Estimate how many square feet of tile needed for floor areas.
 - 11.07 Calculate costs.
 - 11.08 Maintain records of materials used.
 - 11.09 Read blueprints and specification sheets that apply to tile setting.
 - 11.10 Examine blueprints, measure and mark surfaces to be covered and lay out work.
 - 11.11 Prepare list of supplies and tools needed to complete a job.
- 12.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 12.01 Describe the nature and types of business organizations. SY1.0
 - 12.02 Explain the effect of key organizational systems on performance and quality.
 - 12.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 12.04 Explain the impact of the global economy on business organizations. HE 2.0
- 13.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 13.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 13.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 13.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 13.04 Interpret and explain written organizational policies and procedures. ELR2.0

- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 14.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 14.02 Locate, organize and reference written information from various sources. CM3.0
 - 14.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 14.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 14.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 14.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 15.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 15.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 15.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 15.03 Present information formally and informally for specific purposes and audiences. AF2.9

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Tile Setting 3
Course Number: 8723130
Course Credit: 1

Course Description:

This course is designed to provide instruction in adhesives, bedding materials, clay wall applications, masonry bed application, layout, setting, cutting, and grouting of ceramic tile.

- 16.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 16.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 16.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 16.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 16.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 16.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 16.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 16.07 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 16.08 Demonstrate an understanding of federal, state and local taxes and their computation.
- 17.0 Proportion and mix mortar for tile installation--The student will be able to:
- 17.01 Mix setting materials manually with hand tools and equipment.
 - 17.02 Mix setting materials with a power mixer.
 - 17.03 Follow safety practices when mixing setting materials.
 - 17.04 Follow manufacturer directions.
 - 17.05 Select and mix adhesives to set tile.
 - 17.06 Determine quantity and type of setting materials needed.
 - 17.07 Proportion setting materials ingredients for specific uses.
- 18.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 18.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 18.02 Draw conclusions or make inferences from data.
 - 18.03 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.
 - 18.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 19.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 19.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 19.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 20.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 20.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 20.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 20.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 20.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 20.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 20.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 20.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 20.08 Research the benefits of ongoing professional development. ECD9.0
 - 20.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Plastering
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

	Secondary	PSAV
Program Number	8723600	I460409
CIP Number	0646040401	0646040401
Grade Level	9-12, 30, 31	30, 31
Standard Length	3 Credits	450 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G TROWEL TR @7 7G	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G TROWEL TR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-2161 - Plasterers and Stucco Masons	47-2161 - Plasterers and Stucco Masons
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment as plasterers and stucco masons.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of, communication skills, leadership skills, human relations, and employability skills, safe and efficient work practices, mathematics, sketching, basic drafting, safety using scaffolds and ladders, preparation of surfaces and application of plaster and composition moldings.

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

When offered at the postsecondary level, 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	BCV0180	Plasterer	450 Hours	47-2161

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

OCP	Course Number	Course Title	Length	SOC Code	Level
	8723610	Plastering 1	150 Hours		2
	8723620	Plastering 2	150 Hours		2
A	8723630	Plastering 3	150 Hours	47-2161	2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

(http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.

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. 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>).

Standards

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

- 01.0 Read and interpret blueprints and schematics.
- 02.0 Demonstrate science knowledge and skills.
- 03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 04.0 Identify and use materials and finishes.
- 05.0 Demonstrate language arts knowledge and skills.

- 06.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 07.0 Demonstrate proper use of tools, trestles, scaffolds and ladders.
- 08.0 Use information technology tools.
- 09.0 Shape and apply moldings and cornices.
- 10.0 Describe the importance of professional ethics and legal responsibilities.
- 11.0 Make molds.
- 12.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 13.0 Apply plaster
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 16.0 Align surfaces using plumb bob, straight edge and spirit level.
- 17.0 Create smooth finish surfaces.
- 18.0 Create decorative textures and special effects by spraying, brushing, troweling, stippling, or spattering small stones on surface.
- 19.0 Demonstrate mathematics knowledge and skills.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Plastering
PSAV Number: I460409

Course Number: I460409
Occupational Completion Point: A
Plasterer – 450 Hours – SOC Code 47-2161

- 01.0 Read and interpret blueprints and schematics--The student will be able to:
- 01.01 Identify building components using a blueprint.
 - 01.02 Recognize commonly used symbols on blueprints
 - 01.03 Produce finished surfaces in accordance to blueprints, or architect's drawings.
- 02.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 02.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 02.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 02.03 Draw conclusions or make inferences from data.
 - 02.04 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.
 - 02.05 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 02.06 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
 - 02.01 Demonstrate knowledge of the "Right-To-Know Law".
- 03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 03.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 03.02 Locate, organize and reference written information from various sources. CM3.0
 - 03.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 03.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 03.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 03.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 03.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 04.0 Identify and use materials and finishes--The student will be able to:
- 04.01 Mix mortar.
 - 04.02 Mix plaster to designated consistency.
 - 04.03 Install dryvit systems.

- 04.04 Apply hardcoat and putty coat finishes.
- 05.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 05.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 06.0 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:
- 06.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 06.02 Explain emergency procedures to follow in response to workplace accidents.
- 06.03 Create a disaster and/or emergency response plan. SHE2.0
- 07.0 Demonstrate proper use of tools, trestles, scaffolds and ladders--The student will be able to:
- 07.01 Erect scaffolds.
- 07.02 Use ladder.
- 07.03 Use measurement instruments and tools to determine dimensions.
- 07.04 Roughen undercoat with scratcher to provide bond.
- 08.0 Use information technology tools--The students will be able to:
- 08.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 08.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 08.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 08.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 09.0 Shape and apply molding and cornices--The student will be able to:
- 09.01 Strike excess plaster.
- 09.02 Apply plaster using trowel and push template over plaster.
- 09.03 Apply coat of plaster to wall and press trim to position.
- 09.04 Mold and install ornamental plaster panels and trim.
- 10.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 10.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 10.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1

- 10.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 10.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 11.0 Make molds--The student will be able to:
- 11.01 Shape plaster using template.
- 11.02 Spread plaster with trowel when installing ornamental trim.
- 12.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 12.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 12.02 Describe the effect of money management on personal and career goals. FL3.0
- 12.03 Develop a personal budget and financial goals. FL3.1
- 12.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 12.05 Maintain financial records. FL3.3
- 12.06 Read and reconcile financial statements. FL3.4
- 12.07 Research, compare and contrast investment opportunities.
- 13.0 Apply plaster--The student will be able to:
- 13.01 Apply scratch coat of plaster to metal or gypsum lath.
- 13.02 Apply brown coat of plaster to metal or gypsum lath.
- 13.03 Apply finish coat of plaster to metal or gypsum lath.
- 13.04 Spread plaster over lath or masonry base using trowel.
- 13.05 Apply plaster to interior walls.
- 13.06 Apply plaster to ceilings.
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 14.01 Describe the nature and types of business organizations. SY1.0
- 14.02 Explain the effect of key organizational systems on performance and quality.
- 14.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 14.04 Explain the impact of the global economy on business organizations.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 15.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 15.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 15.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 15.04 Employ mentoring skills to inspire and teach others. LT5.0
- 16.0 Align surfaces using plumb bob, straight edge and spirit level--The student will be able to:

- 16.01 Smooth plaster with Darby and float to attain uniform thickness.
- 16.02 Install fiber corner ties.
- 17.0 Create smooth finish surfaces--The student will be able to:
 - 17.01 Produce finished surfaces following instruction.
 - 17.02 Produce finished surfaces using hand tools and portable power tools.
- 18.0 Create decorative textures and special effects by spraying, brushing, troweling, stippling, or spattering small stones on surfaces--The student will be able to:
 - 18.01 Apply plaster with spray gun.
 - 18.02 Spatter surface with small stones to create decorative textures in finish.
 - 18.03 Mark surface of coat with brush and trowel to create decorative textures in finish.
 - 18.04 Produce textured finished surfaces following directions.
- 19.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
 - 19.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 19.02 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 19.03 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 19.04 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 19.05 Determine the correct purchase price, including sales tax for a materials list containing a minimum of six items.
 - 19.06 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 19.07 Demonstrate an understanding of federal, state and local taxes and their computation.
 - 19.08 Construct charts/tables/graphs using functions and data. AF3.5
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 20.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 21.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
 - 21.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 21.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 21.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 21.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 21.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 21.06 Identify and exhibit traits for retaining employment. ECD7.0

- 21.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 21.08 Research the benefits of ongoing professional development. ECD9.0
- 21.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plastering 1
Course Number: 8723610
Course Credit: 1

Course Description:

This course is designed to provide instruction in reading and interpreting blueprints and schematics, identify and use materials and finishes, use of tools, trestles, scaffolds and ladders, shape and apply molding and cornices.

- 01.0 Read and interpret blueprints and schematics--The student will be able to:
- 01.01 Identify building components using a blueprint.
 - 01.02 Recognize commonly used symbols on blueprints
 - 01.03 Produce finished surfaces in accordance to blueprints, or architect's drawings.
- 02.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 02.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 02.02 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 02.03 Draw conclusions or make inferences from data.
 - 02.04 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.
 - 02.05 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 02.06 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
 - 02.02 Demonstrate knowledge of the "Right-To-Know Law".
- 03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 03.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 03.02 Locate, organize and reference written information from various sources. CM3.0
 - 03.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 03.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 03.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 03.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 03.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 04.0 Identify and use materials and finishes--The student will be able to:

- 04.01 Mix mortar.
 - 04.02 Mix plaster to designated consistency.
 - 04.03 Install dryvit systems.
 - 04.04 Apply hardcoat and putty coat finishes.
- 05.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
 - 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 05.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 06.0 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:
- 06.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 06.02 Explain emergency procedures to follow in response to workplace accidents.
 - 06.03 Create a disaster and/or emergency response plan. SHE2.0
- 07.0 Demonstrate proper use of tools, trestles, scaffolds and ladders--The student will be able to:
- 07.01 Erect scaffolds.
 - 07.02 Use ladder.
 - 07.03 Use measurement instruments and tools to determine dimensions.
 - 07.04 Roughen undercoat with scratcher to provide bond.
- 08.0 Use information technology tools--The students will be able to:
- 08.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 08.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 08.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 08.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 09.0 Shape and apply molding and cornices--The student will be able to:
- 09.01 Strike excess plaster.
 - 09.02 Apply plaster using trowel and push template over plaster.
 - 09.03 Apply coat of plaster to wall and press trim to position.
 - 09.04 Mold and install ornamental plaster panels and trim.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Plastering 2**
Course Number: **8723620**
Course Credit: **1**

Course Description:

This course is designed to provide instruction in mold making, applying plaster, and aligning surfaces, creating smooth surfaces and creating decorative textures.

10.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- | | | |
|-------|---|--------|
| 10.01 | Evaluate and justify decisions based on ethical reasoning. | ELR1.0 |
| 10.02 | Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. | ELR1.1 |
| 10.03 | Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. | ELR1.2 |
| 10.04 | Interpret and explain written organizational policies and procedures. | ELR2.0 |

11.0 Make molds--The student will be able to:

- | | |
|-------|---|
| 11.01 | Shape plaster using template. |
| 11.02 | Spread plaster with trowel when installing ornamental trim. |

12.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- | | | |
|-------|--|-------|
| 12.01 | Identify and describe the services and legal responsibilities of financial institutions. | FL2.0 |
| 12.02 | Describe the effect of money management on personal and career goals. | FL3.0 |
| 12.03 | Develop a personal budget and financial goals. | FL3.1 |
| 12.04 | Complete financial instruments for making deposits and withdrawals. | FL3.2 |
| 12.05 | Maintain financial records. | FL3.3 |
| 12.06 | Read and reconcile financial statements. | FL3.4 |
| 12.07 | Research, compare and contrast investment opportunities. | |

13.0 Apply plaster--The student will be able to:

- | | |
|-------|--|
| 13.01 | Apply scratch coat of plaster to metal or gypsum lath. |
| 13.02 | Apply brown coat of plaster to metal or gypsum lath. |
| 13.03 | Apply finish coat of plaster to metal or gypsum lath. |
| 13.04 | Spread plaster over lath or masonry base using trowel. |
| 13.05 | Apply plaster to interior walls. |
| 13.06 | Apply plaster to ceilings. |

14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 14.05 Describe the nature and types of business organizations. SY1.0
 - 14.06 Explain the effect of key organizational systems on performance and quality.
 - 14.07 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 14.08 Explain the impact of the global economy on business organizations.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 15.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 15.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 15.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 15.04 Employ mentoring skills to inspire and teach others. LT5.0
- 16.0 Align surfaces using plumb bob, straight edge and spirit level--The student will be able to:
- 16.01 Smooth plaster with Darby and float to attain uniform thickness.
 - 16.02 Install fiber corner ties.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Plastering 3
Course Number: 8723630
Course Credit: 1

Course Description:

This course is designed to provide instruction in communication, math, science, employability skills and an understanding of entrepreneurship.

- 17.0 Create smooth finish surfaces--The student will be able to:
- 17.01 Produce finished surfaces following instruction.
 - 17.02 Produce finished surfaces using hand tools and portable power tools.
- 18.0 Create decorative textures and special effects by spraying, brushing, troweling, stippling, or spattering small stones on surfaces--The student will be able to:
- 18.01 Apply plaster with spray gun.
 - 18.02 Spatter surface with small stones to create decorative textures in finish.
 - 18.03 Mark surface of coat with brush and trowel to create decorative textures in finish.
 - 18.04 Produce textured finished surfaces following directions.
- 19.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 19.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 19.02 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 19.03 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 19.04 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 19.05 Determine the correct purchase price, including sales tax for a materials list containing a minimum of six items.
 - 19.06 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 19.07 Demonstrate an understanding of federal, state and local taxes and their computation.
 - 19.08 Construct charts/tables/graphs using functions and data. A 3.5
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 20.04 Conduct technical research to gather information necessary for decision-making. PS4.0

21.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 21.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 21.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 21.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 21.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 21.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 21.06 Identify and exhibit traits for retaining employment. ECD7.0
- 21.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 21.08 Research the benefits of ongoing professional development. ECD9.0
- 21.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

Secondary – Career Preparatory	
Program Number	8725000
CIP Number	0648010102
Grade Level	9-12, 30, 31
Standard Length	4 Credits
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters
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 the drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The four courses Drafting 1, 2, 3, 4, under the drafting program are considered core courses. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
	8725020	Drafting 2	1 Credit		2
	8725030	Drafting 3	1 Credit		3
B	8725040	Drafting 4	1 Credit	17-3011	3

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%

Course	Math			Science								
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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 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 (ESE) will need modifications to meet their special 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(s)/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. 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>).

Standards

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

- 01.0 Apply basic drafting skills
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.

- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

01.0 Apply basic drafting skills--The student will be able to:

- 01.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 01.02 Identify and use the various drafting media and techniques.
- 01.03 Demonstrate the use of the alphabet of lines.
- 01.04 Prepare title blocks and other drafting formats.
- 01.05 Use various freehand and other lettering techniques.
- 01.06 Prepare axonometric, oblique and perspective freehand sketches.
- 01.07 Prepare charts, graphs, and diagrams.
- 01.08 Apply geometric construction techniques.

02.0 Apply fundamental computer skills--The student will be able to:

- 02.01 Demonstrate care of equipment.
- 02.02 Operate a mouse, keyboard and digitizer as input devices.
- 02.03 Operate printers and plotters as output devices.
- 02.04 Demonstrate handling and operation of storage media.
- 02.05 Start and shut down a work station.
- 02.06 Adjust monitor controls for maximum comfort and usability.
- 02.07 Perform basic operating system functions.

- 02.08 Start and exit a software program as required.
- 02.09 Demonstrate file management techniques of copying and deleting.
- 02.10 Identify, create, and use directory structure and change directory paths.
- 02.11 Demonstrate file maintenance and backup procedures.
- 02.12 Format and save drawings to storage devices.

- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
 - 03.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences.AF2.9

- 04.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
 - 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.02 Solve arithmetic problems.
 - 04.03 Solve algebra problems.
 - 04.04 Solve right-angle trigonometric problems.
 - 04.05 Solve geometry problems.
 - 04.06 Apply multiple discipline calculations.
 - 04.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.08 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.10 Demonstrate an understanding of federal, state and local taxes and their computation

- 05.0 Prepare multi-view drawings--The student will be able to:
 - 05.01 Prepare multi-view freehand sketches.
 - 05.02 Select proper drawing scale, views and layout.
 - 05.03 Prepare drawings containing horizontal and vertical surfaces.
 - 05.04 Prepare drawings containing circles and/or arcs.
 - 05.05 Prepare drawings incorporating removed details and conventional breaks.

- 06.0 Prepare sectional views--The student will be able to:
 - 06.01 Prepare drawings containing full sections and half sections
 - 06.02 Prepare drawings containing offset sections.
 - 06.03 Prepare drawings containing revolved sections.
 - 06.04 Prepare drawings containing removed sections and broken-out sections.
 - 06.05 Prepare a sectional assembly drawing applying material symbols.

- 07.0 Prepare auxiliary drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

 - 07.01 Prepare drawings containing primary auxiliary views.

07.02 Prepare drawings containing auxiliary views that include curved lines.

08.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 08.02 Prepare drawings using metric dimensions.
- 08.03 Prepare drawings using general and local notes.
- 08.04 Apply basic tolerance techniques.

09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

10.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

11.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 11.01 Prepare isometric, oblique and other pictorial drawings.
- 11.02 Prepare one- and two-point perspectives.

12.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 12.02 Prepare developments of a transition piece.
- 12.03 Prepare drawings involving intersecting pieces.

13.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 13.01 Prepare site plan.
- 13.02 Prepare floor plan.
- 13.03 Prepare exterior elevations.
- 13.04 Prepare roof plan.

14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

15.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 15.01 Understand civil terminology.
- 15.02 Read and interpret civil drawings.
- 15.03 Prepare plan and profile drawings.
- 15.04 Develop topographic drawings.

16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 16.01 Identify electrical/electronic symbols.

16.02 Prepare schematic/block diagrams.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
 # Alignment attempted, but no correlation to academic course.

- 17.0 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:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
 SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 17.02 Explain emergency procedures to follow in response to workplace accidents.
 17.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
 18.02 Explain the effect of key organizational systems on performance and quality.
 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 18.04 Explain the impact of the global economy on business organizations.

- 19.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 19.01 Perform drawing set up.
- 19.02 Construct geometric figures of lines, splines, circles, and arcs.
- 19.03 Create and edit text using appropriate style and size to annotate drawings.
- 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 19.05 Identify, create, store and use standard part symbols and libraries.
- 19.06 Utilize editing commands.
- 19.07 Control entity properties by layer, color and line type.
- 19.08 Use viewing commands to perform zooming and panning.
- 19.09 Plot drawings on media using layout and scale.
- 19.10 Minimize file size.
- 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 19.12 Apply standard dimensioning rules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 20.02 Locate, organize and reference written information from various sources. CM3.0
- 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 20.05 Apply active listening skills to obtain and clarify information. CM7.0
- 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

21.0 Demonstrate applied math skills--The student will be able to:

- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Electronic Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8725100	I480115
CIP Number	0615130502	0615130502
Grade Level	9-12, 30, 31	30,31
Standard Length	8 Credits	1200 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters 17-3012 - Electrical and Electronics Drafters	17-3011 - Architectural and Civil Drafters 17-3012 - Electrical and Electronics Drafters
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	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the electronic drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

When offered at the postsecondary level, 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	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0671	Drafter, Electronics 1	300 Hours	17-3012.01
	TDR0672	Drafter, Electronics 2	300 Hours	

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
B	8725020	Drafting 2	1 Credit	17-3011	2
	8725030	Drafting 3	1 Credit		3
	8725040	Drafting 4	1 Credit		3
	8725110	Electronic Drafting 5	1 Credit		17-3012.01
8725120	Electronic Drafting 6	1 Credit	2		
8725130	Electronic Drafting 7	1 Credit	2		
8725140	Electronic Drafting 8	1 Credit	2		

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%
Electronic Drafting 5	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electronic Drafting 6	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electronic Drafting 7	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electronic Drafting 8	^^	^^	^^	**	**	**	**	**	**	**	**	**

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review

Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

(http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

For details on statewide 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. 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>).

Standards

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

- 01.0 Apply basic drafting skills.
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.

- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Demonstrate knowledge of electronic codes and specifications.
- 27.0 Prepare advanced electronic drawings 1.
- 28.0 Prepare advanced electronic drawings 2.
- 29.0 Prepare advanced computer aided drawings.

- 04.08 Construct charts/tables/graphs using functions and data. AF3.5
- 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.10 Demonstrate an understanding of federal, state and local taxes and their computation
- 05.0 Prepare multi-view drawings--The student will be able to:
- 05.01 Prepare multi-view freehand sketches.
- 05.02 Select proper drawing scale, views and layout.
- 05.03 Prepare drawings containing horizontal and vertical surfaces.
- 05.04 Prepare drawings containing circles and/or arcs.
- 05.05 Prepare drawings incorporating removed details and conventional breaks.
- 06.0 Prepare sectional views--The student will be able to:
- 06.01 Prepare drawings containing full sections and half sections
- 06.02 Prepare drawings containing offset sections.
- 06.03 Prepare drawings containing revolved sections.
- 06.04 Prepare drawings containing removed sections and broken-out sections.
- 06.05 Prepare a sectional assembly drawing applying material symbols.
- 07.0 Prepare auxiliary drawings--The student will be able to:
- 07.01 Prepare drawings containing primary auxiliary views.
- 07.02 Prepare drawings containing auxiliary views that include curved lines.
- 08.0 Apply basic dimensioning--The student will be able to:
- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 08.02 Prepare drawings using metric dimensions.
- 08.03 Prepare drawings using general and local notes.
- 08.04 Apply basic tolerancing techniques.
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: TDR0370**Occupational Completion Point: B****Drafting Assistant – 450 Hours – SOC Code 17-3011**

- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0

- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Prepare pictorial drawings--The student will be able to:
 11.01 Prepare isometric, oblique and other pictorial drawings.
 11.02 Prepare one- and two-point perspectives.
- 12.0 Prepare surface developments--The student will be able to:
 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
 12.02 Prepare developments of a transition piece.
 12.03 Prepare drawings involving intersecting pieces.
- 13.0 Prepare basic architectural drawings--The student will be able to:
 13.01 Prepare site plan.
 13.02 Prepare floor plan.
 13.03 Prepare exterior elevations.
 13.04 Prepare roof plan.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 14.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 15.0 Demonstrate an understanding of basic civil drawings--The student will be able to:
 15.01 Understand civil terminology.
 15.02 Read and interpret civil drawings.
 15.03 Prepare plan and profile drawings.
 15.04 Develop topographic drawings.
- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
 16.01 Identify electrical/electronic symbols.
 16.02 Prepare schematic/block diagrams.
- 17.0 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:
 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 17.02 Explain emergency procedures to follow in response to workplace accidents.
 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 17.01 Describe the nature and types of business organizations. SY1.0
 17.02 Explain the effect of key organizational systems on performance and quality.
 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 17.04 Explain the impact of the global economy on business organizations.

- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
 - 19.02 Construct geometric figures of lines, splines, circles, and arcs.
 - 19.03 Create and edit text using appropriate style and size to annotate drawings.
 - 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
 - 19.05 Identify, create, store and use standard part symbols and libraries.
 - 19.06 Utilize editing commands.
 - 19.07 Control entity properties by layer, color and line type.
 - 19.08 Use viewing commands to perform zooming and panning.
 - 19.09 Plot drawings on media using layout and scale.
 - 19.10 Minimize file size.
 - 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
 - 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 20.02 Locate, organize and reference written information from various sources. CM3.0
 - 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 20.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 21.02 Describe the effect of money management on personal and career goals. FL3.0
 - 21.03 Develop a personal budget and financial goals. FL3.1
 - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 21.05 Maintain financial records. FL3.3
 - 21.06 Read and reconcile financial statements. FL3.4

- 21.07 Research, compare and contrast investment opportunities.
- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 22.04 Employ mentoring skills to inspire and teach others. LT5.0
- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0671

Occupational Completion Point:

Drafter, Electronics 1 – 300 Hours – SOC Code 17-3012

- 26.0 Demonstrate knowledge of electronic codes and specifications--The student will be able to:
- 26.01 Use National Electronic Code Standards in preparing drawings.
 - 26.02 Apply state electric codes to drawing specifications.
 - 26.03 Apply local electric codes to drawing specifications.
- 27.0 Prepare advanced electronic drawings 1--The student will be able to:
- 27.01 Identify electronic device symbols.
 - 27.02 Prepare schematic drawings.
 - 27.03 Prepare printed circuit board drawings.
 - 27.04 Prepare package drawings.
 - 27.05 Prepare connection drawings.
 - 27.06 Prepare interconnection drawings.
- 28.0 Prepare advanced electronic drawings 2--The student will be able to:
- 28.01 Prepare wiring lists.
 - 28.02 Prepare cable drawings.
 - 28.03 Prepare harness drawings.
 - 28.04 Prepare component drawings.
 - 28.05 Prepare logic diagrams.
 - 28.06 Design an electromechanical unit.

Course Number: TDR0672
Occupational Completion Point: C
Drafter, Electronics 2 – 300 Hours – SOC Code 17-3012

- 29.0 Prepare advanced computer aided drawings--The student will be able to:
- 29.01 Prepare schematic drawings.
 - 29.02 Prepare electrical drawings.
 - 29.03 Prepare electronic drawings.
 - 29.04 Prepare electromechanical drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

02.0 Apply basic drafting skills--The student will be able to:

- 02.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 02.02 Identify and use the various drafting media and techniques.
- 02.03 Demonstrate the use of the alphabet of lines.
- 02.04 Prepare title blocks and other drafting formats.
- 02.05 Use various freehand and other lettering techniques.
- 02.06 Prepare axonometric, oblique and perspective freehand sketches.
- 02.07 Prepare charts, graphs, and diagrams.
- 02.08 Apply geometric construction techniques.

03.0 Apply fundamental computer skills--The student will be able to:

- 03.01 Demonstrate care of equipment.
- 03.02 Operate a mouse, keyboard and digitizer as input devices.
- 03.03 Operate printers and plotters as output devices.
- 03.04 Demonstrate handling and operation of storage media.
- 03.05 Start and shut down a work station.
- 03.06 Adjust monitor controls for maximum comfort and usability.
- 03.07 Perform basic operating system functions.

- 03.08 Start and exit a software program as required.
 - 03.09 Demonstrate file management techniques of copying and deleting.
 - 03.10 Identify, create, and use directory structure and change directory paths.
 - 03.11 Demonstrate file maintenance and backup procedures.
 - 03.12 Format and save drawings to storage devices.
- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 03.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.08 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.09 Solve arithmetic problems.
 - 04.10 Solve algebra problems.
 - 04.11 Solve right-angle trigonometric problems.
 - 04.12 Solve geometry problems.
 - 04.13 Apply multiple discipline calculations.
 - 04.14 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.10 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.11 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.11 Demonstrate an understanding of federal, state and local taxes and their computation
- 10.0 Prepare multi-view drawings--The student will be able to:
- 10.01 Prepare multi-view freehand sketches.
 - 10.02 Select proper drawing scale, views and layout.
 - 10.03 Prepare drawings containing horizontal and vertical surfaces.
 - 10.04 Prepare drawings containing circles and/or arcs.
 - 10.05 Prepare drawings incorporating removed details and conventional breaks.
- 11.0 Prepare sectional views--The student will be able to:
- 11.01 Prepare drawings containing full sections and half sections
 - 11.02 Prepare drawings containing offset sections.
 - 11.03 Prepare drawings containing revolved sections.
 - 11.04 Prepare drawings containing removed sections and broken-out sections.
 - 11.05 Prepare a sectional assembly drawing applying material symbols.
- 12.0 Prepare auxiliary drawings--The student will be able to:
- This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5
- 12.01 Prepare drawings containing primary auxiliary views.

12.02 Prepare drawings containing auxiliary views that include curved lines.

13.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 13.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 13.02 Prepare drawings using metric dimensions.
- 13.03 Prepare drawings using general and local notes.
- 13.04 Apply basic tolerance techniques.

14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

11.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 14.01 Prepare isometric, oblique and other pictorial drawings.
- 14.02 Prepare one- and two-point perspectives.

15.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 15.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 15.02 Prepare developments of a transition piece.
- 15.03 Prepare drawings involving intersecting pieces.

16.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 16.01 Prepare site plan.
- 16.02 Prepare floor plan.
- 16.03 Prepare exterior elevations.
- 16.04 Prepare roof plan.

15.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

17.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 17.01 Understand civil terminology.
- 17.02 Read and interpret civil drawings.
- 17.03 Prepare plan and profile drawings.
- 17.04 Develop topographic drawings.

18.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 18.01 Identify electrical/electronic symbols.

18.02 Prepare schematic/block diagrams.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
 # Alignment attempted, but no correlation to academic course.

- 18.0 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:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
 SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 18.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 18.02 Explain emergency procedures to follow in response to workplace accidents.
 18.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
 18.02 Explain the effect of key organizational systems on performance and quality.
 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 18.04 Explain the impact of the global economy on business organizations.

- 20.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 20.01 Perform drawing set up.
- 20.02 Construct geometric figures of lines, splines, circles, and arcs.
- 20.03 Create and edit text using appropriate style and size to annotate drawings.
- 20.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 20.05 Identify, create, store and use standard part symbols and libraries.
- 20.06 Utilize editing commands.
- 20.07 Control entity properties by layer, color and line type.
- 20.08 Use viewing commands to perform zooming and panning.
- 20.09 Plot drawings on media using layout and scale.
- 20.10 Minimize file size.
- 20.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 20.12 Apply standard dimensioning rules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

21.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 21.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 21.02 Locate, organize and reference written information from various sources. CM3.0
- 21.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 21.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 21.05 Apply active listening skills to obtain and clarify information. CM7.0
- 21.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 21.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

23.0 Demonstrate applied math skills--The student will be able to:

- 23.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 23.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Electronic Drafting 5**
Course Number: **8725110**
Course Credit: **1**

Course Description:

This course is designed to provide instruction in various drafting related skills listed.

26.0 Demonstrate knowledge of electronic codes and specifications--The student will be able to:

- 26.01 Use National Electric Code Standards in preparing drawings.
- 26.02 Apply state electric codes to drawing specifications.
- 26.03 Apply local electric codes to drawing specifications.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electronic Drafting 6
Course Number: 8725120
Course Credit: 1

Course Description:

This course is designed to provide instruction in various drafting related skills listed.

27.0 Prepare advanced electronic drawings 1--The student will be able to:

- 27.01 Identify electronic device symbols.
- 27.02 Prepare schematic drawings.
- 27.03 Prepare printed circuit board drawings.
- 27.04 Prepare package drawings.
- 27.05 Prepare connection drawings.
- 27.06 Prepare interconnection drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electronic Drafting 7
Course Number: 8725130
Course Credit: 1

Course Description:

This course is designed to provide instruction in various drafting related skills listed.

28.0 Prepare advanced electronic drawings 2--The student will be able to:

- 28.01 Prepare wiring lists.
- 28.02 Prepare cable drawings.
- 28.03 Prepare harness drawings.
- 28.04 Prepare component drawings.
- 28.05 Prepare logic diagrams.
- 28.06 Design an electromechanical unit.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electronic Drafting 8
Course Number: 8725140
Course Credit: 1

Course Description:

This course is designed to provide instruction in various drafting related skills listed

29.0 Prepare advanced computer aided drawings--The student will be able to:

- 29.01 Prepare schematic drawings.
- 29.02 Prepare electrical drawings.
- 29.03 Prepare electronic drawings.
- 29.04 Prepare electromechanical drawings

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Electrical Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8725200	I480114
CIP Number	0615130501	0615130501
Grade Level	9-12, 30, 31	30,31
Standard Length	8 Credits	1200 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters 17-3012 - Electrical and Electronics Drafters	17-3011 - Architectural and Civil Drafters 17-3012 - Electrical and Electronics Drafters
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	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the electrical drafting industry

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

When offered at the postsecondary level, 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	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0661	Drafter, Electrical 1	300 Hours	17-3012
	TDR0662	Drafter, Electrical 2	300 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
	8725020	Drafting 2	1 Credit		2
B	8725030	Drafting 3	1 Credit	17-3011	3
	8725040	Drafting 4	1 Credit		3
	8725210	Electrical Drafting 5	1 Credit		2
C	8725220	Electrical Drafting 6	1 Credit	17-3012	2
	8725230	Electrical Drafting 7	1 Credit		2
	8725240	Electrical Drafting 8	1 Credit		2
					2

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%
Electrical Drafting 5	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electrical Drafting 6	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electrical Drafting 7	^^	^^	^^	**	**	**	**	**	**	**	**	**
Electrical Drafting 8	^^	^^	^^	**	**	**	**	**	**	**	**	**

** Alignment pending

Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

(http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

For details on statewide 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. 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>).

Standards

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

- 01.0 Apply basic drafting skills
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.

- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Demonstrate knowledge of electrical codes and specifications.
- 27.0 Prepare electrical drawings.
- 28.0 Prepare advanced electrical drawings.
- 29.0 Prepare advanced computer aided drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Electrical Drafting
PSAV Number: I480114

Course Number: TDR0070
Occupational Completion Point: A
Blueprint Reader – 150 Hours – SOC Code 17-3011

- 01.0 Apply basic drafting skills--The student will be able to:
- 01.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
 - 01.02 Identify and use the various drafting media and techniques.
 - 01.03 Demonstrate the use of the alphabet of lines.
 - 01.04 Prepare title blocks and other drafting formats.
 - 01.05 Use various freehand and other lettering techniques.
 - 01.06 Prepare axonometric, oblique and perspective freehand sketches.
 - 01.07 Prepare charts, graphs, and diagrams.
 - 01.08 Apply geometric construction techniques.
- 02.0 Apply fundamental computer skills--The student will be able to:
- 02.01 Demonstrate care of equipment.
 - 02.02 Operate a mouse, keyboard and digitizer as input devices.
 - 02.03 Operate printers and plotters as output devices.
 - 02.04 Demonstrate handling and operation of storage media.
 - 02.05 Start and shut down a work station.
 - 02.06 Adjust monitor controls for maximum comfort and usability.
 - 02.07 Perform basic operating system functions.
 - 02.08 Start and exit a software program as required.
 - 02.09 Demonstrate file management techniques of copying and deleting.
 - 02.10 Identify, create, and use directory structure and change directory paths.
 - 02.11 Demonstrate file maintenance and backup procedures.
 - 02.12 Format and save drawings to storage devices.
- 02.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 02.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 02.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 02.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 04.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.02 Solve arithmetic problems.
 - 04.03 Solve algebra problems.
 - 04.04 Solve right-angle trigonometric problems.
 - 04.05 Solve geometry problems.
 - 04.06 Apply multiple discipline calculations.
 - 04.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

- 04.08 Construct charts/tables/graphs using functions and data. AF3.5
- 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.10 Demonstrate an understanding of federal, state and local taxes and their computation
- 05.0 Prepare multi-view drawings--The student will be able to:
- 05.01 Prepare multi-view freehand sketches.
- 05.02 Select proper drawing scale, views and layout.
- 05.03 Prepare drawings containing horizontal and vertical surfaces.
- 05.04 Prepare drawings containing circles and/or arcs.
- 05.05 Prepare drawings incorporating removed details and conventional breaks.
- 06.0 Prepare sectional views--The student will be able to:
- 06.01 Prepare drawings containing full sections and half sections
- 06.02 Prepare drawings containing offset sections.
- 06.03 Prepare drawings containing revolved sections.
- 06.04 Prepare drawings containing removed sections and broken-out sections.
- 06.05 Prepare a sectional assembly drawing applying material symbols.
- 07.0 Prepare auxiliary drawings--The student will be able to:
- 07.01 Prepare drawings containing primary auxiliary views.
- 07.02 Prepare drawings containing auxiliary views that include curved lines.
- 08.0 Apply basic dimensioning--The student will be able to:
- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 08.02 Prepare drawings using metric dimensions.
- 08.03 Prepare drawings using general and local notes.
- 08.04 Apply basic tolerancing techniques.
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: TDR0370
Occupational Completion Point: B
Drafting Assistant – 450 Hours – SOC Code 17-3011

- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0

- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Prepare pictorial drawings--The student will be able to:
 11.01 Prepare isometric, oblique and other pictorial drawings.
 11.02 Prepare one- and two-point perspectives.
- 12.0 Prepare surface developments--The student will be able to:
 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
 12.02 Prepare developments of a transition piece.
 12.03 Prepare drawings involving intersecting pieces.
- 13.0 Prepare basic architectural drawings--The student will be able to:
 13.01 Prepare site plan.
 13.02 Prepare floor plan.
 13.03 Prepare exterior elevations.
 13.04 Prepare roof plan.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Demonstrate understanding of basic civil drawings--The student will be able to:
 15.01 Understand civil terminology.
 15.02 Read and interpret civil drawings.
 15.03 Prepare plan and profile drawings.
 15.04 Develop topographic drawings.
- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
 16.01 Identify electrical/electronic symbols.
 16.02 Prepare schematic/block diagrams.
- 17.0 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:
 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 17.02 Explain emergency procedures to follow in response to workplace accidents.
 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 17.01 Describe the nature and types of business organizations. SY1.0
 17.02 Explain the effect of key organizational systems on performance and quality.
 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 17.04 Explain the impact of the global economy on business organizations.

- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
 - 19.02 Construct geometric figures of lines, splines, circles, and arcs.
 - 19.03 Create and edit text using appropriate style and size to annotate drawings.
 - 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
 - 19.05 Identify, create, store and use standard part symbols and libraries.
 - 19.06 Utilize editing commands.
 - 19.07 Control entity properties by layer, color and line type.
 - 19.08 Use viewing commands to perform zooming and panning.
 - 19.09 Plot drawings on media using layout and scale.
 - 19.10 Minimize file size.
 - 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
 - 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 20.02 Locate, organize and reference written information from various sources. CM3.0
 - 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 20.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 21.02 Describe the effect of money management on personal and career goals. FL3.0
 - 21.03 Develop a personal budget and financial goals. FL3.1
 - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 21.05 Maintain financial records. FL3.3
 - 21.06 Read and reconcile financial statements. FL3.4

- 21.07 Research, compare and contrast investment opportunities.
- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 22.04 Employ mentoring skills to inspire and teach others. LT5.0
- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0661

Occupational Completion Point:

Drafter, Electrical 1 – 300 Hours – SOC Code 17-3012

- 26.0 Demonstrate knowledge of electric codes and specifications--The student will be able to:
- 26.01 Use National Electric Code Standards in preparing drawings.
 - 26.02 Apply state electric codes to drawing specifications.
 - 26.03 Apply local electric codes to drawing specifications.
- 27.0 Prepare electrical drawings --The student will be able to:
- 27.01 Apply the basic theory of electricity.
 - 27.02 Apply the basic theory of circuitry.
 - 27.03 Use electrical symbols.
 - 27.04 Prepare single-line block diagrams.
 - 27.05 Prepare a panel board schedule.
- 28.0 Prepare advanced electrical drawings --The student will be able to:
- 28.01 Prepare advanced single-line block diagrams.
 - 28.02 Prepare advanced panel board Schedule.

Course Number: TDR0662

Occupational Completion Point: C

Drafter, Electrical 2 – 300 Hours – SOC Code 17-3012

- 29.0 Prepare advanced computer aided drawings--The student will be able to:
- 29.01 Prepare schematic drawings.

- 29.02 Prepare electrical drawings.
- 29.03 Prepare electronic drawings.
- 29.04 Prepare electromechanical drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

02.0 Apply basic drafting skills--The student will be able to:

- 02.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 02.02 Identify and use the various drafting media and techniques.
- 02.03 Demonstrate the use of the alphabet of lines.
- 02.04 Prepare title blocks and other drafting formats.
- 02.05 Use various freehand and other lettering techniques.
- 02.06 Prepare axonometric, oblique and perspective freehand sketches.
- 02.07 Prepare charts, graphs, and diagrams.
- 02.08 Apply geometric construction techniques.

03.0 Apply fundamental computer skills--The student will be able to:

- 03.01 Demonstrate care of equipment.
- 03.02 Operate a mouse, keyboard and digitizer as input devices.
- 03.03 Operate printers and plotters as output devices.
- 03.04 Demonstrate handling and operation of storage media.
- 03.05 Start and shut down a work station.
- 03.06 Adjust monitor controls for maximum comfort and usability.

- 03.07 Perform basic operating system functions.
- 03.08 Start and exit a software program as required.
- 03.09 Demonstrate file management techniques of copying and deleting.
- 03.10 Identify, create, and use directory structure and change directory paths.
- 03.11 Demonstrate file maintenance and backup procedures.
- 03.12 Format and save drawings to storage devices.

03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0

- 03.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 03.03 Present information formally and informally for specific purposes and audiences. AF2.9

05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 04.08 Demonstrate knowledge of arithmetic operations. AF3.2
- 04.09 Solve arithmetic problems.
- 04.10 Solve algebra problems.
- 04.11 Solve right-angle trigonometric problems.
- 04.12 Solve geometry problems.
- 04.13 Apply multiple discipline calculations.
- 04.14 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 04.10 Construct charts/tables/graphs using functions and data. AF3.5
- 04.11 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.11 Demonstrate an understanding of federal, state and local taxes and their computation

10.0 Prepare multi-view drawings--The student will be able to:

- 10.01 Prepare multi-view freehand sketches.
- 10.02 Select proper drawing scale, views and layout.
- 10.03 Prepare drawings containing horizontal and vertical surfaces.
- 10.04 Prepare drawings containing circles and/or arcs.
- 10.05 Prepare drawings incorporating removed details and conventional breaks.

11.0 Prepare sectional views--The student will be able to:

- 11.01 Prepare drawings containing full sections and half sections
- 11.02 Prepare drawings containing offset sections.
- 11.03 Prepare drawings containing revolved sections.
- 11.04 Prepare drawings containing removed sections and broken-out sections.
- 11.05 Prepare a sectional assembly drawing applying material symbols.

12.0 Prepare auxiliary drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 12.01 Prepare drawings containing primary auxiliary views.
- 12.02 Prepare drawings containing auxiliary views that include curved lines.

13.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 13.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 13.02 Prepare drawings using metric dimensions.
- 13.03 Prepare drawings using general and local notes.
- 13.04 Apply basic tolerance techniques.

14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

11.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 14.01 Prepare isometric, oblique and other pictorial drawings.
- 14.02 Prepare one- and two-point perspectives.

15.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 15.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 15.02 Prepare developments of a transition piece.
- 15.03 Prepare drawings involving intersecting pieces.

16.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 16.01 Prepare site plan.
- 16.02 Prepare floor plan.
- 16.03 Prepare exterior elevations.
- 16.04 Prepare roof plan.

15.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

17.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 17.01 Understand civil terminology.
- 17.02 Read and interpret civil drawings.
- 17.03 Prepare plan and profile drawings.
- 17.04 Develop topographic drawings.

18.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 18.01 Identify electrical/electronic symbols.

18.02 Prepare schematic/block diagrams.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
Alignment attempted, but no correlation to academic course.

- 18.0 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:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 18.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
18.02 Explain emergency procedures to follow in response to workplace accidents.
18.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
18.02 Explain the effect of key organizational systems on performance and quality.
18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
18.04 Explain the impact of the global economy on business organizations.

- 20.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 20.01 Perform drawing set up.
- 20.02 Construct geometric figures of lines, splines, circles, and arcs.
- 20.03 Create and edit text using appropriate style and size to annotate drawings.
- 20.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 20.05 Identify, create, store and use standard part symbols and libraries.
- 20.06 Utilize editing commands.
- 20.07 Control entity properties by layer, color and line type.
- 20.08 Use viewing commands to perform zooming and panning.
- 20.09 Plot drawings on media using layout and scale.
- 20.10 Minimize file size.
- 20.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 20.12 Apply standard dimensioning rules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

21.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 21.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 21.02 Locate, organize and reference written information from various sources. CM3.0
- 21.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 21.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 21.05 Apply active listening skills to obtain and clarify information. CM7.0
- 21.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 21.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

23.0 Demonstrate applied math skills--The student will be able to:

- 23.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 23.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electrical Drafting 5
Course Number: 8725210
Course Credit: 1

Course Description:

This course is designed to provide instruction in electronic codes and specifications.

26.0 Demonstrate knowledge of electric codes and specifications--The student will be able to:

- 26.01 Use National Electric Code Standards in preparing drawings.
- 26.02 Apply state electric codes to drawing specifications.
- 26.03 Apply local electric codes to drawing specifications.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electrical Drafting 6
Course Number: 8725220
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing electrical drawing.

27.0 Prepare electrical drawings--The student will be able to:

- 27.01 Apply the basic theory of electricity.
- 27.02 Apply the basic theory of circuitry.
- 27.03 Use electrical symbols.
- 27.04 Prepare single-line block diagrams.
- 27.05 Prepare a panel board schedule.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electrical Drafting 7
Course Number: 8725230
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing electrical drawing.

28.0 Prepare advanced electrical drawings--The student will be able to:

- 28.01 Apply the basic theory of electricity.
- 28.02 Apply the basic theory of circuitry.
- 28.03 Use electrical symbols.
- 28.04 Prepare advanced single-line block diagrams.
- 28.05 Prepare advanced panel board schedule.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electrical Drafting 8
Course Number: 8725240
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing advanced computer aided drawing.

29.0 Prepare advanced computer aided drawings--The student will be able to:

- 29.01 Prepare schematic drawings.
- 29.02 Prepare electrical drawings.
- 29.03 Prepare electronic drawings.
- 29.04 Prepare electromechanical drawings.

2013 - 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Mechanical Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8725300	I480116
CIP Number	0615130601	0615130601
Grade Level	9-12, 30, 31	30,31
Standard Length	13 Credits	1900 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters 17-3013 - Mechanical Drafters	17-3011 - Architectural and Civil Drafters 17-3013 - Mechanical Drafters
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	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the mechanical drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

When offered at the postsecondary level, 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	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0770	Drafting Detailer	200 Hours	17-3013
D	TDR0771	Mechanical CAD Drafter 1	250 Hours	17-3013
	TDR0772	Mechanical CAD Drafter 2	250 Hours	
E	TDR0773	Drafter, Mechanical 1	300 Hours	17-3013
	TDR0774	Drafter, Mechanical 2	300 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
	8725020	Drafting 2	1 Credit		2
	8725030	Drafting 3	1 Credit		3
	8725040	Drafting 4	1 Credit		3
C	8725310	Mechanical Drafting 5	1 Credit	17-3013	2
	8725320	Mechanical Drafting 6	1 Credit		2
D	8725330	Mechanical Drafting 7	1 Credit	17-3013	2
	8725340	Mechanical Drafting 8	1 Credit		2
	8725350	Mechanical Drafting 9	1 Credit		2
E	8725360	Mechanical Drafting 10	1 Credit	17-3013	2
	8725370	Mechanical Drafting 11	1 Credit		2
	8725380	Mechanical Drafting 12	1 Credit		2
	8725390	Mechanical Drafting 13	1 Credit		2

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%
Mechanical Drafting 5	^^	^^	^^	**	**	**	**	**	**	**	**	**
Mechanical Drafting 6	^^	^^	^^	**	**	**	**	**	**	**	**	**
Mechanical Drafting 7	^^	^^	^^	**	**	**	**	**	**	**	**	**
Mechanical Drafting 8	^^	^^	^^	**	**	**	**	**	**	**	**	**
Mechanical Drafting 9	^^	^^	^^	**	**	**	**	**	**	**	**	**

Course	Math			Science									
Mechanical Drafting 10	^^	^^	^^	**	**	**	**	**	**	**	**	**	**
Mechanical Drafting 11	^^	^^	^^	**	**	**	**	**	**	**	**	**	**
Mechanical Drafting 12	^^	^^	^^	**	**	**	**	**	**	**	**	**	**
Mechanical Drafting 13	^^	^^	^^	**	**	**	**	**	**	**	**	**	**

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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. 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>).

Standards

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

- 01.0 Apply basic drafting skills.
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Prepare advanced mechanical drawings
- 27.0 Prepare production drawings.
- 28.0 Prepare basic pneumatic/hydraulic drawings.
- 29.0 Prepare tool drawings.
- 30.0 Prepare advanced computer aided drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Mechanical Drafting
PSAV Number: I480116

Course Number: TDR0070
Occupational Completion Point: A
Blueprint Reader – 150 Hours – SOC Code 17-3011

- 01.0 Apply basic drafting skills--The student will be able to:
- 01.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
 - 01.02 Identify and use the various drafting media and techniques.
 - 01.03 Demonstrate the use of the alphabet of lines.
 - 01.04 Prepare title blocks and other drafting formats.
 - 01.05 Use various freehand and other lettering techniques.
 - 01.06 Prepare axonometric, oblique and perspective freehand sketches.
 - 01.07 Prepare charts, graphs, and diagrams.
 - 01.08 Apply geometric construction techniques.
- 02.0 Apply fundamental computer skills--The student will be able to:
- 02.01 Demonstrate care of equipment.
 - 02.02 Operate a mouse, keyboard and digitizer as input devices.
 - 02.03 Operate printers and plotters as output devices.
 - 02.04 Demonstrate handling and operation of storage media.
 - 02.05 Start and shut down a work station.
 - 02.06 Adjust monitor controls for maximum comfort and usability.
 - 02.07 Perform basic operating system functions.
 - 02.08 Start and exit a software program as required.
 - 02.09 Demonstrate file management techniques of copying and deleting.
 - 02.10 Identify, create, and use directory structure and change directory paths.
 - 02.11 Demonstrate file maintenance and backup procedures.
 - 02.12 Format and save drawings to storage devices.
- 02.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 02.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 02.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 02.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 04.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.02 Solve arithmetic problems.
 - 04.03 Solve algebra problems.
 - 04.04 Solve right-angle trigonometric problems.
 - 04.05 Solve geometry problems.
 - 04.06 Apply multiple discipline calculations.
 - 04.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

- 04.08 Construct charts/tables/graphs using functions and data. AF3.5
- 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.10 Demonstrate an understanding of federal, state and local taxes and their computation.
- 05.0 Prepare multi-view drawings--The student will be able to:
- 05.01 Prepare multi-view freehand sketches.
- 05.02 Select proper drawing scale, views and layout.
- 05.03 Prepare drawings containing horizontal and vertical surfaces.
- 05.04 Prepare drawings containing circles and/or arcs.
- 05.05 Prepare drawings incorporating removed details and conventional breaks.
- 06.0 Prepare sectional views--The student will be able to:
- 06.01 Prepare drawings containing full sections and half sections
- 06.02 Prepare drawings containing offset sections.
- 06.03 Prepare drawings containing revolved sections.
- 06.04 Prepare drawings containing removed sections and broken-out sections.
- 06.05 Prepare a sectional assembly drawing applying material symbols.
- 07.0 Prepare auxiliary drawings--The student will be able to:
- 07.01 Prepare drawings containing primary auxiliary views.
- 07.02 Prepare drawings containing auxiliary views that include curved lines.
- 08.0 Apply basic dimensioning--The student will be able to:
- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 08.02 Prepare drawings using metric dimensions.
- 08.03 Prepare drawings using general and local notes.
- 08.04 Apply basic tolerancing techniques.
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: TDR0370
Occupational Completion Point: B
Drafting Assistant – 450 Hours – SOC Code 17-3011

- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0

- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Prepare pictorial drawings--The student will be able to:
 11.01 Prepare isometric, oblique and other pictorial drawings.
 11.02 Prepare one- and two-point perspectives.
- 12.0 Prepare surface developments--The student will be able to:
 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
 12.02 Prepare developments of a transition piece.
 12.03 Prepare drawings involving intersecting pieces.
- 13.0 Prepare basic architectural drawings--The student will be able to:
 13.01 Prepare site plan.
 13.02 Prepare floor plan.
 13.03 Prepare exterior elevations.
 13.04 Prepare roof plan.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Demonstrate understanding of basic civil drawings--The student will be able to:
 15.01 Understand civil terminology.
 15.02 Read and interpret civil drawings.
 15.03 Prepare plan and profile drawings.
 15.04 Develop topographic drawings.
- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
 16.01 Identify electrical/electronic symbols.
 16.02 Prepare schematic/block diagrams.
- 17.0 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:
 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 17.02 Explain emergency procedures to follow in response to workplace accidents.
 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 17.01 Describe the nature and types of business organizations. SY1.0
 17.02 Explain the effect of key organizational systems on performance and quality.
 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 17.04 Explain the impact of the global economy on business organizations.

- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
 - 19.02 Construct geometric figures of lines, splines, circles, and arcs.
 - 19.03 Create and edit text using appropriate style and size to annotate drawings.
 - 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
 - 19.05 Identify, create, store and use standard part symbols and libraries.
 - 19.06 Utilize editing commands.
 - 19.07 Control entity properties by layer, color and line type.
 - 19.08 Use viewing commands to perform zooming and panning.
 - 19.09 Plot drawings on media using layout and scale.
 - 19.10 Minimize file size.
 - 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
 - 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 20.02 Locate, organize and reference written information from various sources. CM3.0
 - 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 20.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 21.02 Describe the effect of money management on personal and career goals. FL3.0
 - 21.03 Develop a personal budget and financial goals. FL3.1
 - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 21.05 Maintain financial records. FL3.3
 - 21.06 Read and reconcile financial statements. FL3.4

- 21.07 Research, compare and contrast investment opportunities.
- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 22.04 Employ mentoring skills to inspire and teach others. LT5.0
- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0770
Occupational Completion Point: C
Drafting Detailer – 200 Hours – SOC Code 17-3013

- 28.0 Prepare pneumatic/hydraulic drawings--The student will be able to.
- 28.01 Prepare piping drawings.
 - 28.02 Prepare pictorial drawings.
 - 28.03 Prepare sectional drawings.
 - 28.04 Prepare diagrams.

Course Number: TDR0771
Occupational Completion Point:
Mechanical CAD Drafter 1 – 250 Hours – SOC Code 17-3013

- 30.0 Prepare advanced computer aided drawings--The student will be able to.
- 30.01 Prepare advanced mechanical drawings.
 - 30.02 Prepare production drawings.

Course Number: TDR0772
Occupational Completion Point: D
Mechanical CAD Drafter 2 – 250 Hours – SOC Code 17-3013

- 30.0 Prepare advanced computer aided drawings--The student will be able to.
- 30.03 Prepare tool drawings.
 - 30.04 Prepare pneumatic/hydraulic drawings.

Course Number: TDR0773
Occupational Completion Point:
Mechanical Drafter 1 – 300 Hours – SOC Code 17-3013

- 26.0 Prepare advanced mechanical drawings--The student will be able to.
 - 26.01 Resolve problems by descriptive geometry and revolutions.
 - 26.02 Prepare advance surface drawings.
 - 26.03 Identify the various manufacturing methods.
 - 26.04 Use precision dimensioning to include geometric characters.
 - 26.05 Make engineering changes on drawings.
 - 26.06 Prepare fastener drawings.
 - 26.07 Prepare cam calculations and drawings.
 - 26.08 Prepare gear calculations.
 - 26.09 Prepare spring calculations and drawings.

Course Number: TDR0774
Occupational Completion Point: E
Mechanical Drafter 2 – 300 Hours – SOC Code 17-3013

- 27.0 Prepare production drawings--The student will be able to.
 - 27.01 Make a design layout drawing.
 - 27.02 Make detail drawings.
 - 27.03 Make pattern shop detail drawings.
 - 27.04 Make casting drawings.
 - 27.05 Make forging detail drawings.
 - 27.06 Make machining detail drawings.
 - 27.07 Make stamping drawings.
 - 27.08 Make welding drawings.
 - 27.09 Make assembly drawings.
 - 27.10 Prepare installation drawings.

- 29.0 Prepare tool drawings--The student will be able to.
 - 29.01 Design jigs and fixtures.
 - 29.02 Design cutting dies.
 - 29.03 Design forming dies.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

02.0 Apply basic drafting skills--The student will be able to:

- 02.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 02.02 Identify and use the various drafting media and techniques.
- 02.03 Demonstrate the use of the alphabet of lines.
- 02.04 Prepare title blocks and other drafting formats.
- 02.05 Use various freehand and other lettering techniques.
- 02.06 Prepare axonometric, oblique and perspective freehand sketches.
- 02.07 Prepare charts, graphs, and diagrams.
- 02.08 Apply geometric construction techniques.

03.0 Apply fundamental computer skills--The student will be able to:

- 03.01 Demonstrate care of equipment.
- 03.02 Operate a mouse, keyboard and digitizer as input devices.
- 03.03 Operate printers and plotters as output devices.
- 03.04 Demonstrate handling and operation of storage media.
- 03.05 Start and shut down a work station.
- 03.06 Adjust monitor controls for maximum comfort and usability.
- 03.07 Perform basic operating system functions.

- 03.08 Start and exit a software program as required.
 - 03.09 Demonstrate file management techniques of copying and deleting.
 - 03.10 Identify, create, and use directory structure and change directory paths.
 - 03.11 Demonstrate file maintenance and backup procedures.
 - 03.12 Format and save drawings to storage devices.
- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 03.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.08 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.09 Solve arithmetic problems.
 - 04.10 Solve algebra problems.
 - 04.11 Solve right-angle trigonometric problems.
 - 04.12 Solve geometry problems.
 - 04.13 Apply multiple discipline calculations.
 - 04.14 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.10 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.11 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.11 Demonstrate an understanding of federal, state and local taxes and their computation
- 10.0 Prepare multi-view drawings--The student will be able to:
- 10.01 Prepare multi-view freehand sketches.
 - 10.02 Select proper drawing scale, views and layout.
 - 10.03 Prepare drawings containing horizontal and vertical surfaces.
 - 10.04 Prepare drawings containing circles and/or arcs.
 - 10.05 Prepare drawings incorporating removed details and conventional breaks.
- 11.0 Prepare sectional views--The student will be able to:
- 11.01 Prepare drawings containing full sections and half sections
 - 11.02 Prepare drawings containing offset sections.
 - 11.03 Prepare drawings containing revolved sections.
 - 11.04 Prepare drawings containing removed sections and broken-out sections.
 - 11.05 Prepare a sectional assembly drawing applying material symbols.
- 12.0 Prepare auxiliary drawings--The student will be able to:
- This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5
- 12.01 Prepare drawings containing primary auxiliary views.

12.02 Prepare drawings containing auxiliary views that include curved lines.

13.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 13.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 13.02 Prepare drawings using metric dimensions.
- 13.03 Prepare drawings using general and local notes.
- 13.04 Apply basic tolerance techniques.

14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

11.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 14.01 Prepare isometric, oblique and other pictorial drawings.
- 14.02 Prepare one- and two-point perspectives.

15.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 15.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 15.02 Prepare developments of a transition piece.
- 15.03 Prepare drawings involving intersecting pieces.

16.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 16.01 Prepare site plan.
- 16.02 Prepare floor plan.
- 16.03 Prepare exterior elevations.
- 16.04 Prepare roof plan.

15.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

17.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 17.01 Understand civil terminology.
- 17.02 Read and interpret civil drawings.
- 17.03 Prepare plan and profile drawings.
- 17.04 Develop topographic drawings.

18.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 18.01 Identify electrical/electronic symbols.

18.02 Prepare schematic/block diagrams.

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**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

- 18.0 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:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
 SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 18.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 18.02 Explain emergency procedures to follow in response to workplace accidents.
 18.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
 18.02 Explain the effect of key organizational systems on performance and quality.
 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 18.04 Explain the impact of the global economy on business organizations.

- 20.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 20.01 Perform drawing set up.
- 20.02 Construct geometric figures of lines, splines, circles, and arcs.
- 20.03 Create and edit text using appropriate style and size to annotate drawings.
- 20.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 20.05 Identify, create, store and use standard part symbols and libraries.
- 20.06 Utilize editing commands.
- 20.07 Control entity properties by layer, color and line type.
- 20.08 Use viewing commands to perform zooming and panning.
- 20.09 Plot drawings on media using layout and scale.
- 20.10 Minimize file size.
- 20.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 20.12 Apply standard dimensioning rules.

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**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

21.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 21.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 21.02 Locate, organize and reference written information from various sources. CM3.0
- 21.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 21.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 21.05 Apply active listening skills to obtain and clarify information. CM7.0
- 21.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 21.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

23.0 Demonstrate applied math skills--The student will be able to:

- 23.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 23.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 5
Course Number: 8725310
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing pneumatic/hydraulic drawing.

26.0 Prepare pneumatic/hydraulic drawings--The student will be able to.

26.01 Prepare piping drawings.

26.02 Prepare pictorial drawings.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 6
Course Number: 8725320
Course Credit: 1

Course Description:

This course is designed to provide instruction in computer aided drafting and pneumatic/hydraulic drawings.

27.0 Perform basic computer aided drafting functions--The student will be able to:

- 27.01 Perform drawing set up.
- 27.02 Construct geometric figures of lines, splines, circles, and arcs.
- 27.03 Create and edit text using appropriate style and size to annotate drawings.
- 27.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 27.05 Identify, create, store and use standard part symbols and libraries.
- 27.06 Utilize editing commands.

28.0 Prepare pneumatic/hydraulic drawings--The student will be able to.

- 28.01 Prepare sectional drawings.
- 28.02 Prepare diagrams.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 7
Course Number: 8725330
Course Credit: 1

Course Description:

This course is designed to provide instruction in basic computer aided drafting.

29.0 Perform basic computer aided drafting functions--The student will be able to:

- 29.01 Control entity properties by layer, color and line type.
- 29.02 Use viewing commands to perform zooming and panning.
- 29.03 Plot drawings on media using layout and scale.
- 29.04 Minimize file size.
- 29.05 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 29.06 Apply standard dimensioning rules.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 8
Course Number: 8725340
Course Credit: 1

Course Description:

This course is designed to provide instruction in advanced computer aided drawing as listed.

30.0 Prepare advanced computer aided drawings--The student will be able to:

- 30.1 Prepare advanced mechanical drawings.
- 30.2 Prepare production drawings.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 9
Course Number: 8725340
Course Credit: 1

Course Description:

This course is designed to provide instruction in advanced computer aided drawing as listed.

31.0 Prepare advanced computer aided drawings--The student will be able to:

- 31.01 Prepare tool drawings.
- 31.02 Prepare pneumatic/hydraulic drawings

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 10
Course Number: 8725360
Course Credit: 1

Course Description:

This course is designed to provide instruction in advanced mechanical drawings as listed.

32.0 Prepare advanced mechanical drawings--The student will be able to.

- 32.01 Resolve problems by descriptive geometry and revolutions.
- 32.02 Prepare advance surface drawings.
- 32.03 Identify the various manufacturing methods.
- 32.04 Use precision dimensioning to include geometric characters.
- 32.05 Make engineering changes on drawings.
- 32.06 Prepare fastener drawings.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 11
Course Number: 8725370
Course Credit: 1

Course Description:

This course is designed to provide instruction in advanced mechanical drawings and production drawings as listed.

33.0 Prepare advanced mechanical drawings--The student will be able to.

- 33.01 Prepare cam calculations and drawings.
- 33.02 Prepare gear calculations.
- 33.03 Prepare spring calculations and drawings.

34.0 Prepare production drawings--The student will be able to.

- 34.01 Make a design layout drawing.
- 34.02 Make detail drawings.
- 34.03 Make pattern shop detail drawings.
- 34.04 Make casting drawings.
- 34.05 Make forging detail drawings.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 12
Course Number: 8725380
Course Credit: 1

Course Description:

This course is designed to provide instruction in production drawings and tool drawings as listed.

35.0 Prepare production drawings--The student will be able to.

- 35.01 Make machining detail drawings.
- 35.02 Make stamping drawings.
- 35.03 Make welding drawings.
- 35.04 Make assembly drawings.
- 35.05 Prepare installation drawings.

36.0 Prepare tool drawings--The student will be able to.

- 36.01 Design jigs and fixtures.

2013 - 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Mechanical Drafting 13
Course Number: 8725390
Course Credit: 1

Course Description:

This course is designed to provide instruction in tool drawings as listed.

37.0 Prepare tool drawings--The student will be able to.

37.01 Design cutting dies.

37.02 Design forming dies.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Architectural Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8725400	1480112
CIP Number	0615130302	0615130302
Grade Level	9-12, 30, 31	30,31
Standard Length	13 Credits	1900 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT @7 TEC CONSTR @7 7G	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT @7 TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters	17-3011 - Architectural and Civil Drafters
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	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the architectural drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

When offered at the postsecondary level, 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	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0371	Architectural Detailer	200 Hours	17-3011
D	TDR0571	Architectural CAD Drafter 1	275 Hours	17-3011
	TDR0572	Architectural CAD Drafter 2	275 Hours	
E	TDR0573	Architectural Drafter 1	275 Hours	17-3011
	TDR0574	Architectural Drafter 2	275 Hours	

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
	8725020	Drafting 2	1 Credit		2
	8725030	Drafting 3	1 Credit		3
	8725040	Drafting 4	1 Credit		3
C	8725450	Architectural Drafting 5	1 Credit	17-3011	3
	8725460	Architectural Drafting 6	1 Credit		3
D	8725470	Architectural Drafting 7	1 Credit	17-3011	3
	8725480	Architectural Drafting 8	1 Credit		3
	8725490	Architectural Drafting 9	1 Credit		3
E	8725491	Architectural Drafting 10	1 Credit	17-3011	3
	8725492	Architectural Drafting 11	1 Credit		3
	8725493	Architectural Drafting 12	1 Credit		3
	8725494	Architectural Drafting 13	1 Credit		3

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific math and science core academic courses. This alignment resulted from a collaborative review by Career and Technical Education (CTE) teachers and core academic teachers. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%
Architectural Drafting 5	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	1/42 2%	1/56 2%	1/53 2%
Architectural Drafting 6	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	1/42 2%	1/56 2%	1/53 2%
Architectural Drafting 7	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 8	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 9	^^	^^	^^	#	1/52 2%	#	1/55 2%	2/58 3%	1/35 3%	2/42 5%	2/56 4%	1/53 2%

Course	Math				Science							
	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 10	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 11	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 12	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%
Architectural Drafting 13	^^	^^	^^	#	1/52 2%	#	1/55 2%	1/58 2%	1/35 3%	2/42 5%	2/56 4%	1/53 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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. 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>).

Standards

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

- 01.0 Apply basic drafting skills
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Prepare pictorial drawings.
- 27.0 Prepare architectural drawings.
- 28.0 Prepare advanced computer aided drawings.
- 29.0 Prepare basic building utility drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Architectural Drafting
PSAV Number: I480112

Course Number: TDR0070
Occupational Completion Point: A
Blueprint Reader – 150 Hours – SOC Code 17-3011

- 01.0 Apply basic drafting skills--The student will be able to:
- 01.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
 - 01.02 Identify and use the various drafting media and techniques.
 - 01.03 Demonstrate the use of the alphabet of lines.
 - 01.04 Prepare title blocks and other drafting formats.
 - 01.05 Use various freehand and other lettering techniques.
 - 01.06 Prepare axonometric, oblique and perspective freehand sketches.
 - 01.07 Prepare charts, graphs, and diagrams.
 - 01.08 Apply geometric construction techniques.
- 02.0 Apply fundamental computer skills--The student will be able to:
- 02.01 Demonstrate care of equipment.
 - 02.02 Operate a mouse, keyboard and digitizer as input devices.
 - 02.03 Operate printers and plotters as output devices.
 - 02.04 Demonstrate handling and operation of storage media.
 - 02.05 Start and shut down a work station.
 - 02.06 Adjust monitor controls for maximum comfort and usability.
 - 02.07 Perform basic operating system functions.
 - 02.08 Start and exit a software program as required.
 - 02.09 Demonstrate file management techniques of copying and deleting.
 - 02.10 Identify, create, and use directory structure and change directory paths.
 - 02.11 Demonstrate file maintenance and backup procedures.
 - 02.12 Format and save drawings to storage devices.
- 02.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 02.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 02.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 02.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 04.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.02 Solve arithmetic problems.
 - 04.03 Solve algebra problems.
 - 04.04 Solve right-angle trigonometric problems.
 - 04.05 Solve geometry problems.
 - 04.06 Apply multiple discipline calculations.

- 04.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 04.08 Construct charts/tables/graphs using functions and data. AF3.5
- 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.10 Demonstrate an understanding of federal, state and local taxes and their computation

- 05.0 Prepare multi-view drawings--The student will be able to:
 - 05.01 Prepare multi-view freehand sketches.
 - 05.02 Select proper drawing scale, views and layout.
 - 05.03 Prepare drawings containing horizontal and vertical surfaces.
 - 05.04 Prepare drawings containing circles and/or arcs.
 - 05.05 Prepare drawings incorporating removed details and conventional breaks.

- 06.0 Prepare sectional views--The student will be able to:
 - 06.01 Prepare drawings containing full sections and half sections
 - 06.02 Prepare drawings containing offset sections.
 - 06.03 Prepare drawings containing revolved sections.
 - 06.04 Prepare drawings containing removed sections and broken-out sections.
 - 06.05 Prepare a sectional assembly drawing applying material symbols.

- 07.0 Prepare auxiliary drawings--The student will be able to:
 - 07.01 Prepare drawings containing primary auxiliary views.
 - 07.02 Prepare drawings containing auxiliary views that include curved lines.

- 08.0 Apply basic dimensioning--The student will be able to:
 - 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
 - 08.02 Prepare drawings using metric dimensions.
 - 08.03 Prepare drawings using general and local notes.
 - 08.04 Apply basic tolerancing techniques.

- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
 - 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: TDR0370
Occupational Completion Point: B
Drafting Assistant – 450 Hours – SOC Code 17-3011

- 10.0 Use information technology tools--The students will be able to:
 - 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0

- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Prepare pictorial drawings--The student will be able to:
- 11.01 Prepare isometric, oblique and other pictorial drawings.
- 11.02 Prepare one- and two-point perspectives.
- 12.0 Prepare surface developments--The student will be able to:
- 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 12.02 Prepare developments of a transition piece.
- 12.03 Prepare drawings involving intersecting pieces.
- 13.0 Prepare basic architectural drawings--The student will be able to:
- 13.01 Prepare site plan.
- 13.02 Prepare floor plan.
- 13.03 Prepare exterior elevations.
- 13.04 Prepare roof plan.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Demonstrate understanding of basic civil drawings--The student will be able to:
- 15.01 Understand civil terminology.
- 15.02 Read and interpret civil drawings.
- 15.03 Prepare plan and profile drawings.
- 15.04 Develop topographic drawings.
- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
- 16.01 Identify electrical/electronic symbols.
- 16.02 Prepare schematic/block diagrams.
- 17.0 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:
- 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 17.02 Explain emergency procedures to follow in response to workplace accidents.
- 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 17.01 Describe the nature and types of business organizations. SY1.0
- 17.02 Explain the effect of key organizational systems on performance and quality.

- 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 17.04 Explain the impact of the global economy on business organizations.
- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
- 19.02 Construct geometric figures of lines, splines, circles, and arcs.
- 19.03 Create and edit text using appropriate style and size to annotate drawings.
- 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 19.05 Identify, create, store and use standard part symbols and libraries.
- 19.06 Utilize editing commands.
- 19.07 Control entity properties by layer, color and line type.
- 19.08 Use viewing commands to perform zooming and panning.
- 19.09 Plot drawings on media using layout and scale.
- 19.10 Minimize file size.
- 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 20.02 Locate, organize and reference written information from various sources. CM3.0
- 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 20.05 Apply active listening skills to obtain and clarify information. CM7.0
- 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 21.02 Describe the effect of money management on personal and career goals. FL3.0
- 21.03 Develop a personal budget and financial goals. FL3.1

- 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 21.05 Maintain financial records. FL3.3
- 21.06 Read and reconcile financial statements. FL3.4
- 21.07 Research, compare and contrast investment opportunities.

- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 22.04 Employ mentoring skills to inspire and teach others. LT5.0

- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
 - 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 24.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 24.08 Research the benefits of ongoing professional development. ECD9.0
 - 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0371
Occupational Completion Point: C
Architectural Detailer – 200 Hours – SOC Code 17-3011

- 26.0 Prepare pictorial drawings--The student will be able to.
 - 26.01 Prepare isometric drawings
 - 26.02 Prepare oblique drawings
 - 26.03 Prepare perspectives

Course Number: TDR0571
Occupational Completion Point:
Architectural CAD Drafter 1 – 275 Hours – SOC Code 17-3011

- 27.0 Prepare architectural drawings--The student will be able to.
 - 27.01 Interpret catalogs, specifications, technical tables, codes and ordinances
 - 27.02 Prepare floor plan drawings, with dimensions
 - 27.03 Prepare foundation plan and detail drawings, with dimensions
 - 27.04 Prepare roof plans
 - 27.05 Prepare elevation drawings
 - 27.06 Prepare sections and details

Course Number: TDR0572
Occupational Completion Point: D
Architectural CAD Drafter 2 – 275 Hours – SOC Code 17-3011

- 28.0 Prepare advanced computer aided drawings--The student will be able to:
- 28.01 Produce architectural drawings
 - 28.02 Produce structural plans and detail drawings
 - 28.03 Produce civil drawings

Course Number: TDR0573
Occupational Completion Point:
Architectural Drafter 1 – 275 Hours – SOC Code 17-3011

- 27.0 Prepare architectural drawings--The student will be able to.
- 27.07 Prepare schedules and cost estimates
 - 27.08 Prepare a landscape layout

Course Number: TDR0574
Occupational Completion Point: E
Architectural Drafter 2 – 275 Hours – SOC Code 17-3011

- 29.0 Prepare basic building utility drawings--The student will be able to:
- 29.01 Prepare electrical plans and schedules
 - 29.02 Prepare HVAC plans and schedules
 - 29.03 Prepare plumbing plans, riser diagram, and schedules

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

02.0 Apply basic drafting skills--The student will be able to:

- 02.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 02.02 Identify and use the various drafting media and techniques.
- 02.03 Demonstrate the use of the alphabet of lines.
- 02.04 Prepare title blocks and other drafting formats.
- 02.05 Use various freehand and other lettering techniques.
- 02.06 Prepare axonometric, oblique and perspective freehand sketches.
- 02.07 Prepare charts, graphs, and diagrams.
- 02.08 Apply geometric construction techniques.

03.0 Apply fundamental computer skills--The student will be able to:

- 03.01 Demonstrate care of equipment.
- 03.02 Operate a mouse, keyboard and digitizer as input devices.
- 03.03 Operate printers and plotters as output devices.
- 03.04 Demonstrate handling and operation of storage media.
- 03.05 Start and shut down a work station.
- 03.06 Adjust monitor controls for maximum comfort and usability.
- 03.07 Perform basic operating system functions.

- 03.08 Start and exit a software program as required.
 - 03.09 Demonstrate file management techniques of copying and deleting.
 - 03.10 Identify, create, and use directory structure and change directory paths.
 - 03.11 Demonstrate file maintenance and backup procedures.
 - 03.12 Format and save drawings to storage devices.
- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 03.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.08 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.09 Solve arithmetic problems.
 - 04.10 Solve algebra problems.
 - 04.11 Solve right-angle trigonometric problems.
 - 04.12 Solve geometry problems.
 - 04.13 Apply multiple discipline calculations.
 - 04.14 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.10 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.11 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.11 Demonstrate an understanding of federal, state and local taxes and their computation
- 10.0 Prepare multi-view drawings--The student will be able to:
- 10.01 Prepare multi-view freehand sketches.
 - 10.02 Select proper drawing scale, views and layout.
 - 10.03 Prepare drawings containing horizontal and vertical surfaces.
 - 10.04 Prepare drawings containing circles and/or arcs.
 - 10.05 Prepare drawings incorporating removed details and conventional breaks.
- 11.0 Prepare sectional views--The student will be able to:
- 11.01 Prepare drawings containing full sections and half sections
 - 11.02 Prepare drawings containing offset sections.
 - 11.03 Prepare drawings containing revolved sections.
 - 11.04 Prepare drawings containing removed sections and broken-out sections.
 - 11.05 Prepare a sectional assembly drawing applying material symbols.
- 12.0 Prepare auxiliary drawings--The student will be able to:
- This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5
- 12.01 Prepare drawings containing primary auxiliary views.

12.02 Prepare drawings containing auxiliary views that include curved lines.

13.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 13.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 13.02 Prepare drawings using metric dimensions.
- 13.03 Prepare drawings using general and local notes.
- 13.04 Apply basic tolerance techniques.

14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

11.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 14.01 Prepare isometric, oblique and other pictorial drawings.
- 14.02 Prepare one- and two-point perspectives.

15.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 15.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 15.02 Prepare developments of a transition piece.
- 15.03 Prepare drawings involving intersecting pieces.

16.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 16.01 Prepare site plan.
- 16.02 Prepare floor plan.
- 16.03 Prepare exterior elevations.
- 16.04 Prepare roof plan.

15.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

17.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 17.01 Understand civil terminology.
- 17.02 Read and interpret civil drawings.
- 17.03 Prepare plan and profile drawings.
- 17.04 Develop topographic drawings.

18.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 18.01 Identify electrical/electronic symbols.

18.02 Prepare schematic/block diagrams.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
 # Alignment attempted, but no correlation to academic course.

- 18.0 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:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
 SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 18.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 18.02 Explain emergency procedures to follow in response to workplace accidents.
 18.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
 18.02 Explain the effect of key organizational systems on performance and quality.
 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 18.04 Explain the impact of the global economy on business organizations.

- 20.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 20.01 Perform drawing set up.
- 20.02 Construct geometric figures of lines, splines, circles, and arcs.
- 20.03 Create and edit text using appropriate style and size to annotate drawings.
- 20.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 20.05 Identify, create, store and use standard part symbols and libraries.
- 20.06 Utilize editing commands.
- 20.07 Control entity properties by layer, color and line type.
- 20.08 Use viewing commands to perform zooming and panning.
- 20.09 Plot drawings on media using layout and scale.
- 20.10 Minimize file size.
- 20.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 20.12 Apply standard dimensioning rules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

21.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 21.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 21.02 Locate, organize and reference written information from various sources. CM3.0
- 21.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 21.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 21.05 Apply active listening skills to obtain and clarify information. CM7.0
- 21.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 21.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

23.0 Demonstrate applied math skills--The student will be able to:

- 23.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 23.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 5
Course Number: 8725450
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing pictorial drawing.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

26.0 Prepare pictorial drawings--The student will be able to.

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

26.01 Prepare isometric drawings

26.02 Prepare oblique drawings

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 6
Course Number: 8725460
Course Credit: 1

Course Description:

This course is designed to provide instruction in pictorial and architectural drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

26.0 Prepare pictorial drawings--The student will be able to.

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

26.03 Prepare perspectives

27.0 Prepare architectural drawings--The student will be able to.

27.01 Interpret catalogs, specifications, technical tables, codes and ordinances

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 7
Course Number: 8725470
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed architectural drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

27.0 Prepare architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5; SC.912.N.10.19

27.02 Prepare floor plan drawings, with dimensions

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 8
Course Number: 8725480
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed architectural drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

27.0 Prepare architectural drawings--The student will be able to.

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5; SC.912.N.10.19

27.03 Prepare foundation plan and detail drawings, with dimensions

27.04 Prepare roof plans

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 9
Course Number: 8725490
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed architectural and computer aided drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review

Alignment attempted, but no correlation to academic course.

27.0 Prepare architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5; SC.912.N.10.19

27.05 Prepare elevation drawings

27.06 Prepare sections and details

28.0 Prepare advanced computer aided drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

28.01 Produce architectural drawings

28.02 Produce structural plans and detail drawings

28.03 Produce civil drawings

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 10
Course Number: 8725491
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed architectural drawings. Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

27.0 Prepare architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5; SC.912.N.10.19

27.07 Prepare schedules and cost estimates

27.08 Prepare a landscape layout

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 11
Course Number: 8725492
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed basic building utility drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

29.0 Prepare basic building utility drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5

29.01 Prepare electrical plans and schedules.

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 12
Course Number: 8725493
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed basic utility drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

29.0 Prepare basic building utility drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5

29.02 Prepare HVAC plans and schedules

**Florida Department of Education
Student Performance Standards**

Course Title: Architectural Drafting 13
Course Number: 8725494
Course Credit: 1

Course Description:

This course is designed to provide instruction in listed basic building utility drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	1/52 2%
Algebra 2	^^	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	1/42 2%
Geometry	^^	Physics 1	1/56 2%	Earth-Space Science	1/58 2%	Physical Science	1/56 2%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

29.0 Prepare basic building utility drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.16; SC.912.N.3.5

29.03 Prepare plumbing plans, riser diagram, and schedules

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Structural Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8725500	I480113
CIP Number	0615130401	0615130401
Grade Level	9-12, 30, 31	30, 31
Standard Length	12 Credits	1800 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters 17-3019 - Drafters, All Other	17-3011 - Architectural and Civil Drafters 17-3019 - Drafters, 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	N/A	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the structural drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

When offered at the postsecondary level, 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	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0870	Drafter, Cartographic	300 Hours	17-3019
D	TDR0871	Drafter, Civil 1	300 Hours	17-3019
	TDR0872	Drafter, Civil 2	300 Hours	
E	TDR0873	Drafter, Structural	300 Hours	17-3019

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725010	Drafting 1	1 Credit	17-3011	2
	8725020	Drafting 2	1 Credit		2
	8725030	Drafting 3	1 Credit		3
	8725040	Drafting 4	1 Credit		3
C	8725550	Structural Drafting 5	1 Credit	17-3019	2
	8725560	Structural Drafting 6	1 Credit		2
D	8725570	Structural Drafting 7	1 Credit	17-3019	2
	8725580	Structural Drafting 8	1 Credit		2
	8725590	Structural Drafting 9	1 Credit		2
	8725591	Structural Drafting 10	1 Credit		2
E	8725592	Structural Drafting 11	1 Credit	17-3019	2
	8725593	Structural Drafting 12	1 Credit		2

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific science core academic courses. Pending full implementation of the Common Core State Standards for Mathematics, some or all of the courses in this program will be aligned to specific math core academic courses. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Drafting 1	^^	^^	^^	#	2/52 4%	#	2/55 4%	3/58 5%	1/35 3%	4/42 10%	3/56 5%	2/53 4%
Drafting 2	^^	^^	^^	1/53 2%	7/52 13%	4/56 7%	3/55 5%	8/58 14%	1/35 3%	5/42 12%	9/56 16%	7/53 13%
Drafting 3	^^	^^	^^	#	#	13/56 23%	#	#	#	#	#	#
Drafting 4	^^	^^	^^	1/53 2%	7/52 13%	12/56 21%	5/55 9%	4/58 7%	2/35 6%	10/42 24%	12/56 21%	9/53 17%
Structural Drafting 5	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 6	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 7	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 8	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 9	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 10	^^	^^	^^	**	**	**	**	**	**	**	**	**
Structural Drafting 11	^^	^^	^^	**	**	**	**	**	**	**	**	**

Course	Math			Science									
Structural Drafting 12	^	^	^	**	**	**	**	**	**	**	**	**	**

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
[#] Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fl DOE.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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 01.0 Apply basic drafting skills
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Prepare map drawings.
- 27.0 Prepare computer aided map details.
- 28.0 Understand surveying and mapping procedures.
- 29.0 Prepare basic civil drawings.
- 30.0 Prepare advanced architectural drawings.
- 31.0 Prepare structural details.
- 32.0 Prepare advanced map drawings.
- 33.0 Prepare advanced civil drawings.
- 34.0 Prepare structural steel drawings.
- 35.0 Prepare reinforced concrete drawings.
- 36.0 Prepare structural wood drawings.
- 37.0 Prepare advanced computer aided drawings, two-dimensional and three-dimensional.

- 04.08 Construct charts/tables/graphs using functions and data. AF3.5
- 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 04.10 Demonstrate an understanding of federal, state and local taxes and their computation
- 05.0 Prepare multi-view drawings--The student will be able to:
- 05.01 Prepare multi-view freehand sketches.
- 05.02 Select proper drawing scale, views and layout.
- 05.03 Prepare drawings containing horizontal and vertical surfaces.
- 05.04 Prepare drawings containing circles and/or arcs.
- 05.05 Prepare drawings incorporating removed details and conventional breaks.
- 06.0 Prepare sectional views--The student will be able to:
- 06.01 Prepare drawings containing full sections and half sections
- 06.02 Prepare drawings containing offset sections.
- 06.03 Prepare drawings containing revolved sections.
- 06.04 Prepare drawings containing removed sections and broken-out sections.
- 06.05 Prepare a sectional assembly drawing applying material symbols.
- 07.0 Prepare auxiliary drawings--The student will be able to:
- 07.01 Prepare drawings containing primary auxiliary views.
- 07.02 Prepare drawings containing auxiliary views that include curved lines.
- 08.0 Apply basic dimensioning--The student will be able to:
- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 08.02 Prepare drawings using metric dimensions.
- 08.03 Prepare drawings using general and local notes.
- 08.04 Apply basic tolerancing techniques.
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: TDR0370
Occupational Completion Point: B
Drafting Assistant – 450 Hours – SOC Code 17-3011

- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0

- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 11.0 Prepare pictorial drawings--The student will be able to:
 11.01 Prepare isometric, oblique and other pictorial drawings.
 11.02 Prepare one- and two-point perspectives.
- 12.0 Prepare surface developments--The student will be able to:
 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
 12.02 Prepare developments of a transition piece.
 12.03 Prepare drawings involving intersecting pieces.
- 13.0 Prepare basic architectural drawings--The student will be able to:
 13.01 Prepare site plan.
 13.02 Prepare floor plan.
 13.03 Prepare exterior elevations.
 13.04 Prepare roof plan.
- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 15.0 Demonstrate understanding of basic civil drawings--The student will be able to:
 15.01 Understand civil terminology.
 15.02 Read and interpret civil drawings.
 15.03 Prepare plan and profile drawings.
 15.04 Develop topographic drawings.
- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
 16.01 Identify electrical/electronic symbols.
 16.02 Prepare schematic/block diagrams.
- 17.0 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:
 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 17.02 Explain emergency procedures to follow in response to workplace accidents.
 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 17.01 Describe the nature and types of business organizations. SY1.0
 17.02 Explain the effect of key organizational systems on performance and quality.
 17.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 17.04 Explain the impact of the global economy on business organizations.

- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
 - 19.02 Construct geometric figures of lines, splines, circles, and arcs.
 - 19.03 Create and edit text using appropriate style and size to annotate drawings.
 - 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
 - 19.05 Identify, create, store and use standard part symbols and libraries.
 - 19.06 Utilize editing commands.
 - 19.07 Control entity properties by layer, color and line type.
 - 19.08 Use viewing commands to perform zooming and panning.
 - 19.09 Plot drawings on media using layout and scale.
 - 19.10 Minimize file size.
 - 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
 - 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 20.02 Locate, organize and reference written information from various sources. CM3.0
 - 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 20.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 21.02 Describe the effect of money management on personal and career goals. FL3.0
 - 21.03 Develop a personal budget and financial goals. FL3.1
 - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 21.05 Maintain financial records. FL3.3
 - 21.06 Read and reconcile financial statements. FL3.4

- 21.07 Research, compare and contrast investment opportunities.
- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 22.04 Employ mentoring skills to inspire and teach others. LT5.0
- 24.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 24.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 24.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 24.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 24.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 24.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 24.06 Identify and exhibit traits for retaining employment. ECD7.0
- 24.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 24.08 Research the benefits of ongoing professional development. ECD9.0
- 24.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0870

Occupational Completion Point: C

Drafter, Cartographic – 300 Hours – SOC Code 17-3019

- 26.0 Prepare map drawings--The student will be able to:
- 26.01 Prepare traverse drawings.
- 26.02 Prepare plat drawings.
- 26.03 Prepare street layout drawings.
- 26.04 Prepare map drawings.
- 27.0 Prepare computer aided map details--The student will be able to:
- 27.01 Draft range, section and township map.
- 27.02 Prepare a map using bearings.
- 27.03 Prepare a map using coordinates.
- 27.04 Convert map into metric dimensions.
- 28.0 Understand surveying and mapping procedures--The student will be able to:
- 28.01 Employ basic mapping specifications.
- 28.02 Interpret aerial photogrammetry.
- 28.03 Employ horizontal measures.
- 28.04 Employ leveling procedures.
- 28.05 Obtain angular measurements.
- 28.06 Interpret legal descriptions.
- 29.0 Prepare basic civil drawings--The student will be able to:
- 29.01 Prepare topographic drawings.

- 29.02 Prepare drainage drawings.
- 29.03 Prepare highway drawings.

Course Number: TDR0871
Occupational Completion Point:
Drafter, Civil 1 – 300 Hours – SOC Code 17-3019

- 30.0 Prepare advanced architectural drawings--The student will be able to:
 - 30.01 Prepare floor plan drawings.
 - 30.02 Prepare foundation plan drawings.
 - 30.03 Prepare detailed drawings.
- 31.0 Prepare structural details--The student will be able to:
 - 31.01 Interpret structural manuals and technical tables.
 - 31.02 Draw structural connections.

Course Number: TDR0872
Occupational Completion Point: D
Drafter, Civil 2 – 300 Hours – SOC Code 17-3019

- 32.0 Prepare advanced map drawings--The student will be able to:
 - 32.01 Prepare traverse drawings.
 - 32.02 Prepare street layout drawings.
 - 32.03 Prepare advanced map drawings.
 - 32.04 Prepare highway drawings.
 - 32.05 Prepare topographic drawings.
- 33.0 Prepare advanced civil drawings--The student will be able to:
 - 33.01 Prepare drainage drawings.
 - 33.02 Prepare plat drawings.
 - 33.03 Prepare advanced plan and profile drawings.
 - 33.04 Prepare utility drawings.
 - 33.05 Prepare a commercial site plan.

Course Number: TDR0873
Occupational Completion Point: E
Drafter, Structural – 300 Hours – SOC Code 17-3019

- 34.0 Prepare structural steel drawings--The student will be able to:
 - 34.01 Use the "Manual of Steel Construction" and other technical data.
 - 34.02 Interpret codes and specifications.
 - 34.03 Calculate reactions and stresses.
 - 34.04 Prepare shear and moment diagrams.
 - 34.05 Detail bolted connections.
 - 34.06 Detail welded connections.
 - 34.07 Prepare erection plans and schedules.
 - 34.08 Assist in the preparation of bids.
 - 34.09 Prepare advance bill for ordering materials.
- 35.0 Prepare reinforced concrete drawings--The student will be able to:

- 35.01 Use the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and other technical data.
 - 35.02 Interpret codes and specifications.
 - 35.03 Interpret engineering drawings.
 - 35.04 Prepare column detail drawings.
 - 35.05 Prepare footing and foundation drawings.
 - 35.06 Prepare floor and roof detail drawings.
 - 35.07 Prepare special structure detail drawings.
 - 35.08 Prepare bar lists and schedules.
- 36.0 Prepare structural wood drawings--The student will be able to:
- 36.01 Use the "Timber Construction Manual".
 - 36.02 Interpret codes and specifications.
 - 36.03 Prepare fastening and connection details.
 - 36.04 Prepare framing plans.
 - 36.05 Assist in the preparation of bids.
 - 36.06 Prepare advance bill for ordering materials.
- 37.0 Prepare advanced computer aided drawings, two-dimensional and three dimensional--
The student will be able to:
- 37.01 Produce architectural drawings.
 - 37.02 Produce structural (steel, wood, and reinforced concrete) drawings.
 - 37.03 Produce map drawings.
 - 37.04 Produce civil drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills, mathematical skills, multi-view and sectional drawings.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	#	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	2/52 4%
Algebra 2	^^	Chemistry 1	2/55 4%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	^^	Physics 1	2/53 4%	Earth-Space Science	3/58 5%	Physical Science	3/56 5%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

02.0 Apply basic drafting skills--The student will be able to:

- 02.01 Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- 02.02 Identify and use the various drafting media and techniques.
- 02.03 Demonstrate the use of the alphabet of lines.
- 02.04 Prepare title blocks and other drafting formats.
- 02.05 Use various freehand and other lettering techniques.
- 02.06 Prepare axonometric, oblique and perspective freehand sketches.
- 02.07 Prepare charts, graphs, and diagrams.
- 02.08 Apply geometric construction techniques.

03.0 Apply fundamental computer skills--The student will be able to:

- 03.01 Demonstrate care of equipment.
- 03.02 Operate a mouse, keyboard and digitizer as input devices.
- 03.03 Operate printers and plotters as output devices.
- 03.04 Demonstrate handling and operation of storage media.
- 03.05 Start and shut down a work station.
- 03.06 Adjust monitor controls for maximum comfort and usability.

- 03.07 Perform basic operating system functions.
 - 03.08 Start and exit a software program as required.
 - 03.09 Demonstrate file management techniques of copying and deleting.
 - 03.10 Identify, create, and use directory structure and change directory paths.
 - 03.11 Demonstrate file maintenance and backup procedures.
 - 03.12 Format and save drawings to storage devices.
- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 03.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.08 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.09 Solve arithmetic problems.
 - 04.10 Solve algebra problems.
 - 04.11 Solve right-angle trigonometric problems.
 - 04.12 Solve geometry problems.
 - 04.13 Apply multiple discipline calculations.
 - 04.14 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.10 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.11 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.11 Demonstrate an understanding of federal, state and local taxes and their computation
- 10.0 Prepare multi-view drawings--The student will be able to:
- 10.01 Prepare multi-view freehand sketches.
 - 10.02 Select proper drawing scale, views and layout.
 - 10.03 Prepare drawings containing horizontal and vertical surfaces.
 - 10.04 Prepare drawings containing circles and/or arcs.
 - 10.05 Prepare drawings incorporating removed details and conventional breaks.
- 11.0 Prepare sectional views--The student will be able to:
- 11.01 Prepare drawings containing full sections and half sections
 - 11.02 Prepare drawings containing offset sections.
 - 11.03 Prepare drawings containing revolved sections.
 - 11.04 Prepare drawings containing removed sections and broken-out sections.
 - 11.05 Prepare a sectional assembly drawing applying material symbols.
- 12.0 Prepare auxiliary drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 12.01 Prepare drawings containing primary auxiliary views.
- 12.02 Prepare drawings containing auxiliary views that include curved lines.

13.0 Apply basic dimensioning--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 13.01 Prepare drawings containing linear, angular, and circular standard dimensions.
- 13.02 Prepare drawings using metric dimensions.
- 13.03 Prepare drawings using general and local notes.
- 13.04 Apply basic tolerance techniques.

14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.8; SC.912.L.17.13; SC.912.N.4.1, 2

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR2.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course is designed to provide instruction in drafting skills for pictorial drawing, surface development, architectural drawing. Demonstrate an understanding of civil drawing and electrical/electronic literacy.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	4/56 7%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	3/55 5%	Genetics	1/35 3%	Marine Science 1 Honors	5/42 12%
Geometry	^^	Physics 1	7/53 13%	Earth-Space Science	8/58 14%	Physical Science	9/56 16%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
 # Alignment attempted, but no correlation to academic course.

11.0 Use information technology tools--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

14.0 Prepare pictorial drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.N.3.5

- 14.01 Prepare isometric, oblique and other pictorial drawings.
- 14.02 Prepare one- and two-point perspectives.

15.0 Prepare surface developments--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 15.01 Prepare developments of prisms, cylinders, cones and pyramids.
- 15.02 Prepare developments of a transition piece.
- 15.03 Prepare drawings involving intersecting pieces.

16.0 Prepare basic architectural drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.7.4,8; SC.912.L.17.16; SC.912.N.3.5; SC.912.P.10.4; SC.912.P.12.3

- 16.01 Prepare site plan.
- 16.02 Prepare floor plan.
- 16.03 Prepare exterior elevations.
- 16.04 Prepare roof plan.

15.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.1.1, 3, 4, 6

- 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

17.0 Demonstrate understanding of basic civil drawings--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.6.4; SC.912.L.17.16; SC.912.N.3.5

- 17.01 Understand civil terminology.
- 17.02 Read and interpret civil drawings.
- 17.03 Prepare plan and profile drawings.
- 17.04 Develop topographic drawings.

18.0 Demonstrate basic electrical/electronic literacy--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5; SC.912.P.10.13, 14, 15

- 18.01 Identify electrical/electronic symbols.

18.02 Prepare schematic/block diagrams.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course is designed to provide instruction to perform basic computer aided drafting skills.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	13/56 23%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	^^	Chemistry 1	#	Genetics	#	Marine Science 1 Honors	#
Geometry	^^	Physics 1	#	Earth-Space Science	#	Physical Science	#

[^] Alignment pending full implementation of the Common Core State Standards for Mathematics.

^{**} Alignment pending review
 # Alignment attempted, but no correlation to academic course.

- 18.0 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:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.E.7.4, 8; SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20;
 SC.912.L.18.12; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.4.1, 2

- 18.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 18.02 Explain emergency procedures to follow in response to workplace accidents.
 18.03 Create a disaster and/or emergency response plan. SHE2.0

- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
 18.02 Explain the effect of key organizational systems on performance and quality.
 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 18.04 Explain the impact of the global economy on business organizations.

- 20.0 Perform basic computer aided drafting functions--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.N.3.5

- 20.01 Perform drawing set up.
- 20.02 Construct geometric figures of lines, splines, circles, and arcs.
- 20.03 Create and edit text using appropriate style and size to annotate drawings.
- 20.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 20.05 Identify, create, store and use standard part symbols and libraries.
- 20.06 Utilize editing commands.
- 20.07 Control entity properties by layer, color and line type.
- 20.08 Use viewing commands to perform zooming and panning.
- 20.09 Plot drawings on media using layout and scale.
- 20.10 Minimize file size.
- 20.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 20.12 Apply standard dimensioning rules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction on how to demonstrate communication, math, and basic science and how it applied to drafting. Demonstrate an understanding of employability skills and entrepreneurship.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	^^	Biology 1	12/56 21%	Anatomy/Physiology Honors	1/53 2%	Astronomy Solar/Galactic Honors	7/52 13%
Algebra 2	^^	Chemistry 1	5/55 9%	Genetics	2/35 6%	Marine Science 1 Honors	10/42 24%
Geometry	^^	Physics 1	12/56 21%	Earth-Space Science	4/58 7%	Physical Science	12/56 21%

^^ Alignment pending full implementation of the Common Core State Standards for Mathematics.

** Alignment pending review
Alignment attempted, but no correlation to academic course.

21.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 21.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 21.02 Locate, organize and reference written information from various sources. CM3.0
- 21.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 21.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 21.05 Apply active listening skills to obtain and clarify information. CM7.0
- 21.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 21.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

23.0 Demonstrate applied math skills--The student will be able to:

- 23.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 23.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.2, 4, 5, 8, 9, 11, 13, 19, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.1, 2;
 SC.912.P.10.1, 2, 4, 14, 15; SC.912.P.12.3
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 23.02 Describe the effect of money management on personal and career goals. FL3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 25.08 Research the benefits of ongoing professional development. ECD9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 5
Course Number: 8725550
Course Credit: 1

Course Description:

This course is designed to provide instruction in map drawing and computer aided map details.

26.0 Prepare map drawings--The student will be able to:

- 26.01 Prepare traverse drawings.
- 26.02 Prepare plat drawings.
- 26.03 Prepare street layout drawings.
- 26.04 Prepare map drawings.

27.0 Prepare computer aided map details--The student will be able to:

- 27.01 Draft range, section and township map.
- 27.02 Prepare a map using bearings.
- 27.03 Prepare a map using coordinates.
- 27.04 Convert map into metric dimensions.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 6
Course Number: 8725560
Course Credit: 1

Course Description:

This course is designed to provide instruction in surveying, mapping, and preparing basic civil drawing.

28.0 Understand surveying and mapping procedures--The student will be able to:

- 28.01 Employ basic mapping specifications.
- 28.02 Interpret aerial photogrammetry.
- 28.03 Employ horizontal measures.
- 28.04 Employ leveling procedures.
- 28.05 Obtain angular measurements.
- 28.06 Interpret legal descriptions.

29.0 Prepare basic civil drawings--The student will be able to:

- 29.01 Prepare topographic drawings.
- 29.02 Prepare drainage drawings.
- 29.03 Prepare highway drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 7
Course Number: 8725570
Course Credit: 1

Course Description:

This course is designed to provide instruction in advanced architectural drawings.

30.0 Prepare advanced architectural drawings--The student will be able to:

- 30.01 Prepare floor plan drawings.
- 30.02 Prepare foundation plan drawings.
- 30.03 Prepare detailed drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 8
Course Number: 8725580
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing structural details.

31.0 Prepare structural details--The student will be able to:

- 31.01 Interpret structural manuals and technical tables.
- 31.02 Draw structural connections.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 9
Course Number: 8725590
Course Credit: 1

Course Description:

There course is designed to provide instruction in preparing advanced map drawings.

32.0 Prepare advanced map drawings--The student will be able to:

- 32.01 Prepare traverse drawings.
- 32.02 Prepare street layout drawings.
- 32.03 Prepare advanced map drawings.
- 32.04 Prepare highway drawings.
- 32.05 Prepare topographic drawings.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 10
Course Number: 8725591
Course Credit: 1

Course Description:

This course is designed to provide instruction preparing advanced civil drawings.

33.0 Prepare advanced civil drawings--The student will be able to:

- 33.01 Prepare drainage drawings.
- 33.02 Prepare plat drawings.
- 33.03 Prepare advanced plan and profile drawings.
- 33.04 Prepare utility drawings.
- 33.05 Prepare a commercial site plan.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 11
Course Number: 8725592
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing structural steel drawings and reinforced concrete drawings.

34.0 Prepare structural steel drawings--The student will be able to:

- 34.01 Use the "Manual of Steel Construction" and other technical data.
- 34.02 Interpret codes and specifications.
- 34.03 Calculate reactions and stresses.
- 34.04 Prepare shear and moment diagrams.
- 34.05 Detail bolted connections.
- 34.06 Detail welded connections.
- 34.07 Prepare erection plans and schedules.
- 34.08 Assist in the preparation of bids.
- 34.09 Prepare advance bill for ordering materials.

35.0 Prepare reinforced concrete drawings--The student will be able to:

- 35.01 Use the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and other technical data.
- 35.02 Interpret codes and specifications.
- 35.03 Interpret engineering drawings.
- 35.04 Prepare column detail drawings.
- 35.05 Prepare footing and foundation drawings.
- 35.06 Prepare floor and roof detail drawings.
- 35.07 Prepare special structure detail drawings.
- 35.08 Prepare bar lists and schedules.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Structural Drafting 12
Course Number: 8725593
Course Credit: 1

Course Description:

This course is designed to provide instruction in preparing structural wood drawings, and advanced computer aided drawing as listed.

36.0 Prepare structural wood drawings--The student will be able to:

- 36.01 Use the "Timber Construction Manual".
- 36.02 Interpret codes and specifications.
- 36.03 Prepare fastening and connection details.
- 36.04 Prepare framing plans.
- 36.05 Assist in the preparation of bids.
- 36.06 Prepare advance bill for ordering materials.

37.0 Prepare advanced computer aided drawings, two-dimensional and three dimensional--
The student will be able to:

- 37.01 Produce architectural drawings.
- 37.02 Produce structural (steel, wood, and reinforced concrete) drawings.
- 37.03 Produce map drawings.
- 37.04 Produce civil drawings.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: **Blueprint Reading and Estimation**
Program Type: **Career Preparatory**
Career Cluster: **Architecture & Construction**

	Secondary	PSAV
Program Number	8725600	I469919
CIP Number	0646041501	0646041501
Grade Level	9-12,30,31	30,31
Standard Length	1 Credit	150 Hours
Teacher Certification	TEC CONSTR @7 7G CARPENTRY @7 7G DRAFTING @7 7G BLDG CONSTR @7 7G BLUE PRNT RDG @7 7G	TEC CONSTR @7 7G CARPENTRY @7 7G DRAFTING @7 7G BLDG CONSTR @7 7G BLUE PRNT RDG @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	13-1051 - Cost Estimators	13-1051 - Cost Estimators
Facility Code	244 - 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	N/A

Purpose

The purpose of this program is to prepare students for employment in blueprint reading and cost estimators.

This program 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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point that focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Blueprint Reading and Estimation industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

When offered at the postsecondary level, 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	BCV0044	Cost Estimator	150 Hours	13-1051

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8725610	Blueprint Reading and Estimation	1 Credit	13-1051	2

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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 N/A, Language N/A, and Reading N/A. 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.

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. 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>).

Standards

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

- 01.0 Maintain blueprints.
- 02.0 Prepare sketches.
- 03.0 Develop basic blueprint reading skills.
- 04.0 Interpret mechanical drawings.
- 05.0 Interpret architectural drawings.
- 06.0 Interpret structural drawings.
- 07.0 Interpret electronic drawings.
- 08.0 Interpret pneumatic/hydraulic drawings.
- 09.0 Interpret charts and graphs.
- 10.0 Interpret maps drawings.
- 11.0 Estimate materials and cost.
- 12.0 Identify codes and standards.

- 13.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 14.0 Demonstrate mathematics knowledge and skills.
- 15.0 Demonstrate science knowledge and skills.
- 16.0 Solve problems using critical thinking skills, creativity and innovation.
- 17.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

**Program Title: Blueprint Reading and Estimation
PSAV Number: I469919**

**Course Number: BCV0044
Occupational Completion Point: A
Cost Estimator – 150 Hours – SOC Code 13-1051**

01.0 Maintain blueprints--The student will be able to:

- 01.01 Make a blueprint.
- 01.02 Maintain blueprints.

02.0 Prepare sketches--The student will be able to:

- 02.01 Use freehand techniques.
- 02.02 Prepare multi-view sketch drawings.
- 02.03 Prepare pictorial sketch drawings.

03.0 Develop basic blueprint reading skills--The student will be able to:

- 03.01 Apply math skills.
- 03.02 Read scales and measuring instruments.
- 03.03 Read and interpret multi-view drawings.
- 03.04 Read and interpret section views.
- 03.05 Read and interpret auxiliary views.
- 03.06 Read and interpret types of dimensions.
- 03.07 Read and interpret pictorial drawings.
- 03.08 Read and interpret supplementary information.

04.0 Interpret mechanical drawings--The student will be able to:

- 04.01 Read and interpret removable fastener drawings.
- 04.02 Read and interpret welding drawings.
- 04.03 Read and interpret geometric tolerances.
- 04.04 Read and interpret cam drawings.
- 04.05 Read and interpret gear drawings.
- 04.06 Read and interpret assembly and sub-assembly drawings.
- 04.07 Read and interpret detail drawings.
- 04.08 Read and interpret surface developments.
- 04.09 Read and interpret bearing drawings.
- 04.10 Read and interpret spring drawings.
- 04.11 Read and interpret casting drawings.
- 04.12 Read and interpret forging drawings.
- 04.13 Read and interpret tool drawings.
- 04.14 Read and interpret stamping drawings.
- 04.15 Read and interpret numerical control drawings.
- 04.16 Read and interpret computer aided drawings.

05.0 Interpret architectural drawings--The student will be able to:

- 05.01 Read and interpret plot plans.
- 05.02 Read and interpret foundation plan drawings.
- 05.03 Read and interpret floor plan drawings.
- 05.04 Read and interpret elevation drawings.
- 05.05 Read and interpret section views and details.
- 05.06 Read and interpret schedules.
- 05.07 Read and interpret stair details.
- 05.08 Read and interpret fireplace details.
- 05.09 Read and interpret truss drawings.
- 05.10 Read and interpret roof-framing plans.
- 05.11 Read and interpret electrical plans.
- 05.12 Read and interpret plumbing drawings.
- 05.13 Read and interpret heating/cooling plans.
- 05.14 Read and interpret landscape layout drawings.
- 05.15 Read and interpret specifications.

06.0 Interpret structural drawings--The student will be able to:

- 06.01 Read and interpret erection plans.
- 06.02 Read and interpret structural steel design drawings.
- 06.03 Read and interpret structural steel drawings.
- 06.04 Read and interpret concrete engineering drawings.
- 06.05 Read and interpret placing drawings.

07.0 Interpret electronic drawings--The student will be able to:

- 07.01 Read and interpret schematic drawings.
- 07.02 Read and interpret printed circuit board drawings.
- 07.03 Read and interpret package drawings.
- 07.04 Read and interpret connection drawings.
- 07.05 Read and interpret interconnection drawings.
- 07.06 Read and interpret wiring lists.
- 07.07 Read and interpret cable drawings.
- 07.08 Read and interpret harness drawings.
- 07.09 Read and interpret component drawings.
- 07.10 Read and interpret logic diagrams.
- 07.11 Read and interpret block diagrams.

08.0 Interpret pneumatic/hydraulic drawings--The student will be able to:

- 08.01 Read and interpret pictorial diagrams.
- 08.02 Read and interpret cutaway diagrams.
- 08.03 Read and interpret graphical diagrams.
- 08.04 Read and interpret combination diagrams.

09.0 Interpret charts and graphs--The student will be able to:

- 09.01 Read and interpret charts.

- 09.02 Read and interpret graphs.
- 10.0 Interpret map drawings--The student will be able to:
- 10.01 Read and interpret traverse drawings.
 - 10.02 Read and interpret plat drawings.
 - 10.03 Read and interpret street layout drawings.
 - 10.04 Read and interpret map drawings.
 - 10.05 Read and interpret topographic drawings.
- 11.0 Estimate materials and costs--The student will be able to:
- 11.01 Compile manufactured material take-offs.
 - 11.02 Compile construction take-offs.
 - 11.03 Compile mechanical equipment take-offs.
 - 11.04 Compile electrical/electronic take-offs.
 - 11.05 Compile labor costs.
 - 11.06 Compile equipment costs.
 - 11.07 Compile overhead costs.
- 12.0 Identify codes and standards--The student will be able to:
- 12.01 Identify construction codes and standards.
 - 12.02 Identify mechanical standards.
 - 12.03 Identify electronic standards.
- 13.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 13.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 13.02 Locate, organize and reference written information from various sources. CM3.0
 - 13.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 13.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 13.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 13.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 13.07 Exhibit public relations skills that aid in achieving customer satisfaction. M10.0
- 14.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 14.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 14.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 14.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 14.04 Demonstrate an understanding of federal, state and local taxes and their computation.
- 15.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 15.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 15.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 16.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 - 16.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 16.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 16.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 16.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 17.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
 - 17.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 17.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 17.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 17.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 17.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 17.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 17.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 17.08 Research the benefits of ongoing professional development. ECD9.0
 - 17.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: **Blueprint Reading and Estimation**
Course Number: **8725610**
Course Credit: **1**

Course Description:

This course is designed to provide instruction in demonstrating and understanding of the elements of blueprint reading and estimating as listed.

01.0 Maintain blueprints--The student will be able to:

- 01.01 Make a blueprint.
- 01.02 Maintain blueprints.

02.0 Prepare sketches--The student will be able to:

- 02.01 Use freehand techniques.
- 02.02 Prepare multi-view sketch drawings.
- 02.03 Prepare pictorial sketch drawings.

03.0 Develop basic blueprint reading skills--The student will be able to:

- 03.01 Apply math skills.
- 03.02 Read scales and measuring instruments.
- 03.03 Read and interpret multi-view drawings.
- 03.04 Read and interpret section views.
- 03.05 Read and interpret auxiliary views.
- 03.06 Read and interpret types of dimensions.
- 03.07 Read and interpret pictorial drawings.
- 03.08 Read and interpret supplementary information.

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- 04.04 Read and interpret cam drawings.
- 04.05 Read and interpret gear drawings.
- 04.06 Read and interpret assembly and sub-assembly drawings.
- 04.07 Read and interpret detail drawings.
- 04.08 Read and interpret surface developments.
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- 04.10 Read and interpret spring drawings.
- 04.11 Read and interpret casting drawings.
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- 04.13 Read and interpret tool drawings.
- 04.14 Read and interpret stamping drawings.

- 04.15 Read and interpret numerical control drawings.
- 04.16 Read and interpret computer aided drawings.

05.0 Interpret architectural drawings--The student will be able to:

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- 05.04 Read and interpret elevation drawings.
- 05.05 Read and interpret section views and details.
- 05.06 Read and interpret schedules.
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- 07.03 Read and interpret package drawings.
- 07.04 Read and interpret connection drawings.
- 07.05 Read and interpret interconnection drawings.
- 07.06 Read and interpret wiring lists.
- 07.07 Read and interpret cable drawings.
- 07.08 Read and interpret harness drawings.
- 07.09 Read and interpret component drawings.
- 07.10 Read and interpret logic diagrams.
- 07.11 Read and interpret block diagrams.

08.0 Interpret pneumatic/hydraulic drawings--The student will be able to:

- 08.01 Read and interpret pictorial diagrams.
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- 08.03 Read and interpret graphical diagrams.
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09.0 Interpret charts and graphs--The student will be able to:

- 09.01 Read and interpret charts.
- 09.02 Read and interpret graphs.
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 - 11.05 Compile labor costs.
 - 11.06 Compile equipment costs.
 - 11.07 Compile overhead costs.
- 12.0 Identify codes and standards--The student will be able to:
 - 12.01 Identify construction codes and standards.
 - 12.02 Identify mechanical standards.
 - 12.03 Identify electronic standards.
- 13.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
 - 13.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 13.02 Locate, organize and reference written information from various sources. CM3.0
 - 13.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 13.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 13.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 13.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 13.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 14.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
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 - 14.04 Demonstrate an understanding of federal, state and local taxes and their computation.

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 - 15.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 16.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 16.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 16.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 16.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 16.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 17.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 17.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 17.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 17.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 17.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 17.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 17.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 17.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 17.08 Research the benefits of ongoing professional development. ECD9.0
 - 17.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Electricity
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

	Secondary	PSAV
Program Number	8727200	I460312
CIP Number	0646030202	0646030202
Grade Level	9-12, 30, 31	30,31
Standard Length	8 Credits	1200 Hours
Teacher Certification	ELECTRICAL @7 7G	ELECTRICAL @7 7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	47-3013 - Helpers--Electricians 47-2111 - Electricians	47-3013 - Helpers--Electricians 47-2111 - Electricians
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	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries.

This program focuses on broad, transferable skills, stresses the understanding of all aspects of the electricity 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.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. The recommended sequence allows students to complete specified portions of a program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary level, 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	BCV0603	Electrician Helper	300 Hours	47-3013
B	BCV0640	Residential Electrician	450 Hours	47-2111
C	BCV0652	Commercial Electrician	450 Hours	47-2111

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

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8727210	Electricity 1	1 Credit	47-3013	2
	8727220	Electricity 2	1 Credit		2
B	8727230	Electricity 3	1 Credit	47-2111	3
	8727240	Electricity 4	1 Credit		3
	8727250	Electricity 5	1 Credit		3
C	8727260	Electricity 6	1 Credit	47-2111	3
	8727270	Electricity 7	1 Credit		3
	8727280	Electricity 8	1 Credit		3

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

Academic Alignment

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards contained in specific math and science core academic courses. This alignment resulted from a collaborative review by Career and Technical Education (CTE) teachers and core academic teachers. The table below contains the results of the alignment efforts. Data shown in the table includes the number of academic standards in the CTE course, the total number of math and science standards contained in the academic course, and the percentage of alignment to the CTE course. The following academic courses were included in the alignment (see code for use in table).

Academic Subject Area	Academic Course
Math	Algebra 1 (ALG1) Algebra 2 (ALG2) Geometry (GEO)
Science	Anatomy/Physiology Honors (APH) Astronomy Solar/Galactic Honors (ASGH) Biology 1 (BIO1) Chemistry 1 (CHM1) Earth-Space Science (ESS) Genetics (GEN) Marine Science 1 Honors (MS1H) Physical Science (PS) Physics 1 (PHY1)

Course	Math			Science								
	ALG1	ALG2	GEO	APH	ASGH	BIO1	CHM1	ESS	GEN	MS1H	PS	PHY1
Electricity 1	2/36 6%	3/41 7%	#	#	8/52 15%	3/56 5%	6/55 11%	6/58 10%	#	5/42 12%	11/56 20%	18/53 34%
Electricity 2	2/36 6%	7/41 17%	#	#	#	4/56 7%	1/55 2%	1/58 2%	1/35 3%	4/42 10%	4/56 7%	2/53 4%
Electricity 3	**	**	**	**	**	**	**	**	**	**	**	**
Electricity 4	**	**	**	**	**	**	**	**	**	**	**	**
Electricity 5	**	**	**	**	**	**	**	**	**	**	**	**
Electricity 6	**	**	**	**	**	**	**	**	**	**	**	**
Electricity 7	**	**	**	**	**	**	**	**	**	**	**	**
Electricity 8	**	**	**	**	**	**	**	**	**	**	**	**

** Alignment pending

Alignment attempted, but no correlation to academic course.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all

career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

(http://www.fl DOE.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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.fl DOE.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.

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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

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For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fl DOE.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. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (<http://www.fl DOE.org/articulation/CCD/default.asp>).

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate an understanding of basic electricity.
- 07.0 Read and interpret basic electric codes.
- 08.0 Apply mathematics knowledge and skills to electricity.
- 09.0 Demonstrate further understanding of electricity.
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate language arts knowledge and skills.
- 12.0 Demonstrate science knowledge and skills.
- 13.0 Demonstrate proficiency in electrical math problems and skills.

- 14.0 Use information technology tools.
- 15.0 Describe the importance of professional ethics and legal responsibilities.
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 17.0 Demonstrate Alternating-Current (AC) circuit skills.
- 18.0 Explain the importance of employability and entrepreneurship skills.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 21.0 Install residential wiring.
- 22.0 Install residential wiring systems.
- 23.0 Demonstrate proficiency in commercial wiring.
- 24.0 Demonstrate specialized electrical skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Electricity
PSAV Number: I460312

Course Number: BCV0603
Occupational Completion Point: A
Electrician Helper – 300 Hours – SOC Code 47-3013

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Create a disaster and/or emergency response plan. SHE2.0
 - 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
 - 01.08 Describe "Right-to-Know" Law as recorded in (29 CFR.1910.1200)
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:
- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
 - 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
 - 02.03 Lay out electrical devices, complying with regulations.
 - 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 03.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 03.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 03.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 03.04 Draw each type of circuit and calculate the circuit values.
 - 03.05 Explain and apply Ohm's Law.

- 03.06 Compute conductance and resistance of conductors and insulators.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 04.02 Locate, organize and reference written information from various sources. CM3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 05.0 Demonstrate mathematics knowledge and skills--The student will be able to:
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate an understanding of basic electricity--The student will be able to:
- 06.01 Explain the principles of electromagnetism.
 - 06.02 Explain the magnetic properties of circuits and devices.
 - 06.03 Relate electricity to the nature of matter.
 - 06.04 Describe various ways that electricity is produced.
- 07.0 Read and interpret basic electric codes--The student will be able to:
- 07.01 Describe the importance of following the local, state and national electric codes.
 - 07.02 Read and interpret basic electric codes, wiring plans and specifications.
 - 07.03 Identify licensure requirements for electrical occupations.
 - 07.04 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.
- 08.0 Apply mathematics knowledge and skills to electricity--The student will be able to:
- 08.01 Demonstrate Solve basic algebraic formulas related to electricity.
 - 08.02 Solve basic trigonometric functions related to electrical theory.
 - 08.03 Explain basic AC theory and solve related mathematical problems using appropriate test equipment.
 - 08.04 Solve math-related problems from measurements on training aids. (Optional)
- 09.0 Demonstrate further understanding of electricity--The student will be able to:
- 09.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.

- 09.02 Explain how voltage is produced by chemical, mechanical, thermal, photoelectric and piezo electric means.
- 09.03 Identify electrical symbols in construction documents.
- 10.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
 - 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 11.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
 - 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 11.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 12.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
 - 12.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 12.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

Course Number: BCV0640

Occupational Completion Point: B

Residential Electrician – 450 Hours -- SOC Code 47-2111

- 13.0 Demonstrate proficiency in electrical math problems and skills--The student will be able to:
 - 13.01 Calculate wiring costs.
 - 13.02 Draw an industrial electrical-wiring plan.
 - 13.03 Describe the use of high-voltage test equipment.
 - 13.04 Describe how to test insulation.
 - 13.05 Describe how to balance a load.
 - 13.06 Use electrical related math skills.
- 14.0 Use information technology tools--The students will be able to:
 - 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0

- 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 14.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 15.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 15.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 15.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 16.02 Describe the effect of money management on personal and career goals. FL3.0
- 16.03 Develop a personal budget and financial goals. FL3.1
- 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 16.05 Maintain financial records. FL3.3
- 16.06 Read and reconcile financial statements. FL3.4
- 16.07 Research, compare and contrast investment opportunities.
- 17.0 Demonstrate Alternating-Current (AC) circuit skills--The student will be able to:
- 17.01 Identify the physical and electrical characteristics of capacitors and inductors.
- 17.02 Demonstrate proficiency in measuring, testing and connecting a transformer.
- 17.03 Apply the principles of transformers to AC circuits.
- 17.04 Identify the properties of an AC signal.
- 17.05 Identify AC sources.
- 17.06 Analyze and apply the principles of transformers to AC circuits.
- 17.07 Analyze polyphase circuits.
- 17.08 Install a simple polyphase circuit.
- 18.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 18.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 18.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 18.06 Identify and exhibit traits for retaining employment. ECD7.0
- 18.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 18.08 Research the benefits of ongoing professional development. ECD9.0
- 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 19.01 Describe the nature and types of business organizations. SY1.0
 - 19.02 Explain the effect of key organizational systems on performance and quality.
 - 19.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 19.04 Explain the impact of the global economy on business organizations.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 20.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 20.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 20.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 20.04 Employ mentoring skills to inspire and teach others. LT5.0
- 21.0 Install residential wiring--The student will be able to:
- 21.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
 - 21.02 Draw a residential wiring plan, using electrical-wiring symbols.
 - 21.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
 - 21.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.
- 22.0 Install residential wiring systems--The student will be able to:
- 22.01 Install and wire a low-voltage signal system.
 - 22.02 Install conduit systems.
 - 22.03 Provide power for heating, ventilation, and air-conditioning equipment.
 - 22.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Service-entrance main panel
 - b. Service-entrance meter base
 - c. Alarm system/smoke detectors
 - 22.05 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
 - 22.06 Connect single-phase and three-phase transformers.
 - 22.07 Troubleshoot residential electric circuits.

Course Number: BCV0652

Occupational Completion Point: C

Commercial Electrician – 450 Hours -- SOC Code 47-2111

- 23.0 Demonstrate proficiency in commercial wiring--The student will be able to:

- 23.01 Read and interpret a commercial wiring plan and specifications.
 - 23.02 Draw a commercial electrical-wiring plan.
 - 23.03 Select tools, equipment, materials, and wires to complete a job.
 - 23.04 Install the following according to the plan and specifications, complying with appropriate electric codes:
 - a. Wire mold
 - b. Conduit, duct, and raceway systems
 - c. Conductors in a conduit
 - 23.05 Describe the difference between a residential and a commercial lighting circuit.
 - 23.06 Construct control circuits from schematics.
 - 23.07 Describe high-voltage (over 600V) wiring requirements.
 - 23.08 Demonstrate knowledge of installing wiring in hazardous areas.
 - 23.09 Explain a commercial three-phase receptacle circuit, and an emergency-lighting system.
 - 23.10 Explain commercial-service-entrance requirements.
- 24.0 Demonstrate specialized electrical skills--The student will be able to:
- 24.01 Explain solid-state control devices.
 - 24.02 Explain data cable installation according to the plan and specifications.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 1
Course Number: 8727210
Course Credit: 1

Course Description:

This course enables students to develop the essential competencies for working in the electrical industry. These competencies include safety practices, direct-current electrical-circuit skills, appropriate communication and math skills, basic electricity and electric codes.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	2/36 6%	Biology 1	3/56 5%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	8/52 15%
Algebra 2	3/41 7%	Chemistry 1	6/55 11%	Genetics	#	Marine Science 1 Honors	5/42 12%
Geometry	#	Physics 1	18/53 34%	Earth-Space Science	6/58 10%	Physical Science	11/56 20%

** Alignment pending

Alignment attempted, but no correlation to academic course.

01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 SC.912.L.17.8; SC.912.P.10.2

- 01.01 Clean the work area and maintain it in a safe condition.
- 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 01.03 Identify and operate workplace-safety electrical devices.
- 01.04 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.
- 01.05 Explain emergency procedures to follow in response to workplace accidents.
- 01.06 Create a disaster and/or emergency response plan. SHE2.0
- 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
- 01.08 Describe "Right-to-Know" Law as recorded in (29 CFR.1910.1200)

02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.5.1, 4, 5, 7; SC.912.P.10.1, 2, 3, 12, 21

- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
- 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
- 02.03 Lay out electrical devices, complying with regulations.
- 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - 02.05 Conductors and cable
 - 02.06 Standard outlets and switch boxes
 - 02.07 Explain cord connections on major appliances
 - 02.08 Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.

03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.2.1; MA.912.A.3.3; MA.912.A.5.3, 7; SC.912.P.8.3; SC.912.P.10.4, 5, 10, 13, 15, 18; SC.912.P.12.5, 9

- 03.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
- 03.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
- 03.03 Analyze, and explain a series, series-parallel, and parallel circuit.
- 03.04 Draw each type of circuit and calculate the circuit values.
- 03.05 Explain and apply Ohm's Law.
- 03.06 Compute conductance and resistance of conductors and insulators.

04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.2.1, 2; MA.912.A.10.1; SC.912.P.10.3

- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 04.02 Locate, organize and reference written information from various sources. CM3.0
- 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 04.05 Apply active listening skills to obtain and clarify information. CM7.0
- 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

05.0 Demonstrate mathematics knowledge and skills--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.1.4, 5; MA.912.A.10.1; SC.912.P.10.1, 2, 20; SC.912.P.12.1, 2, 5, 9

- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 05.03 Construct charts/tables/graphs using functions and data. AF3.5

06.0 Demonstrate an understanding of basic electricity--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
SC.912.E.5.2, 6; SC.912.L.17.10, 11, 13, 15, 19; SC.912.P.8.1, 3; SC.912.P.10.18, 21;
SC.912.P.12.5, 7, 9

- 06.01 Explain the principles of electromagnetism.
- 06.02 Explain the magnetic properties of circuits and devices.
- 06.03 Relate electricity to the nature of matter.
- 06.04 Describe various ways that electricity is produced.

07.0 Read and interpret basic electric codes--The student will be able to:

- 07.01 Describe the importance of following the local, state and national electric codes.
- 07.02 Read and interpret basic electric codes, wiring plans and specifications.
- 07.03 Identify licensure requirements for electrical occupations.
- 07.04 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 2
Course Number: 8727220
Course Credit: 1

Course Description:

This course enables students to develop competencies related to math and science applications in electricity.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Math		Science					
Algebra 1	2/36 6%	Biology 1	4/56 7%	Anatomy/Physiology Honors	#	Astronomy Solar/Galactic Honors	#
Algebra 2	7/41 7%	Chemistry 1	1/55 2%	Genetics	1/35 3%	Marine Science 1 Honors	4/42 10%
Geometry	#	Physics 1	2/53 4%	Earth-Space Science	1/58 2%	Physical Science	4/56 7%

** Alignment pending

Alignment attempted, but no correlation to academic course.

08.0 Apply mathematics knowledge and skills to electricity--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 MA.912.A.2.1; MA.912.A.3.3; MA.912.A.5.1, 3, 4, 5, 7; MA.912.A.6.5; MA.912.A.8.5;
 MA.912.T.2.1; SC.912.P.10.26

- 08.01 Demonstrate Solve basic algebraic formulas related to electricity.
- 08.02 Solve basic trigonometric functions related to electrical theory.
- 08.03 Explain basic AC theory and solve related mathematical problems using appropriate test equipment.
- 08.04 Solve math-related problems from measurements on training aids. (Optional)

09.0 Demonstrate further understanding of electricity--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
 MA.912.A.2.1, 2; MA.912.A.8.7; SC.912.P.10.3, 4

- 09.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.
- 09.02 Explain how voltage is produced by chemical, mechanical, thermal, photoelectric and piezo electric means.
- 09.03 Identify electrical symbols in construction documents.

10.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.10.1

- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0

11.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0

This standard supports the following Next Generation Sunshine State Standards:
MA.912.A.2.1

- 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 11.03 Present information formally and informally for specific purposes and audiences. AF2.9

12.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

This standard supports the following Next Generation Sunshine State Standards:
SC.912.L.17.8, 10, 11, 13, 15, 17, 19, 20

- 12.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 12.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 3
Course Number: 8727230
Course Credit: 1

Course Description:

This course provides students with electrical math skills.

- 13.0 Demonstrate proficiency in electrical math problems and skills--The student will be able to:
- 13.01 Calculate wiring costs.
 - 13.02 Draw an industrial electrical-wiring plan.
 - 13.03 Describe the use of high-voltage test equipment.
 - 13.04 Describe how to test insulation.
 - 13.05 Describe how to balance a load.
 - 13.06 Use electrical related math skills.
- 14.0 Use information technology tools--The students will be able to:
- 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 14.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 15.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 15.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 15.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 16.02 Describe the effect of money management on personal and career goals. FL3.0
 - 16.03 Develop a personal budget and financial goals. FL3.1

- | | | |
|-------|---|-------|
| 16.04 | Complete financial instruments for making deposits and withdrawals. | FL3.2 |
| 16.05 | Maintain financial records. | FL3.3 |
| 16.06 | Read and reconcile financial statements. | FL3.4 |
| 16.07 | Research, compare and contrast investment opportunities. | |

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 4
Course Number: 8727240
Course Credit: 1

Course Description:

This course enables students to develop the competencies needed for employment in the residential electrical industry. These competencies include electrical math, alternating-current circuit, and troubleshooting residential electric circuits.

17.0 Demonstrate Alternating-Current (AC) circuit skills--The student will be able to:

- 17.01 Identify the physical and electrical characteristics of capacitors and inductors.
- 17.02 Demonstrate proficiency in measuring, testing and connecting a transformer.
- 17.03 Apply the principles of transformers to AC circuits.
- 17.04 Identify the properties of an AC signal.
- 17.05 Identify AC sources.
- 17.06 Analyze and apply the principles of transformers to AC circuits.
- 17.07 Analyze poly-phase circuits.
- 17.08 Install a simple poly-phase circuit.

18.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:

- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 18.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 18.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 18.06 Identify and exhibit traits for retaining employment. ECD7.0
- 18.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 18.08 Research the benefits of ongoing professional development. ECD9.0
- 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 19.01 Describe the nature and types of business organizations. SY1.0
- 19.02 Explain the effect of key organizational systems on performance and quality.
- 19.03 List and describe quality control systems and/or practices common to the workplace. SY2.0

- 19.04 Explain the impact of the global economy on business organizations.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 20.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 20.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 20.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 20.04 Employ mentoring skills to inspire and teach others. LT5.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 5
Course Number: 8727250
Course Credit: 1

Course Description:

This course enables students to develop competencies in the installation of residential wiring.

21.0 Install residential wiring--The student will be able to:

- 21.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
- 21.02 Draw a residential wiring plan, using electrical-wiring symbols.
- 21.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
- 21.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 6
Course Number: 8727260
Course Credit: 1

Course Description:

This course provides students with an in-depth knowledge of the installation of residential wiring.

22.0 Install residential wiring systems--The student will be able to:

- 22.01 Install and wire a low-voltage signal system.
- 22.02 Install conduit systems.
- 22.03 Provide power for heating, ventilation, and air-conditioning equipment.
- 22.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Service-entrance main panel
 - b. Service-entrance meter base
 - c. Alarm system/smoke detectors
- 22.05 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
- 22.06 Connect single-phase and three-phase transformers.
- 22.07 Troubleshoot residential electric circuits.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 7
Course Number: 8727270
Course Credit: 1

Course Description:

This course enables students to develop competencies for commercial wiring installation.

23.0 Demonstrate proficiency in commercial wiring--The student will be able to:

- 23.01 Read and interpret a commercial wiring plan and specifications.
- 23.02 Draw a commercial electrical-wiring plan.
- 23.03 Select tools, equipment, materials, and wires to complete a job.
- 23.04 Install the following according to the plan and specifications, complying with appropriate electric codes:
 - a. Wire mold
 - b. Conduit, duct, and raceway systems
 - c. Conductors in a conduit
- 23.05 Describe the difference between a residential and a commercial lighting circuit.
- 23.06 Construct control circuits from schematics.
- 23.07 Describe high-voltage (over 600V) wiring requirements.
- 23.08 Demonstrate knowledge of installing wiring in hazardous areas.
- 23.09 Explain a commercial three-phase receptacle circuit, and an emergency-lighting system.
- 23.10 Explain commercial-service-entrance requirements.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Electricity 8
Course Number: 8727280
Course Credit: 1

Course Description:

This course enables students to develop specialized skills in electricity.

24.0 Demonstrate specialized electrical skills--The student will be able to:

24.01 Explain solid-state control devices.

24.02 Explain data cable installation according to the plan and specifications.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Civil Engineering Aide
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

Secondary – Career Preparatory	
Program Number	8915000
CIP Number	0715029901
Grade Level	9-12, 30, 31
Standard Length	4 Credits
Teacher Certification	TEC CONSTR @7 7G TEC EN AID @7 SURVEY 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3031 - Surveying and Mapping Technicians
Facility Code	263 - 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 entry level employment as surveying technicians, mapping technicians, and surveyor's helpers assisting civil engineers, surveyors, urban planners or civil engineering aides.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point. When the recommended sequence is followed, the structure will allow students to complete specific portions of the program for employment or continue in training programs. A student who completes the applicable competencies at any occupational completion point may either continue with a training program or become an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8915010	Civil Engineering Aide 1	1 Credit	17-3031	2
	8915020	Civil Engineering Aide 2	1 Credit		2
	8915030	Civil Engineering Aide 3	1 Credit		3
	8915040	Civil Engineering Aide 4	1 Credit		3

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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 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 (ESE) will need modifications to meet their special 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(s)/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. 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>).

Standards

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

- 01.0 Demonstrate mathematics knowledge and skills.
- 02.0 Demonstrate algebraic and geometric math skills using concrete and graphic models.
- 03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 04.0 Demonstrate language arts knowledge and skills.
- 05.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 06.0 Assist civil engineers in collecting and analyzing soil samples.
- 07.0 Demonstrate the use of survey and mapping instruments to perform level surveys.
- 08.0 Identify uses of photographic equipment.
- 09.0 Demonstrate beginning knowledge of grading and drainage concepts.
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate the use of survey instruments to conduct boundary surveys.
- 12.0 Understand basic concepts of structures.
- 13.0 Demonstrate model building, using civil engineering principles.
- 14.0 Use information technology tools.
- 15.0 Assist transportation planners in obtaining information for traffic engineering.
- 16.0 Prepare project drawings and supporting documents.
- 17.0 Describe the importance of professional ethics and legal responsibilities of the business of civil engineering.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Explain the importance of employability and entrepreneurship skills.
- 20.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 21.0 Identify the purposes and uses of civil engineering documents and/or forms.
- 22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 23.0 Identify the environmental impact of a civil engineering project.
- 24.0 Describe the economics of civil engineering projects.
- 25.0 Use project scheduling software.
- 26.0 Demonstrate understanding of water and wastewater systems.
- 27.0 Identify the required licensing and certifications for civil engineering.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Civil Engineering Aide 1
Course Number: 8915010
Course Credit: 1

Course Description:

This course provides basic mathematical, scientific, or technical aspects of civil engineering. Work place safety and communication skills are included.

01.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

01.01 Demonstrate knowledge of arithmetic operations. AF3.2

01.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

01.03 Construct charts/tables/graphs using functions and data. AF3.5

02.0 Demonstrate algebraic and geometric math skills using concrete and graphic models--
The student will be able to:

02.01 Calculate missing elements of right triangles using the Pythagorean Theorem and trigonometric functions.

02.02 Calculate volume and area of rectangles, squares, triangles, parallelograms, cylinders, cones, and spheres.

02.03 Collect, read, analyze, interpret, and report on data in graphs, charts, spreadsheets, and tables.

02.04 Measure dimensions of time, temperature, distance, capacity and mass/weight using real life models and computer simulations.

02.05 Make and apply measurements to include, but not limited to, distance, perimeter, area, volume, force, shear and pressure (load) in both traditional and metric units.

02.06 Make estimates and approximations and judge the feasibility of the result.

03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

03.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0

03.02 Locate, organize and reference written information from various sources. CM3.0

03.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0

03.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0

03.05 Apply active listening skills to obtain and clarify information. CM7.0

03.06 Develop and interpret tables and charts to support written and oral communications. CM8.0

03.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

03.08 Define civil engineering terms by use of structural analysis, decoding, and contextual clues or by using a dictionary.

- 04.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 04.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 04.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 04.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 05.01 Identify hazards related to civil engineering and prevention of injury.
 - 05.02 Describe and practice safety techniques related to confined entry conditions, handling chemicals and materials, spill controls, etc.
 - 05.03 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 05.04 Explain emergency procedures to follow in response to workplace accidents.
 - 05.05 Create a disaster and/or emergency response plan. SHE2.0
- 06.0 Assist civil engineers in collecting and analyzing soil samples--The student will be able to:
- 06.01 Understand why soil samples are collected and tested.
 - 06.02 Demonstrate the procedures used to prepare soil samples for testing.
 - 06.03 Show ability to take a disturbed soil sample.
- 07.0 Demonstrate the use of survey and mapping instruments to perform level surveys--The student will be able to:
- 07.01 Demonstrate knowledge and use of survey equipment.
 - 07.02 Perform a level survey.
 - 07.03 Read and analyze a topographic contour map.
 - 07.04 Generate topographic contours from field notes.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Civil Engineering Aide 2
Course Number: 8915020
Course Credit: 1

Course Description:

This course provides instruction in beginning photography, drainage and geological concepts. Students will be introduced to the use of the computer in civil engineering. Practical application of concepts will be demonstrated through model building.

- 08.0 Identify uses of photographic equipment--The student will be able to:
- 08.01 Understand documentation and record-keeping purposes and procedures.
 - 08.02 Understand legal, environmental and public relations applications of visual records.
 - 08.03 Demonstrate proper use of photographic equipment.
- 09.0 Demonstrate beginning knowledge of grading and drainage concepts--The student will be able to:
- 09.01 Demonstrate knowledge of hydraulic flow through use of correct mathematical formulas and report analysis.
 - 09.02 Recognize soil types and land cover as related to runoff.
 - 09.03 Recognize erosion, non point-source pollution and erosion control methods.
- 10.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 11.0 Demonstrate the use of survey instruments to conduct boundary surveys--The student will be able to:
- 11.01 Perform boundary survey.
 - 11.02 Perform boundary survey closing from field notes.
 - 11.03 Demonstrate knowledge and use of survey equipment.
- 12.0 Understand basic concepts of structures--The student will be able to:
- 12.01 Identify the forces of equilibrium (both internal and external).
 - 12.02 Describe how strength of material affects the overall balance of a structure.
 - 12.03 Perform a simple structure analysis.

12.04 Understand factors of safety.

13.0 Demonstrate model building, using civil engineering principles--The student will be able to:

13.01 Develop the sense of scale.

13.02 Participate in a model building project.

13.03 Perform simple structure analysis.

14.0 Use information technology tools--The students will be able to:

14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0

14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0

14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0

14.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Civil Engineering Aide 3
Course Number: 8915030
Course Credit: 1

Course Description:

This course provides laboratory experiences and begins preparing students for the practicum. Instruction in beginning surveying, drafting, and business related skills are included.

15.0 Assist transportation planners in obtaining information for traffic engineering--The student will be able to:

- 15.01 Collect and interpret data for origin/destination studies.
- 15.02 Collect and analyze traffic signal timing data.
- 15.03 Perform traffic counts.
- 15.04 Collect and interpret demographic data.
- 15.05 Understand traffic terminology such as peak hour and average daily trips, etc.
- 15.06 Understand the importance of an urban transportation plan.
- 15.07 Develop an urban transportation plan.

16.0 Prepare project drawings and supporting documents--The student will be able to:

- 16.01 Demonstrate the ability to read and interpret civil engineering drawings.
- 16.02 Use an engineering scale to measure plans.
- 16.03 Prepare site plan and grading and drainage plan.
- 16.04 Plot roadway cross sections, plan and profiles.
- 16.05 Prepare roadway typical section templates.
- 16.06 Use computer-aided drafting and design (CADD) to create drawing files.

17.0 Describe the importance of professional ethics and legal responsibilities of the business of civil engineering--The student will be able to:

- 17.01 Describe the role and job descriptions of civil engineering staff members.
- 17.02 Describe the roles and responsibilities of various entities involved in a construction project (contractor, supplier, engineer, owner, government and lending agencies).
- 17.03 Describe the roles of agencies and their purposes: OSHA, ASTM, ACI, ASSHTO, and FDOT.
- 17.04 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 17.05 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 17.06 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 17.07 Interpret and explain written organizational policies and procedures. ELR2.0

18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 18.01 Describe the nature and types of business organizations. SY1.0
- 18.02 Explain the effect of key organizational systems on performance and quality.
- 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 18.04 Explain the impact of the global economy on business organizations.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Course Title: Civil Engineering Aide 4
Course Number: 8915040
Course Credit: 1

Course Description:

This course provides practical experience in the civil engineering industry. Students will demonstrate employability skills. It is a practicum that covers all aspects of Civil Engineering Aide employment. Civil Engineering Aide 1, 2, and 3 are pre-requisites to this course.

19.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 19.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
- 19.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
- 19.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 19.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 19.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 19.06 Identify and exhibit traits for retaining employment. ECD7.0
- 19.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 19.08 Research the benefits of ongoing professional development. ECD9.0
- 19.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

20.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 20.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 20.02 Describe the effect of money management on personal and career goals. FL3.0
- 20.03 Develop a personal budget and financial goals. FL3.1
- 20.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 20.05 Maintain financial records. FL3.3
- 20.06 Read and reconcile financial statements. FL3.4
- 20.07 Research, compare and contrast investment opportunities.

21.0 Identify the purposes and uses of civil engineering documents and/or forms--The student will be able to:

- 21.01 Describe the civil engineering uses of a Patent notebook and/or diary.
- 21.02 Describe the laboratory Comprehensive Quality Assurance Plan (COMP-QAP) as it relates to civil engineering testing procedures.
- 21.03 Identify sources of errors in forms and demonstrate techniques for minimizing errors.

22.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 22.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 22.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 22.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 22.04 Employ mentoring skills to inspire and teach others. LT5.0
- 23.0 Identify the environmental impact of a civil engineering project--The student will be able to:
- 23.01 Explain the importance of sustainable design.
 - 23.02 Explain the importance and impact of environmental regulations.
 - 23.03 Describe the environmental permitting procedures.
 - 23.04 Understand how environmental rules and laws are mandated.
- 24.0 Describe the economics of civil engineering projects--The student will be able to:
- 24.01 Understand basic economic terms.
 - 24.02 Understand life cycle of projects.
 - 24.03 Identify the required licensing for civil engineering.
- 25.0 Use project scheduling software--The student will be able to:
- 25.01 Apply factors such as project costs, critical path, milestones and duration to project schedules.
 - 25.02 Prepare Gant and a Pert charts.
- 26.0 Demonstrate understanding of water and wastewater systems--The student will be able to:
- 26.01 Explain and diagram water cycle.
 - 26.02 Describe drinking water sources, contaminants, disposal options, regulations and basic treatment methods.
 - 26.03 Perform basic pipe and pump sizing calculations for the movement of water.
 - 26.04 Understand gravity and forced systems.
- 27.0 Identify the required licensing and certifications for civil engineering--The student will be able to:
- 27.01 Identify education, experience and testing requirements.
 - 27.02 Understand ramifications of unlicensed engineering.
 - 27.03 Understand the need for continuing education.
 - 27.04 Discuss the education, experience and certification and/or licensure requirements of various workers of the civil engineering and related fields.
 - 27.05 Investigate areas of specialty in civil engineering.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Drafting PSAV
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	C100200
CIP Number	0615130100
Grade Level	30,31
Standard Length	1500 Hours
Teacher Certification	BLDG CONSTR @7 7G DRAFTING @7 7G TEC DRAFT 7G TEC CONSTR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters, 17-3013 - Mechanical Drafters, 17-3019 – Drafters, 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: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the drafting industry.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of seven occupational completion points. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or become an occupational completer.

When offered at the postsecondary level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TDR0070	Blueprint Reader	150 Hours	17-3011
B	TDR0370	Drafting Assistant	450 Hours	17-3011
C	TDR0775	Drafting Detailer 1	150 Hours	17-3011
	TDR0776	Drafting Detailer 2	150 Hours	
D	TDR0570	Architectural Drafter	150 Hours	17-3011
E	TDR0874	Civil Drafter	150 Hours	17-3011
F	TDR0777	Mechanical Drafter	150 Hours	17-3013
G	TDR0875	Structural Drafter	150 Hours	17-3019

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Apply basic drafting skills.
- 02.0 Apply fundamental computer skills.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Prepare multi-view drawings.
- 06.0 Prepare sectional views.
- 07.0 Prepare auxiliary drawings.
- 08.0 Apply basic dimensioning.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Use information technology tools.
- 11.0 Prepare pictorial drawings.
- 12.0 Prepare surface developments.
- 13.0 Prepare basic architectural drawings.
- 14.0 Solve problems using critical thinking skills, creativity and innovation.
- 15.0 Demonstrate an understanding of basic civil drawings.
- 16.0 Demonstrate basic electrical/electronic literacy.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 19.0 Perform basic computer aided drafting functions.

- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 21.0 Demonstrate applied math skills.
- 22.0 Demonstrate science knowledge and skills.
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Explain the importance of employability and entrepreneurship skills.
- 26.0 Prepare Pictorial Drawings.
- 27.0 Prepare computer aided 3-D architectural drawings.
- 28.0 Prepare architectural multi-level residential drawings.
- 29.0 Prepare a basic plot plan drawing.
- 30.0 Prepare a basic site plan drawing.
- 31.0 Prepare a basic landscape plan drawing.
- 32.0 Prepare computer aided mechanical working drawings.
- 33.0 Prepare computer aided 3-D mechanical drawings.
- 34.0 Prepare typical wall section.
- 35.0 Prepare foundation plan drawing.
- 36.0 Prepare a basic electrical plan drawing.
- 37.0 Prepare a basic HVAC plan drawing.
- 38.0 Prepare a basic plumbing plan drawing.
- 39.0 Prepare architectural drawings for a commercial building.
- 40.0 Prepare advanced computer aided drawings.
- 41.0 Prepare basic building utility drawings.
- 42.0 Prepare presentation drawings.
- 43.0 Prepare map drawings.
- 44.0 Prepare computer aided map details.
- 45.0 Understand surveying and mapping procedures.
- 46.0 Prepare basic civil drawings.
- 47.0 Prepare advanced map drawings.
- 48.0 Prepare advanced civil drawings.
- 49.0 Prepare advanced mechanical drawings.
- 50.0 Prepare production drawings.
- 51.0 Prepare pneumatic/hydraulic drawings.
- 52.0 Prepare pneumatic/hydraulic drawings.
- 53.0 Prepare advanced architectural drawings.
- 54.0 Prepare structural details.
- 55.0 Prepare structural steel drawings.
- 56.0 Prepare reinforced concrete drawings.
- 57.0 Prepare structural wood drawings.
- 58.0 Prepare advanced computer aided drawings, two-dimensional and three dimensional.

- 04.05 Solve geometry problems.
 - 04.06 Apply multiple discipline calculations.
 - 04.07 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.08 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.09 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 04.10 Demonstrate an understanding of federal, state and local taxes and their computation
- 05.0 Prepare multi-view drawings--The student will be able to:
- 05.01 Prepare multi-view freehand sketches.
 - 05.02 Select proper drawing scale, views and layout.
 - 05.03 Prepare drawings containing horizontal and vertical surfaces.
 - 05.04 Prepare drawings containing circles and/or arcs.
 - 05.05 Prepare drawings incorporating removed details and conventional breaks.
- 06.0 Prepare sectional views--The student will be able to:
- 06.01 Prepare drawings containing full sections and half sections
 - 06.02 Prepare drawings containing offset sections.
 - 06.03 Prepare drawings containing revolved sections.
 - 06.04 Prepare drawings containing removed sections and broken-out sections.
 - 06.05 Prepare a sectional assembly drawing applying material symbols.
- 07.0 Prepare auxiliary drawings--The student will be able to:
- 07.01 Prepare drawings containing primary auxiliary views.
 - 07.02 Prepare drawings containing auxiliary views that include curved lines.
- 08.0 Apply basic dimensioning--The student will be able to:
- 08.01 Prepare drawings containing linear, angular, and circular standard dimensions.
 - 08.02 Prepare drawings using metric dimensions.
 - 08.03 Prepare drawings using general and local notes.
 - 08.04 Apply basic tolerance techniques.
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 09.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 10.0 Use information technology tools--The students will be able to:

- 10.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 10.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

- 11.0 Prepare pictorial drawings--The student will be able to:
 - 11.01 Prepare isometric, oblique and other pictorial drawings.
 - 11.02 Prepare one- and two-point perspectives.

- 12.0 Prepare surface developments--The student will be able to:
 - 12.01 Prepare developments of prisms, cylinders, cones and pyramids.
 - 12.02 Prepare developments of a transition piece.
 - 12.03 Prepare drawings involving intersecting pieces.

- Course Number: TDR0370**
- Occupational Completion Point: B**
- Drafting Assistant – 450 Hours – SOC Code 17-3011**

- 13.0 Prepare basic architectural drawings--The student will be able to:
 - 13.01 Prepare site plan.
 - 13.02 Prepare floor plan.
 - 13.03 Prepare exterior elevations.
 - 13.04 Prepare roof plan.

- 14.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
 - 14.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 14.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 14.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 14.04 Conduct technical research to gather information necessary for decision-making. PS4.0

- 15.0 Demonstrate understanding of basic civil drawings--The student will be able to:
 - 15.01 Understand civil terminology.
 - 15.02 Read and interpret civil drawings.
 - 15.03 Prepare plan and profile drawings.
 - 15.04 Develop topographic drawings.

- 16.0 Demonstrate basic electrical/electronic literacy--The student will be able to:
 - 16.01 Identify electrical/electronic symbols.

- 16.02 Prepare schematic/block diagrams.
- 17.0 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:
- 17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 17.02 Explain emergency procedures to follow in response to workplace accidents.
- 17.03 Create a disaster and/or emergency response plan. SHE2.0
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 18.01 Describe the nature and types of business organizations. SY1.0
- 18.02 Explain the effect of key organizational systems on performance and quality.
- 18.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 18.04 Explain the impact of the global economy on business organizations.
- 19.0 Perform basic computer aided drafting functions--The student will be able to:
- 19.01 Perform drawing set up.
- 19.02 Construct geometric figures of lines, splines, circles, and arcs.
- 19.03 Create and edit text using appropriate style and size to annotate drawings.
- 19.04 Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- 19.05 Identify, create, store and use standard part symbols and libraries.
- 19.06 Utilize editing commands.
- 19.07 Control entity properties by layer, color and line type.
- 19.08 Use viewing commands to perform zooming and panning.
- 19.09 Plot drawings on media using layout and scale.
- 19.10 Minimize file size.
- 19.11 Use query commands to interrogate database for entity characteristics, distance, area and status.
- 19.12 Apply standard dimensioning rules.
- 20.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 20.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 20.02 Locate, organize and reference written information from various sources. CM3.0
- 20.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 20.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 20.05 Apply active listening skills to obtain and clarify information. CM7.0
- 20.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 20.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

- 21.0 Demonstrate applied math skills--The student will be able to:
- 21.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 21.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 22.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 23.02 Describe the effect of money management on personal and career goals. FL3.0
 - 23.03 Develop a personal budget and financial goals. FL3.1
 - 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 23.05 Maintain financial records. FL3.3
 - 23.06 Read and reconcile financial statements. FL3.4
 - 23.07 Research, compare and contrast investment opportunities.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT 1.0
 - 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 24.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 24.04 Employ mentoring skills to inspire and teach others. LT5.0
- 25.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
 - 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 25.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 25.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 25.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 25.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 25.08 Research the benefits of ongoing professional development. ECD9.0
 - 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 25.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

Course Number: TDR0775
Occupational Completion Point:
Drafting Industries 1 – 150 Hours – SOC Code 17-3011

- 26.0 Prepare Pictorial Drawings--The students will be able to:
- 26.01 Prepare isometric drawings.
 - 26.02 Prepare oblique drawings.
 - 26.03 Prepare perspectives.
- 27.0 Prepare computer aided 3-D architectural drawings--The students will be able to:
- 27.01 Pictorial Floor Plan.
 - 27.02 Pictorial Isometric Exterior Views.
 - 27.03 Pictorial Perspective Exterior Views.
- 28.0 Prepare architectural multi-level residential drawings--The students will be able to:
- 28.01 Prepare First floor plan.
 - 28.02 Prepare Second floor plan.
 - 28.03 Prepare basic roof layout drawing.
 - 28.04 Prepare 2-Story elevation drawing.
- 29.0 Prepare a basic plot plan drawing--The students will be able to:
- 29.01 Layout a residential plot.
 - 29.02 Indicate plot size and limits.
 - 29.03 Indicate plot orientation.
 - 29.04 Layout public street and sidewalk.
 - 29.05 Layout public utility lines
 - 29.06 Write a Plot Legal Description.
- 30.0 Prepare a basic site plan drawing--The students will be able to:
- 30.01 Layout basic plot specifications.
 - 30.02 Dimension building location.
 - 30.03 Layout and label specialty features-(patio/pool/spa/gazebo).
- 31.0 Prepare a basic landscape plan drawing--The students will be able to:
- 31.01 Layout landscape features.
 - 31.03 Develop a schedule of plants / shrubs.
 - 31.02 Develop a list of landscape symbols.

Course Number: TDR0776
Occupational Completion Point: C
Drafting Industries 2 – 150 Hours – SOC Code 17-3011

- 32.0 Prepare computer aided mechanical working drawings--The students will be able to:
- 32.01 Prepare Multi-view drawings applying CAD techniques.

- 32.02 Prepare Dimensioned drawings applying CAD techniques.
- 32.03 Prepare Drawings with Bill of Materials.
- 33.0 Prepare computer aided 3-D mechanical drawings--The students will be able to:
 - 33.01 Prepare a pictorial drawing of a mechanical device.
 - 33.02 Prepare a dimensioned pictorial drawing.
- 34.0 Prepare typical wall section--The students will be able to:
 - 34.01 Prepare a 2 story residence wall section using CAD techniques.
 - 34.02 Apply materials symbols.
 - 34.03 Apply notes and dimensions to a typical wall section.
- 35.0 Prepare foundation plan drawing--The students will be able to:
 - 35.01 Prepare a foundation plan drawing for a 2 story residence.
 - 35.02 Apply symbols and a footing schedule to foundation drawing.
- 36.0 Prepare a basic electrical plan drawing--The students will be able to:
 - 36.01 Prepare an electrical plan for a residence.
 - 36.02 Apply electrical plan list of symbols to electrical plan.
- 37.0 Prepare a basic HVAC plan drawing--The students will be able to:
 - 37.01 Prepare an HVAC plan for a residence.
 - 37.02 Apply HVAC plan list of symbols to HVAC plan.
- 38.0 Prepare a basic plumbing plan drawing--The students will be able to:
 - 38.01 Prepare a plumbing plan for a residence.
 - 38.02 Apply plumbing plan list of symbols to plumbing plan.

Course Number: TDR0570

Occupational Completion Point: D

Architectural Drafter – 150 Hours – SOC Code 17-3011

- 39.0 Prepare architectural drawings for a commercial building--The student will be able to:
 - 39.01 Interpret catalogs, specifications, technical tables, codes and ordinances for commercial buildings.
 - 39.02 Prepare floor plan, with dimensions for a Commercial Bldg.
 - 39.03 Prepare foundation plan and detail drawings, with dimensions.
 - 39.04 Prepare roof plan.
 - 39.05 Prepare elevation drawings.
 - 39.06 Prepare sections and details.
 - 39.07 Prepare schedules and cost estimates.
- 40.0 Prepare advanced computer aided drawings--The student will be able to:

- 40.01 Produce 3-D architectural drawings for a Commercial Bldg.
- 40.02 Produce structural plans and detail drawings.
- 40.03 Produce civil drawings.

41.0 Prepare basic building utility drawings--The student will be able to:

- 41.01 Prepare electrical plans and schedules for a Commercial Bldg.
- 41.02 Prepare HVAC plans and schedules.
- 41.03 Prepare plumbing plans, riser diagram, and schedules.

42.0 Prepare presentation drawings--The student will be able to:

- 42.01 Produce pictorial drawings for a Commercial Building.
- 42.02 Prepare color presentation pictorial drawings.
- 42.03 Prepare a dynamic presentation zoom views or walk-thru.
- 42.04 Produce a drawing portfolio.

Course Number: TDR0874

Occupational Completion Point: E

Civil Drafter – 150 Hours – SOC Code 17-3011

43.0 Prepare map drawings--The student will be able to:

- 43.01 Prepare traverse drawings.
- 43.02 Prepare plat drawings.
- 43.03 Prepare street layout drawings.
- 43.04 Prepare map drawings.

44.0 Prepare computer aided map details--The student will be able to:

- 44.01 Draft range, section and township map.
- 44.02 Prepare a map using bearings.
- 44.03 Prepare a map using coordinates.
- 44.04 Convert map into metric dimensions.

45.0 Understand surveying and mapping procedures--The student will be able to:

- 45.01 Employ basic mapping specifications.
- 45.02 Interpret aerial photogrammetry.
- 45.03 Employ horizontal measures.
- 45.04 Employ leveling procedures.
- 45.05 Obtain angular measurements.
- 45.06 Interpret legal descriptions.

46.0 Prepare basic civil drawings--The student will be able to:

- 46.01 Prepare topographic drawings.
- 46.02 Prepare drainage drawings.
- 46.03 Prepare highway drawings.

47.0 Prepare advanced map drawings--The student will be able to:

- 47.01 Prepare traverse drawings.
- 47.02 Prepare street layout drawings.
- 47.03 Prepare advanced map drawings.
- 47.04 Prepare highway drawings.
- 47.05 Prepare topographic drawings.

48.0 Prepare advanced civil drawings--The student will be able to:

- 48.01 Prepare drainage drawings.
- 48.02 Prepare plat drawings.
- 48.03 Prepare advanced plan and profile drawings.
- 48.04 Prepare utility drawings.
- 48.05 Prepare a commercial site plan.

Course Number: TDR0777

Occupational Completion Point: F

Mechanical Drafter – 150 Hours – SOC Code 17-3013

49.0 Prepare advanced mechanical drawings --The student will be able to:

- 49.01 Resolve problems by descriptive geometry and revolutions.
- 49.02 Prepare advance surface drawings.
- 49.03 Identify the various manufacturing methods.
- 49.04 Use precision dimensioning to include geometric characters.
- 49.05 Make engineering changes on drawings.
- 49.06 Prepare fastener drawings.
- 49.07 Prepare cam calculations and drawings.
- 49.08 Prepare gear calculations.
- 49.09 Prepare spring calculations and drawings.

50.0 Prepare production drawings-- Using 3-D CAD techniques, the student will be able to:

- 50.01 Make a design layout drawing.
- 50.02 Make detail drawings.
- 50.03 Make pattern shop detail drawings.
- 50.04 Make casting drawings.
- 50.05 Make forging detail drawings.
- 50.06 Make machining detail drawings.
- 50.07 Make stamping drawings.
- 50.08 Make welding drawings.
- 50.09 Make assembly drawings.
- 50.10 Prepare installation drawings.

51.0 Prepare pneumatic/hydraulic drawings--The student will be able to:

- 51.01 Prepare piping drawings.
- 51.02 Prepare pictorial piping drawings.
- 51.03 Prepare sectional drawings.
- 51.04 Prepare diagrams.

52.0 Prepare tool drawings-- Using 3-D CAD techniques, the student will be able to:

- 52.01 Design jigs and fixtures.
- 52.02 Design cutting dies.
- 52.03 Design forming dies.

Course Number: TDR0875

Occupational Completion Point: G

Structural Drafter – 150 Hours – SOC Code 17-3019

53.0 Prepare advanced architectural drawings--The student will be able to:

- 53.01 Prepare advanced floor plan drawings.
- 53.02 Prepare advanced foundation plan drawings.
- 53.03 Prepare advanced detailed drawings.

54.0 Prepare structural details--The student will be able to:

- 54.01 Interpret structural manuals and technical tables.
- 54.02 Draw structural connections.

55.0 Prepare structural steel drawings--The student will be able to:

- 55.01 Use the "Manual of Steel Construction" and other technical data.
- 55.02 Interpret codes and specifications.
- 55.03 Calculate reactions and stresses.
- 55.04 Prepare shear and moment diagrams.
- 55.05 Detail bolted connections.
- 55.06 Detail welded connections.
- 55.07 Prepare erection plans and schedules.
- 55.08 Assist in the preparation of bids.
- 55.09 Prepare advance bill for ordering materials.

56.0 Prepare reinforced concrete drawings--The student will be able to:

- 56.01 Use the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and other technical data.
- 56.02 Interpret codes and specifications.
- 56.03 Interpret engineering drawings.
- 56.04 Prepare column detail drawings.
- 56.05 Prepare footing and foundation drawings.
- 56.06 Prepare floor and roof detail drawings.
- 56.07 Prepare special structure detail drawings.
- 56.08 Prepare bar lists and schedules.

57.0 Prepare structural wood drawings--The student will be able to:

- 57.01 Use the "Timber Construction Manual".
- 57.02 Interpret codes and specifications.
- 57.03 Prepare fastening and connection details.
- 57.04 Prepare framing plans.

- 57.05 Assist in the preparation of bids.
- 57.06 Prepare advance bill for ordering materials.

58.0 Prepare advanced computer aided drawings, two-dimensional and three dimensional--
The student will be able to:

- 58.01 Produce 3-D architectural drawings.
- 58.02 Produce structural 3-D (steel, wood, and reinforced concrete) drawings.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Air-Conditioning, Refrigeration and Heating Technology 1
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	C400100
CIP Number	0647020107
Grade Level	30, 31
Standard Length	750 Hours
Teacher Certification	AC HEAT ME @7 7G REFRG MECH 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
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

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning (A/C), and refrigeration and ventilation industry. This program prepares students for employment as A/C, Refrigeration and Heating Helper, A/C, Refrigeration and Heating Mechanic Assistant, A/C, Refrigeration and Heating Mechanic, A/C, Refrigeration and Heating Technician, and Refrigeration Technician (SOC 49-9021).

The student should obtain EPA certification prior to leaving school in order to be employed in any job that requires work with refrigerants.

This program focuses on broad, transferable skills, stresses the understanding of the heating, air-conditioning, refrigeration and ventilation industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, the underlying principles of technology, and health, safety, and environmental issues.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ACR0041	Air Conditioning, Refrigeration and Heating Helper	250 Hours	49-9021
B	ACR0043	Air Conditioning, Refrigeration and Heating Mechanic Assistant	250 Hours	49-9021
C	ACR0047	Air Conditioning, Refrigeration and Heating Mechanic 1	250 Hours	49-9021

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.fl DOE.org/workforce/dwdframe/artic_frame.asp.

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment.
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.

- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 09.0 Troubleshoot and wire electrical motors and their components.
- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems.
- 12.0 Explain the function of basic electronics.
- 13.0 Demonstrate language arts knowledge and skills.
- 14.0 Use information technology tools.
- 15.0 Solve problems using critical thinking skills, creativity and innovation.
- 16.0 Read construction documents.
- 17.0 Demonstrate science knowledge and skills.
- 18.0 Explain the properties of matter and heat behavior.
- 19.0 Analyze fluids, pressures, refrigerants, and related codes.
- 20.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 23.0 Select appropriate commercial compressors.
- 24.0 Test and adjust commercial evaporative condensers.
- 25.0 Maintain, test, and troubleshoot commercial evaporators.
- 26.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 30.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 31.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 32.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 33.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 34.0 Demonstrate a working knowledge of refrigerants and oils.
- 35.0 Interpret, use and modify construction drawings and specifications.
- 36.0 Conduct system startup and shutdown.
- 37.0 Design heating and cooling systems.
- 38.0 Use combustion-type heating servicing and testing equipment.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Air-Conditioning, Refrigeration and Heating Technology 1
PSAV Number: C400100

Course Number: ACR0041
Occupational Completion Point: A
A/C, Refrigeration and Heating Helper – 250 Hours – SOC Code 49-9021

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan. SHE 2.0
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 02.01 Identify and use
 - a. Basic hand tools and tool accessories
 - b. Power tools (electric, mechanical, and pneumatic, if available)
 - c. Pipe and tube-working tools of the trade
 - d. Specialized tools of the trade
 - 02.02 Apply appropriate care and maintenance procedures for tools and tool accessories, following the directions in the tool-equipment manufacturer's manual.

- 03.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF 3.0
- 03.01 Demonstrate knowledge of arithmetic operations. AF 3.2
 - 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
 - 03.03 Construct charts/tables/graphs using functions and data. AF 3.5
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
 - 04.02 Locate, organize and reference written information from various sources. CM 3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment--The student will be able to:
- 05.01 Explain the principles of electricity.
 - 05.02 Explain single- and three-phase power distribution.
 - 05.03 Define and explain watts, ohms, volts, and amps.
 - 05.04 Identify and explain electrical measuring tools and devices.
 - 05.05 Explain the standards for and ways to measure watts, resistance, voltage, and amperage, using appropriate instruments or devices.
 - 05.06 Identify and explain appropriate electrical wiring symbols.
 - 05.07 Draw and explain a wiring schematic diagram for a control system.
 - 05.08 Create a wiring schematic for each of the following, using all components and symbols for safe and effective operation and interpretation:
 - a. An air-conditioner
 - b. An electric furnace
 - c. A heat pump
 - d. An oil furnace (optional)
 - e. A gas furnace
 - 05.09 Explain codes and standards and safety requirements for working with the electrical components used in heating, air conditioning, and refrigeration.
 - 05.10 Troubleshoot protection devices, such as fuses and breakers.
 - 05.11 Interpret tables and charts from the National Electrical Codes (NEC).
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components--The student will be able to:
- 06.01 Identify and explain the operations of electrical control systems and their components (zone damper motors, dual fuel lock out controls, outdoor thermostats/low ambient controls, defrost controls/timers, and auxiliary heating controls).

- 06.02 Identify, install, and troubleshoot controls for heating, air-conditioning, and refrigeration systems.
 - 06.03 Explain the operation of different types of electromechanical thermostats.
 - 06.04 Wire basic heating, air-conditioning, and refrigeration systems.
 - 06.05 Troubleshoot operational problems for different types of electromechanical thermostats.
 - 06.06 Explain the electrical and mechanical operations of the basic heat pump.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
- 07.01 Determine wire sizes and voltage drops.
 - 07.02 Describe the operation of various types of transformers.
 - 07.03 Draw and identify various power-transformers.
 - 07.04 Test, size, and replace protection devices such as fuses and breakers, motor starters, and overloads.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems--The student will be able to:
- 08.01 Explain how alternating current is developed and draw a sine wave.
 - 08.02 Identify single-phase and three-phase wiring arrangements.
 - 08.03 Explain how phase shift occurs in inductors and capacitors.
 - 08.04 Describe the types of capacitors and their applications.
 - 08.05 Explain the operation of single-phase and three-phase induction motors.
 - 08.06 Identify the various types of single-phase motors and their applications.
 - 08.07 State and demonstrate the safety precautions, such as lock out / tag out, which must be followed when working with electrical equipment.
 - 08.08 Explain how the electric company uses a demand meter.
 - 08.09 Identify and explain the operations and applications of various types of electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.10 Maintain, test, and troubleshoot various types of commercial electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.11 Demonstrate the proper use of motor testing equipment.
- 09.0 Troubleshoot and wire electrical motors and their components--The student will be able to:
- 09.01 Identify and explain the functions of various types of motors and their components.
 - 09.02 Troubleshoot, test, and analyze motors, using various methods.
 - 09.03 Identify, troubleshoot, and wire various types of electric motors.
 - 09.04 Reverse the rotation of a motor.
- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems--The student will be able to:
- 10.01 Explain the basic principles and functions of Direct Digital Control (DDC).
 - 10.02 Explain basic solid-state circuits and boards.

- 10.03 Identify, test, and replace circuits and boards.
- 10.04 Identify and explain the functions of a building-management system.
- 10.05 Program a programmable thermostat.

- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems --The student will be able to:
 - 11.01 Explain how the principles of designing an electrical system for residential heating and air-conditioning systems apply to commercial heating and air-conditioning systems.
 - 11.02 Define and compare single- and multiphase voltage and current related to commercial heating and air-conditioning systems.
 - 11.03 Calculate various circuit loads in commercial heating and air-conditioning applications using Ohm's law.
 - 11.04 Troubleshoot electrical circuits for commercial heating and air-conditioning systems

- 12.0 Explain the function of basic electronics--The student will be able to:
 - 12.01 Explain the basic theory of electronics and semiconductors.
 - 12.02 Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.
 - 12.03 Identify different types of resistors and explain how their resistance values can be determined.
 - 12.04 Describe the operation and function of thermistors and cad cells.
 - 12.05 Test semiconductor components.
 - 12.06 Identify the connectors on a personal computer.

- 13.0 Demonstrate language arts knowledge and skills--The student will be able to:
 - 13.01 Locate, comprehend and evaluate key elements of oral and written information. ECD10.0
 - 13.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF 2.0
 - 13.03 Present information formally and informally for specific purposes and audiences. AF 2.4
 - 13.03 Present information formally and informally for specific purposes and audiences. AF 2.5
 - 13.03 Present information formally and informally for specific purposes and audiences. AF 2.9

- 14.0 Use information technology tools--The student will be able to:
 - 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT 1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
 - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
 - 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

- 15.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:

- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS 1.0
- 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 15.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

Course Number: ACR0043**Occupational Completion Point: B****A/C, Refrigeration and Heating Mechanic Assistant – 250 Hours – SOC Code 49-9021**16.0 Read construction documents--The student will be able to:

- 16.01 Recognize and identify basic construction drawing terms, components and symbols.
- 16.02 Relate information on construction drawings to actual locations on the print.
- 16.03 Recognize different classifications of construction drawings.
- 16.04 Interpret and use drawing dimensions.

17.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:

- 17.01 Explain the basic principles of heating, ventilation and air-conditioning.
- 17.02 Identify educational paths to career opportunities in the HVAC profession.
- 17.03 Identify and explain the four major refrigeration components.
- 17.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
- 17.05 Differentiate between air-conditioning and refrigeration.
- 17.06 Differentiate between split systems and package systems.
- 17.07 Describe the benefits of conditioned air and environments.
- 17.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
- 17.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
- 17.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
- 17.11 Identify various professional organizations, associations, and societies, and explain their purposes.

18.0 Demonstrate science knowledge and skills--The student will be able to: AF 4.0

- 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF 4.1
- 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF 4.3

19.0 Explain the properties of matter and heat behavior--The student will be able to:

- 19.01 Describe and explain freezing point, critical temperature, and absolute zero.
- 19.02 Describe matter, heat, and heat transfer.

- 19.03 Differentiate between heat and temperature.
- 19.04 Explain and distinguish among the characteristics of the three states of matter.
- 19.05 Explain the relationship between temperature and humidity.
- 19.06 Differentiate between latent heat and sensible heat.
- 20.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:
- 20.01 Identify the refrigeration cycle.
- 20.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
- 20.03 Define and explain "pressure," "fluid," and "temperature."
- 20.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
- 20.05 Identify and explain the classifications, properties, and uses of different refrigerants.
- 20.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
- 20.07 Define and identify "color-coding" of refrigerant cylinders.
- 20.08 Compare Pressure and Temperature (P/T) charts.
- 20.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
- 20.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 21.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 21.01 Explain the types, operation, use, and maintenance requirements of
- a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
- 21.02 Evaluate metering-device performance.
- 21.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
- 21.04 Analyze the operating condition of a compressor.
- 21.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
- 21.06 Identify the location and explain the uses of refrigerant flow accessories.
- 21.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
- 21.08 Evaluate system performance.
- 22.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 22.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 22.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR 1.1

- 22.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
- 22.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The student will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 23.02 Describe the effect of money management on personal and career goals. FL 3.0
- 23.03 Develop a personal budget and financial goals. FL 3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
- 23.05 Maintain financial records. FL 3.3
- 23.06 Read and reconcile financial statements. FL 3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Select appropriate commercial compressors--The student will be able to:
- 24.01 Compare commercial-compressor requirements with those for residential and light commercial heating and air-conditioning systems.
- 24.02 Select appropriate commercial compressors for cooling requirements.
- 24.03 Describe the mechanical operation for each type of compressor.
- 24.04 Explain compressor lubrication methods.
- 24.05 Explain methods used to control compressor capacity.
- 24.06 Describe how compressor protection devices operate.
- 24.07 Perform the common procedures used when field servicing open and semi-hermetic compressors.
- 25.0 Test and adjust commercial evaporative condensers--The student will be able to:
- 25.01 Determine the proper air and fluid flow for commercial evaporative condensers.
- 25.02 Test and adjust the airflow for proper temperature difference.
- 25.03 Test and adjust the water flow for proper GPM and temperature difference.
- 25.04 Check for proper water treatment.
- 26.0 Maintain, test, and troubleshoot commercial evaporators--The student will be able to:
- 26.01 Determine the operational requirements for evaporators used in commercial heating and air-conditioning applications.
- 26.02 Select appropriate evaporators for commercial heating and air-conditioning systems.
- 26.03 Maintain, test, and adjust various commercial heating and air-conditioning accessories.
- 27.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 27.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.02 Bend tubing, using tube benders.
- 27.03 Connect tubing, using

- a. Flared fittings
 - b. Compression fittings
 - 27.04 Connect tubing, using solderless connectors.
 - 27.05 Connect tubing, using a swaged-joint connection.
 - 27.06 Identify and use various types of torches.
 - 27.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 27.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 27.09 Braze tubing.
 - 27.10 Silver-braze brass, steels, and copper.
 - 27.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 27.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 27.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 27.14 Maintain project time and materials lists.
 - 27.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 28.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 28.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD 7.0
 - 28.07 Identify opportunities and research requirements for career advancement. ECD 8.0
 - 28.08 Research the benefits of ongoing professional development. ECD 9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 30.01 Describe the nature and types of business organizations. SY1.0
 - 30.02 Explain the effect of key organizational systems on performance and quality.

- 30.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 30.04 Explain the impact of the global economy on business organizations.

Course Number: ACR0047**Occupational Completion Point:****A/C, Refrigeration and Heating Mechanic 1 – 270 Hours – SOC Code 49-9021**

- 31.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
- 31.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
- 31.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
- 31.03 Explain pressure and temperature drops.
- 32.0 Utilize and operate mechanical refrigeration servicing and testing equipment--The student will be able to:
- 32.01 Identify the effects of superheat and sub-cooling on a system.
- 32.02 Identify and explain the functions of servicing and testing equipment (such as vacuum pumps, micron gauges, EPA-approved equipment, leak detectors, and charging systems).
- 32.03 Operate a refrigerant recovery system.
- 32.04 Explain the standards for and ways to measure, test, maintain, and evacuate a mechanical heating, air-conditioning, and refrigeration system.
- 32.05 Evacuate the refrigerant system with various vacuum methods.
- 32.06 Demonstrate compliance with Environmental Protection Agency (EPA) rules and regulations and, if possible, take the EPA test.
- 32.07 Charge various air-conditioning and mechanical refrigeration systems by various methods.
- 32.08 Demonstrate the effects of superheat and sub-cooling on a system utilizing test equipment (such as thermometers and gages)
- 33.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures--The student will be able to:
- 33.01 Read and comply with dispatch orders.
- 33.02 Explain local codes and ordinances.
- 33.03 Select and use appropriate tools and safety practices to test equipment.
- 33.04 Determine the electrical requirements of equipment.
- 33.05 Assist in the installation of a heating and air-conditioning system to the manufacturer's installation and operation specifications, using a practical knowledge of duct fabrication methods.
- 33.06 Determine the proper charge in a residential air-conditioning unit and adjust superheat.
- 33.07 Determine the temperature drop across the evaporator.
- 33.08 Determine the temperature rise across the condenser.
- 33.09 Write a service report.
- 33.10 Apply good customer-relations skills.

34.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:

- 34.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
- 34.02 Determine the start-up and checkout procedures recommended by different manufacturers.
- 34.03 Determine the electrical requirements of equipment.
- 34.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
- 34.05 Determine the temperature drop across the outdoor coil on a heat pump.
- 34.06 Determine the temperature rise across the indoor coil on a heat pump.
- 34.07 Test for a proper refrigerant charge in a residential heat pump.
- 34.08 Apply good customer-relations skills.

35.0 Demonstrate a working knowledge of refrigerants and oils--The student will be able to:

- 35.01 Identify the refrigerants in common use and state the types of applications in which each is used.
- 35.02 Explain the effects of releasing refrigerants into the atmosphere.
- 35.03 Explain how refrigerants are classified by their chemical composition.
- 35.04 Describe the color-coding scheme used to identify refrigerant cylinders.
- 35.05 Describe how azeotropes and near-azeotropes differ from each other and from so-called pure refrigerants.
- 35.06 Interpret a P-T chart for an azeotrope refrigerant.
- 35.07 Calculate superheat and subcooling.
- 35.08 Demonstrate refrigerant leak detecting methods.
- 35.09 Identify the different types of oils used in refrigeration systems and explain their relationships to the various refrigerants.
- 35.10 Explain how to add and remove oil from a system.
- 35.11 Describe how to test oil for contamination.

36.0 Interpret, use and modify construction drawings and specifications--The student will be able to:

- 36.01 Read mechanical plans within a set of construction drawings explain their relationship.
- 36.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
- 36.03 Interpret specification documents and apply them to the plans.
- 36.04 Interpret shop drawings and apply them to the plans and specifications.
- 36.05 Develop a field set of as-built drawings.
- 36.06 Identify the steps required for transferring design information to component production.
- 36.07 List and classify materials most commonly used in HVAC systems.

37.0 Conduct system startup and shutdown--The student will be able to:

- 37.01 Start up and shut down an air handler and related forced-air distribution system.
- 37.02 Test compressor oil for acid contamination.
- 37.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.

38.0 Design heating and cooling systems--The student will be able to:

- 38.01 Identify and describe the steps in the system design process.
- 38.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
- 38.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
- 38.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
- 38.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
- 38.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
- 38.07 Identify the various types of duct systems and explain why and where each type is used.
- 38.08 Demonstrate the effect of fittings and transitions on duct system design.
- 38.09 Use a friction loss chart and duct sizing table to size duct.
- 38.10 Install insulation and vapor barriers used in duct systems.
- 38.11 Following proper design principles select and install refrigerant and condensate piping.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Air-Conditioning, Refrigeration and Heating Technology 2
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	C400200
CIP Number	0647020108
Grade Level	30, 31
Standard Length	600 Hours
Teacher Certification	AC HEAT ME @7 G REFRG MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
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

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning (A/C), and refrigeration and ventilation industry. This program prepares students for employment as A/C, Refrigeration and Heating Helper, A/C, Refrigeration and Heating Mechanic Assistant, A/C, Refrigeration and Heating Mechanic, A/C, Refrigeration and Heating Technician, and Refrigeration Technician (SOC 49-9021).

The student should obtain EPA certification prior to leaving school in order to be employed in any job that requires work with refrigerants.

This program focuses on broad, transferable skills, stresses the understanding of the heating, air-conditioning, refrigeration and ventilation industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, the underlying principles of technology, and health, safety, and environmental issues.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This is a planned sequence of instruction consisting two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer

Air-Conditioning, Refrigeration and Heating Technology 1 is a core program. It is recommended students complete **Air-Conditioning, Refrigeration and Heating Technology 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Air-Conditioning, Refrigeration and Heating Technology 2**.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ACR0049	Air Conditioning, Refrigeration and Heating Mechanic 2	250 Hours	49-9021
B	ACR0044	Air Conditioning, Refrigeration and Heating Technician	350 Hours	49-9021

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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, Language 9, and Reading 9. 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.fl DOE.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

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.

Standards

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

- 01.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 02.0 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 03.0 Maintain, troubleshoot, and repair commercial heating systems.
- 04.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems.
- 05.0 Demonstrate knowledge of retail refrigeration systems.
- 06.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 07.0 Develop an understanding of hydronic systems.
- 08.0 Develop an understanding of steam systems.
- 09.0 Determine the properties of air.
- 10.0 Use a pressure enthalpy chart to diagram refrigerant cycles.
- 11.0 Explain the standards for and ways to measure indoor-air quality.
- 12.0 Operate environmental control systems as used in commercial heating and air-conditioning systems.
- 13.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications.
- 14.0 Maintain and repair thermal storage systems.
- 15.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems.
- 16.0 Calculate commercial heating and air-conditioning loads.
- 17.0 Install air distribution systems.
- 18.0 Evaluate commercial airside systems.
- 19.0 Balance an air distribution system.
- 20.0 Select energy conservation equipment.

- 21.0 Analyze building management systems.
- 22.0 Recommend alternative heating and cooling systems for various case studies.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Air-Conditioning, Refrigeration and Heating Technology 2
PSAV Number: C400200

Course Number: ACR0049
Occupational Completion Point: A
A/C, Refrigeration and Heating Mechanic 2 – 250 Hours – SOC Code 49-9021

- 01.0 Use combustion-type heating servicing and testing equipment--The student will be able to:
- 01.01 Explain combustion theory and the safety precautions for using combustion-type-heating servicing and testing equipment.
 - 01.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
 - 01.03 Use the servicing and testing equipment.
 - 01.04 Test, analyze, and troubleshoot combustion-type-heating systems.
- 02.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems--The student will be able to:
- 02.01 Identify and discuss the safety and regulation issues and concerns.
 - 02.02 Explain the operations of various types of gas valves and regulators (such as low-voltage, line-voltage, pneumatic, solenoid, and gas and pressure regulators).
 - 02.03 Identify and size various types of gas valves and regulators.
 - 02.04 Determine the application of gas valves and regulators.
 - 02.05 Troubleshoot gas valves and regulators.
- 03.0 Maintain, test, and adjust commercial heating and air-conditioning accessories--The student will be able to
- 03.01 Compare commercial accessories with residential and light- commercial-heating and air-conditioning accessories.
 - 03.02 Select the heating and air-conditioning accessories appropriate for various commercial applications.
 - 03.03 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 04.0 Maintain, troubleshoot, and repair commercial heating systems--The student will be able to:
- 04.01 Identify the components of various commercial heating systems.
 - 04.02 Explain the operational principles of various commercial heating systems.
 - 04.03 Test and analyze heating air-distribution systems.
 - 04.04 Maintain, troubleshoot, and repair various commercial heating systems, such as:
 - a. A gas furnace and boiler
 - b. An oil furnace and boiler
 - c. An electric furnace

- d. Electric heaters
- e. A heat pump
- f. Solar-heating systems

05.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems--The student will be able to:

- 05.01 Follow safety precautions.
- 05.02 Describe new technologies in heating, air-conditioning, and refrigeration installation, including
 - a. Variable-speed motors
 - b. Heat-pipe systems
 - c. Desiccant systems
 - d. Gas-driven heating systems
- 05.03 Lay out, construct, and troubleshoot comfort systems.
- 05.04 Test and analyze systems.
- 05.05 Test and analyze heat-recovery systems.

06.0 Demonstrate knowledge of retail refrigeration systems--The student will be able to:

- 06.01 Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
- 06.02 Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
- 06.03 Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.
- 06.04 Identify and describe the supporting components and accessories used in retail refrigeration systems.
- 06.05 Describe the various methods of defrost used in retail refrigeration systems.
- 06.06 Identify and describe the applications for the various types of retail refrigeration systems.
- 06.07 Describe the control system components used in retail refrigeration systems.
- 06.08 Explain the operating sequence of a retail refrigeration system.
- 06.09 Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.

07.0 Demonstrate knowledge of commercial and industrial refrigeration systems--The student will be able to:

- 07.01 Identify different types of refrigerated coolers and display cases and describe each one's common application.
- 07.02 Compare the basic components used in commercial/industrial refrigeration systems with those used in retail refrigeration systems.
- 07.03 Identify single, multiple, and satellite compressor systems. Describe the applications, installation considerations, and advantages and disadvantages of each type.
- 07.04 Identify packaged condensing units and unit coolers. Describe their applications, operation, and installation considerations.
- 07.05 Identify two-stage compressors and explain their operation and applications.
- 07.06 Identify the various accessories used in commercial refrigeration systems. Explain why each is used and where it should be installed in the system.

- 07.07 Identify the various refrigeration control devices. Explain the purpose of each type and how it works.
- 07.08 Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.

08.0 Develop an understanding of hydronic systems--The student will be able to:

- 08.01 Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
- 08.02 Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
- 08.03 Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual-temperature water systems.
- 08.04 Describe the safety precautions used when working with hot-water/chilled-water systems.
- 08.05 Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
- 08.06 Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.
- 08.07 Explain the principles involved, and describe the procedures used, in balancing hydronic systems.
- 08.08 Select, calibrate, and properly use the tools and instruments needed to balance hydronic systems.
- 08.09 Read the pressure across a water system circulating pump.

09.0 Develop an understanding of steam systems--The student will be able to:

- 09.01 Explain the terms and concepts used when working with steam-heating systems.
- 09.02 Identify major components of steam heating systems and explain the purpose of each.
- 09.03 Describe the basic steam-heating cycle.
- 09.04 Safely perform selected operating procedures on low-pressure steam boilers and systems.
- 09.05 Install and maintain selected steam traps.
- 09.06 Identify the common piping configurations used with steam-heating systems.

Course Number: ACR0044

Occupational Completion Point: B

A/C, Refrigeration and Heating Technician – 350 Hours – SOC Code 49-9021

10.0 Determine the properties of air--The student will be able to:

- 10.01 Explain the principles of psychrometrics.
- 10.02 Identify and explain the components and uses of a psychrometric meter.
- 10.03 Identify indoor-air-quality concerns as related to psychrometrics.
- 10.04 Determine the properties of air, using a psychrometric chart.
- 10.05 Follow safety precautions.
- 10.06 Identify and explain the different types and benefits of
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems

- 10.07 Fabricate, operate, maintain, and troubleshoot
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems

- 11.0 Use a pressure enthalpy chart to diagram refrigerant cycles--The student will be able to:
 - 11.01 Identify all components of the pressure enthalpy chart.
 - 11.02 Define "enthalpy" and "entropy."
 - 11.03 Diagram several refrigerant cycles, using the pressure enthalpy chart.

- 12.0 Explain the standards for and ways to measure indoor-air quality--The student will be able to:
 - 12.01 Define indoor-air quality.
 - 12.02 Identify and explain the codes and standards regarding indoor-air quality.
 - 12.03 Select and use indoor-air-quality measuring devices.
 - 12.04 Explain the standards for and ways to measure indoor-air quality, using various methods.

- 13.0 Operate environmental control systems as used in commercial heating and air-conditioning systems--The student will be able to:
 - 13.01 Identify and explain the various types of environmental control systems and their sequences of operation as used in commercial heating and air-conditioning systems.
 - 13.02 Maintain, test, and troubleshoot various types of environmental control systems as used in commercial heating and air-conditioning systems.

- 14.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications--The student will be able to:
 - 14.01 Identify pneumatic control systems.
 - 14.02 Demonstrate the ability to maintain and troubleshoot pneumatic control systems.

- 15.0 Maintain and repair thermal storage systems--The student will be able to:
 - 15.01 Apply appropriate codes, standards, and safety practices.
 - 15.02 Describe the benefits and limitations of each type.
 - 15.03 Explain the operational principles of a thermal storage system.
 - 15.04 Identify and explain various types of thermal storage systems.
 - 15.05 Maintain, troubleshoot, and test various types of thermal storage systems.

- 16.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems--The student will be able to:
 - 16.01 Keep a record of the installation, maintenance, and repair of commercial heating and air-conditioning systems.
 - 16.02 Apply local and national codes and safety practices.
 - 16.03 Lay out a commercial heating and air-conditioning system.
 - 16.04 Lay out a typical split commercial air-conditioning system.

- 16.05 Lay out a typical split commercial heating system.
 - 16.06 Maintain, test, analyze, and repair various types of commercial heating and air-conditioning systems.
 - 16.07 Maintain, troubleshoot, and repair water-cooled condensers
- 17.0 Calculate commercial heating and air-conditioning loads--The student will be able to:
- 17.01 Explain conduction as a heat-load source.
 - 17.02 Describe the implications of conducting and the resistance values for different types of construction materials.
 - 17.03 Define "U" value (BTU/hr/ft²F).
 - 17.04 Define "K" value (°Fft²hr/BTU).
 - 17.05 Define "C" value (°Fft²hr/BTU).
 - 17.06 Define "R" value (°Fft²hr/BTU).
 - 17.07 Interpret heat-transfer tables ("U," "K," "C," and "R").
 - 17.08 Locate the total heat-transfer value of any surface (R) - (U).
 - 17.09 Explain infiltration and exfiltration/ventilation as a heat-load source.
 - 17.10 Explain a product heat-load source.
 - 17.11 Explain miscellaneous loads (people, motors, and equipment) as heat-load sources.
 - 17.12 Explain the purpose of vapor barriers.
 - 17.13 Interpret tables of specific heat values as applied to commercial heating and air-conditioning systems.
 - 17.14 Calculate and design systems.
 - 17.15 Calculate cooling and heating equipment sizes.
 - 17.16 Design and identify methods of installing air-movement systems.
- 18.0 Install air distribution systems--The student will be able to:
- 18.01 Describe airflow and pressures in a basic forced-air distribution system.
 - 18.02 Explain the differences between propeller and centrifugal fans and blowers.
 - 18.03 Identify the various types of duct systems and explain why and where each type is used.
 - 18.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.
 - 18.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.
 - 18.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
 - 18.07 Demonstrate or explain the use and installation of dampers used in duct systems.
 - 18.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
 - 18.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.
 - 18.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.
- 19.0 Evaluate commercial airside systems--The student will be able to:
- 19.01 Identify the differences in various types of commercial all-air systems.

- 19.02 Identify the type of building in which a particular type of system is used.
- 19.03 Explain the typical range of capacities for a commercial air system.

20.0 Balance an air distribution system--The student will be able to:

- 20.01 Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.
- 20.02 Explain the fan and pump laws.
- 20.03 Use a psychrometric chart to evaluate air properties and changes in air properties.
- 20.04 Explain the principles involved in the balancing of air and water distribution systems.
- 20.05 Define common terms used by manufacturers when describing grilles, registers, and diffusers.
- 20.06 Identify and use the tools and instruments needed to balance air distribution systems.
- 20.07 Change the speed of an air distribution system supply fan.

21.0 Select energy conservation equipment--The student will be able to:

- 21.01 Identify and explain the operation of energy conservation equipment.
- 21.02 Operate selected energy conservation equipment.

22.0 Analyze building management systems--The student will be able to:

- 22.01 Identify the major components of a building management system and describe how they fit together.
- 22.02 Operate a basic direct digital controller.

23.0 Recommend alternative heating and cooling systems for various case studies--The student will be able to:

- 23.01 Describe alternative technologies for heating such as in-floor, direct-fired makeup unit (DFMU), solar, air turnover, corn or wood pellet burners, waste oil/multi-fuel and fireplace inserts.
- 23.02 Describe alternative technologies for heating such as ductless systems, computer rooms, chilled beams and multi-zone.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Carpentry 1
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	C510100
CIP Number	0646020111
Grade Level	30, 31
Standard Length	600 Hours
Teacher Certification	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONST @7 7G TEC CONSTR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-3012 - Helpers--Carpenters 47-2031 - Carpenters
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

The purpose of this program is to prepare students for employment in the carpentry industry with a stress on basic carpentry skills.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for additional training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

After completing the core, carpentry students may opt to take either the Trim and Finish Carpentry course or the Frame Carpentry course as exit-point goals. However, in order to proceed to Carpentry, students must first complete both the Trim and Finish Carpentry course and the Frame Carpentry course in addition to the core or demonstrate mastery of the performance standards contained in those courses.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0107	Carpenter Helper	300 Hours	47-3012
B	BCV0111	Trim & Finish Carpenter	300 Hours	47-2031

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Apply shop safety skills.
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field.
- 04.0 Create basic construction drawings.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Recommend appropriate building materials for specific scenarios.
- 07.0 Select appropriate fasteners and hardware for specific scenarios.
- 08.0 Demonstrate science knowledge and skills.
- 09.0 Apply occupational safety skills.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession.
- 12.0 Fasten stock and joints.
- 13.0 Construct millwork from a set of drawings.
- 14.0 Demonstrate language arts knowledge and skills.
- 15.0 Read and design construction documents.
- 16.0 Assemble and install cabinets and components.
- 17.0 Solve problems using critical thinking skills, creativity and innovation.
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions.

- 19.0 Assemble and install cabinetry.
- 20.0 Install interior and exterior doors (wood and/or metal).
- 21.0 Use information technology tools.
- 22.0 Install trim and finish carpentry using plans and specifications.
- 23.0 Cut and install framing members for a floor (wood and/or metal).
- 24.0 Cut and install a wall and partition framing (wood and/or metal).
- 25.0 Install an interior wall and ceiling materials.
- 26.0 Describe the importance of professional ethics and legal responsibilities.
- 27.0 Lay out and construct an interior-stair system.
- 28.0 Demonstrate personal money-management concepts, procedures and strategies.
- 29.0 Comply with hurricane codes.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 31.0 Demonstrate knowledge of roof framing.
- 32.0 Demonstrate knowledge of roofing applications.
- 33.0 Apply thermal and moisture protection.
- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 35.0 Frame walls using cold-formed steel.
- 36.0 Perform site-preparation and layout activities.
- 37.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Carpentry 1
PSAV Number: C510100

Course Number: BCV0107
Occupational Completion Point: A
Carpenter Helper – 300 Hours – SOC Code 47-3012

Course Number: BCV0107
Occupational Completion Point: A
Carpenter Helper – 300 Hours – SOC Code 47-3012

- 01.0 Apply shop safety skills--The student will be able to:
- 01.01 Maintain a clean, orderly and safe work area.
 - 01.02 Transport, handle and store materials safely.
 - 01.03 Operate a fire extinguisher.
 - 01.04 Qualify in basic first-aid procedures.
 - 01.05 Identify safety hazards.
 - 01.06 Demonstrate the use and care of personal protective equipment (PPE).
- 02.0 Utilize manual and power tools relevant to the carpentry and cabinetmaking professions--The student will be able to:
- 02.01 Identify various hand and power tools.
 - 02.02 Select correct tools for specific jobs.
 - 02.03 Clean and care for tools and equipment.
 - 02.04 Demonstrate proficiency in the safe use of hand and power tools.
 - 02.05 Read and use carpenter's measuring tools.
- 03.0 Demonstrate mathematics knowledge and skills relevant to the carpentry and cabinetmaking field--The student will be able to: AF3.0
- 03.01 Apply geometry and algebra skills to solve math problems related to carpentry and/or cabinetmaking with and without a calculator. AF3.2
 - 03.02 Demonstrate knowledge of arithmetic operations. AF3.4
 - 03.03 Solve problems for distance, area and volume. AF3.5
 - 03.04 Analyze and apply data and measurements to solve problems and interpret documents. AF3.5
 - 03.05 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Create basic construction drawings--The student will be able to:
- 04.01 Recognize and identify basic construction drawing terms, components and symbols.
 - 04.02 Relate information on construction drawings to actual locations on the print.
 - 04.03 Recognize different classifications of construction drawings.
 - 04.04 Interpret and use drawing dimensions and scales.

- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 05.02 Locate, organize and reference written information from various sources. CM3.0
 - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.0 Recommend appropriate building materials for specific scenarios--The student will be able to:
- 06.01 Identify the grades and species of lumber and their appropriate uses.
 - 06.02 Identify the actual and nominal sizes of lumber.
 - 06.03 Identify the grades of plywood and wood products.
 - 06.04 Identify defects and blemishes that affect the durability and strength of lumber.
 - 06.05 Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
 - 06.06 Explain the uses of various types of engineered lumber.
- 07.0 Select appropriate fasteners and hardware for specific scenarios--The student will be able to:
- 07.01 Identify the fasteners commonly used in carpentry and/or cabinetmaking.
 - 07.02 Identify the hardware commonly used in carpentry and/or cabinetmaking.
- 08.0 Demonstrate science knowledge and skills--The student will be able to: AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings. AF4.3
- 09.0 Apply occupational safety skills--The student will be able to:
- 09.01 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
 - 09.02 Explain the purpose of the Occupational Safety and Health Administration (OSHA).
 - 09.03 Identify health-related problems that may result from exposure to hazardous materials.
 - 09.04 Describe the proper precautions for handling hazardous materials.
 - 09.05 Explain eligibility and the procedures for obtaining worker's compensation.
 - 09.06 Explain the importance of complying with the Americans with Disabilities Act (ADA) requirements.
- 10.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:

- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE2.0

- 11.0 Select and use hand and power tools relevant to the carpentry and cabinetmaking profession--The student will be able to:
 - 11.01 Identify the hand tools commonly used by carpenters and describe their uses.
 - 11.02 Use hand tools in a safe and appropriate manner.
 - 11.03 State the general safety rules for operating all power tools, regardless of type.
 - 11.04 State the general rules for properly maintaining all power tools, regardless of type.
 - 11.05 Identify the portable power tools commonly used by carpenters and describe their uses.
 - 11.06 Use portable power tools in a safe and appropriate manner.

- 12.0 Fasten stock and joints--The student will be able to:
 - 12.01 Identify types of glues and fasteners and describe their applications.
 - 12.02 Fasten stock with glue and clamps.
 - 12.03 Fasten stock and joints with appropriate fasteners, such as:
 - a. nails
 - b. staples
 - c. screws
 - d. bolts
 - 12.04 Fill and finish nail and screw holes with fillers and plugs.
 - 12.05 Glue and clamp stock, using various techniques.

- 13.0 Construct millwork from a set of drawings--The student will be able to:
 - 13.01 Recognize the common types of woods used to make cabinets.
 - 13.02 Use stationary power tools.
 - 13.03 Identify and cut the various types of joints used in cabinetmaking.
 - 13.04 Build a cabinet from a set of drawings.
 - 13.05 Install plastic laminate on a countertop core.

- 14.0 Demonstrate language arts knowledge and skills--The student will be able to: AF2.0
 - 14.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 14.02 Draft, revise and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 14.03 Present information formally and informally for specific purposes and audiences. AF2.9

- 15.0 Read and design construction documents--The student will be able to:
 - 15.01 Explain the types of drawings usually included in a set of plans and list the information found on each type.
 - 15.02 Identify the different types of lines used on construction drawings.
 - 15.03 Identify selected abbreviations commonly used on plans.

- 15.04 Read and interpret plans, elevations, schedules, sections and details contained in basic construction drawings.
 - 15.05 State the purpose of written specifications.
 - 15.06 Identify and describe the parts of a specification.
 - 15.07 Conduct quantity takeoff for materials.
 - 15.08 Design millwork and draw details in construction documents for a given scenario.
- 16.0 Assemble and install cabinets and components--The student will be able to:
- 16.01 Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
 - 16.02 Install fasteners.
 - 16.03 Install drawers.
 - 16.04 Install various types of doors, including:
 - a. overlay
 - b. lipped
 - c. flush
 - 16.05 Install adjustable shelving.
 - 16.06 Install glass panels and metal grills.
 - 16.07 Install specialty hardware, such as a lazy Susan, wire racks and "pull-outs".
 - 16.08 Install sliding doors and track.
- 17.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
- 17.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 17.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 17.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 17.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 18.0 Investigate sustainability issues related to the carpentry and cabinetmaking professions--The student will be able to:
- 18.01 Describe the impact of the construction industry on the natural environment.
 - 18.02 Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
 - 18.03 Recommend sustainable alternatives to conventional carpentry and cabinetmaking practices.
 - 18.04 Identify specific practices that can lessen adverse impacts on the environment.
 - 18.05 Investigate building assessment tools such as Leadership in Energy and Environmental Design (LEED) and Green Globes.
 - 18.06 Assess construction activities pertaining to the carpentry and cabinetmaking profession that contribute to a project's overall sustainability.

Course Number: BCV0111

Occupational Completion Point: B

Trim And Finish Carpenter – 300 Hours – SOC Code 47-2031

- 19.0 Assemble and install cabinetry--The student will be able to:

- 19.01 Recognize the common types of woods used to make cabinets.
 - 19.02 Correctly and safely use stationary power tools.
 - 19.03 Identify and cut the various types of joints used in cabinetmaking.
 - 19.04 Build a cabinet from a set of drawings.
 - 19.05 Install plastic laminate on a countertop core.
- 20.0 Install interior and exterior doors (wood and/or metal)--The student will be able to:
- 20.01 Identify the types and parts of door systems.
 - 20.02 Install a door jamb and hang a door.
 - 20.03 Identify and install door hardware.
- 21.0 Use information technology tools--The student will be able to:
- 21.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, and email and internet applications. IT2.0
 - 21.03 Employ computer operations applications to access, create, manage, integrate and store information. IT3.0
 - 21.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 22.0 Install trim and finish carpentry using plans and specifications--The student will be able to:
- 22.01 Read an architect's scale for a trim and finish carpentry job.
 - 22.02 Determine dimensions from plans.
 - 22.03 Relate information on plans and specifications to real parts, locations, hardware and fasteners.
- 23.0 Cut and install framing members for a floor (wood and/or metal)--The student will be able to:
- 23.01 Identify and describe floor-framing members, including subfloor.
 - 23.02 Lay out, cut and install supports for structures (e.g., sills, columns, beams and girders).
 - 23.03 Lay out and install various types of joists and openings, including joists for a cantilevered floor.
 - 23.04 Install various types of bridging.
 - 23.05 Install various types of subfloors, applying fastening techniques.
- 24.0 Cut and install a wall and partition framing (wood and/or metal)--The student will be able to:
- 24.01 Identify framing members used in wall and partition construction.
 - 24.02 Lay out wall lines and partition locations on a floor.
 - 24.03 Lay out walls for studs, doors and windows.
 - 24.04 Cut studs, trimmers, cripples, headers and fire stops to length.

- 24.05 Build T's, corners and headers.
- 24.06 Lay out and assemble wall sections.
- 24.07 Install wall sheathing and/or diagonal bracing.
- 24.08 Install insulation material and a vapor barrier.

- 25.0 Install an interior wall and ceiling materials--The student will be able to:
 - 25.01 Install furring strips
 - 25.02 Install drywall.
 - 25.03 Identify and install paneling and trim.
 - 25.04 Identify and install ceiling materials and systems.

- 26.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
 - 26.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 26.02 Evaluate alternative responses to workplace situations based on personal professional, ethical, legal responsibilities and employer policies. ELR1.1
 - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 26.04 Interpret and explain written organizational policies and procedures. ELR2.0

- 27.0 Lay out and construct an interior-stair system--The student will be able to:
 - 27.01 Identify the types and styles of interior-stair systems.
 - 27.02 Identify the components of an interior-stair system.
 - 27.03 Calculate the number of risers and treads for an interior-stair system.
 - 27.04 Lay out, cut and assemble an interior-stair system (rough and finish).

- 28.0 Demonstrate personal money-management concepts, procedures and strategies--The student will be able to:
 - 28.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 28.02 Describe the effect of money management on personal and career goals. FL3.0
 - 28.03 Develop a personal budget and financial goals. FL3.1
 - 28.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 28.05 Maintain financial records. FL3.3
 - 28.06 Read and reconcile financial statements. FL3.4
 - 28.07 Research, compare and contrast investment opportunities.

- 29.0 Comply with hurricane codes--the student will be able to:
 - 29.01 Install hurricane anchors.
 - 29.02 Install hurricane clips.
 - 29.03 Install hurricane straps.
 - 29.04 Explain the purpose and importance of the codes relating to hurricanes.

- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:

- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 30.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 30.04 Employ mentoring skills to inspire and teach others. LT5.0

31.0 Demonstrate knowledge of roof framing--The student will be able to:

- 31.01 Understand the terms associated with roof framing.
- 31.02 Identify the roof framing members used in gable and hip roofs.
- 31.03 Identify the methods used to calculate the length of a rafter.
- 31.04 Identify the various types of trusses used in roof framing.
- 31.05 Use a rafter framing square, speed square and calculator in laying out a roof.
- 31.06 Identify various types of sheathing used in roof construction.
- 31.07 Frame a gable roof with vent openings.
- 31.08 Frame a roof opening.
- 31.09 Erect a gable roof using trusses.
- 31.10 Estimate the materials used in framing and sheathing a roof.

32.0 Demonstrate knowledge of roofing applications--The student will be able to:

- 32.01 Identify the materials and methods used in roofing.
- 32.02 Explain the safety requirements for roof jobs.
- 32.03 Install fiberglass shingles on gable and hip roofs.
- 32.04 Close up a valley using fiberglass shingles.
- 32.05 Explain how to make various roof projections watertight when using fiberglass shingles.
- 32.06 Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
- 32.07 Lay out, cut and install a cricket or saddle.
- 32.08 Install wood shingles and shakes on roofs.
- 32.09 Describe how to close up a valley using wood shingles and shakes.
- 32.10 Explain how to make roof projections watertight when using wood shakes and shingles.
- 32.11 Complete the cuts and install the main and hip ridge caps using wood shakes/shingles.
- 32.12 Demonstrate the techniques for installing other selected types of roofing materials.

33.0 Apply thermal and moisture protection--The student will be able to:

- 33.01 Describe the requirements for insulation.
- 33.02 Describe the characteristics of various types of insulation material.
- 33.03 Calculate the required amounts of insulation for a structure.
- 33.04 Install selected insulation materials.
- 33.05 Describe the requirements for moisture control and ventilation.
- 33.06 Install selected vapor barriers.
- 33.07 Describe various methods of waterproofing.
- 33.08 Describe air infiltration control requirements.
- 33.09 Install selected building wraps.

- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 34.01 Describe the nature and types of business organizations. SY1.0
 - 34.02 Explain the effect of key organizational systems on performance and quality.
 - 34.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 34.04 Explain the impact of the global economy on business organizations.
- 35.0 Frame walls using cold-formed steel--The student will be able to:
- 35.01 Identify the components of a steel framing system.
 - 35.02 Identify and select the tools and fasteners used in a steel framing system.
 - 35.03 Identify applications for steel framing systems.
 - 35.04 Demonstrate the ability to build back-to-back, box and L-headers.
 - 35.05 Lay out and install a steel stud structural wall with openings to include bracing and blocking.
 - 35.06 Lay out and install a steel stud non-structural wall with openings to include blocking and bracing.
- 36.0 Perform site-preparation and layout activities--The student will be able to:
- 36.01 Identify building layout from plans and specifications using math skills.
 - 36.02 Set up and adjust a transit and builder's level over one point and establish lines over two points.
 - 36.03 Erect batter boards and locate building lines.
 - 36.04 Locate building line points on batter boards using a builder's level.
 - 36.05 Locate building lines on a plot plan.
 - 36.06 Square a building, using the 3-4-5-triangle method and the diagonal method.
- 37.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 37.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 37.02 Develop personal career plan that includes goals, objectives and strategies.ECD2.0
 - 37.03 Examine licensing, certification and industry credentialing requirements. ECD3.0
 - 37.04 Maintain a career portfolio to document knowledge, skills and experience.ECD5.0
 - 37.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 37.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 37.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 37.08 Research the benefits of ongoing professional development. ECD9.0
 - 37.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Carpentry 2
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	C510200
CIP Number	0646020112
Grade Level	30, 31
Standard Length	600 Hours
Teacher Certification	CAB WOODWK @7 7G CARPENTRY @7 7G BLDG CONST @7 7G TEC CONSTR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2031 - Carpenters
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
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment in the carpentry industry with a stress on basic carpentry skills.

This program focuses on broad, transferable skills, stresses the understanding of the carpentry and cabinetmaking industry, and demonstrates elements of the industry. Such as planning,

technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for additional training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0122	Carpenter, Rough	450 Hours	47-2031
B	BCV0128	Carpenter	150 Hours	47-2031

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Perform concrete tests.
- 02.0 Lay foundations.
- 03.0 Construct vertical formwork.
- 04.0 Construct horizontal formwork.
- 05.0 Erect and properly align tilt-up wall panels.
- 06.0 Install drywall and apply finish.
- 07.0 Install a suspended ceiling.
- 08.0 Interpret door and door hardware requirements based on plans and specifications.
- 09.0 Install windows and exterior doors.
- 10.0 Apply interior trim.
- 11.0 Lay out and construct an exterior-stair system.
- 12.0 Apply exterior finishing.
- 13.0 Set up and install basic rigging and scaffolding.
- 14.0 Erect, plumb and brace a simple concrete form with reinforcement.
- 15.0 Explain and demonstrate how to place reinforcing bars in walls, columns, beams, girders, joists and slabs.
- 16.0 Explain the transport and placement of concrete.
- 17.0 Demonstrate an understanding of trenching and excavation.
- 18.0 Identify structural timber.
- 19.0 Use plans and specifications for form carpentry.
- 20.0 Explain or identify various forms.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

**Program Title: Carpentry 2
PSAV Number: C510200**

**Course Number: BCV0122
Occupational Completion Point: A
Carpenter (Rough) – 450 Hours – SOC Code 47-2031**

01.0 Perform concrete tests--The student will be able to:

- 01.01 Identify various types of cement and describe their uses.
- 01.02 Identify types and sizes of concrete aggregates.
- 01.03 Identify types of concrete admixtures and describe their uses.
- 01.04 Identify special types of concrete and describe their uses.
- 01.05 Calculate concrete volume requirements for rectangular, cylindrical, or other geometric structures using formulas, concrete tables and/or concrete calculators, as applicable.
- 01.06 Use concrete curing methods and materials.
- 01.07 Apply concrete testing methods.
- 01.08 Mix concrete using different aggregates and admixtures.
- 01.09 Sample concrete using a test cylinder.
- 01.10 Perform slump testing of concrete.
- 01.11 Demonstrate how to properly set up a curing box.

02.0 Lay foundations--The student will be able to:

- 02.01 Establish elevations.
- 02.02 Identify various types of footing and foundations.
- 02.03 Select the appropriate footing for a foundation.
- 02.04 Lay out and construct a selected footing and foundation using an established gridline.
- 02.05 Install templates, keyways and embedments.
- 02.06 Form and strip pier foundation forms and prepare for resetting at another location.
- 02.07 Identify the different classes of slabs-on-grade.
- 02.08 Identify edge forms and explain their purpose.
- 02.09 Construct and disassemble edge forms.
- 02.10 Install vapor barrier, reinforcement and control joints.
- 02.11 Establish finish grade and fill requirements.

03.0 Construct vertical formwork--The student will be able to:

- 03.01 Explain safety procedures associated with using concrete wall forms.
- 03.02 Identify the various types of concrete wall forms.
- 03.03 Identify the components of each type of vertical forming system.
- 03.04 Erect, plumb and brace a selected wall.
- 03.05 Recognize various types of manufactured forms.
- 03.06 State the differences in construction and use among different types of forms.

- 03.07 Erect, plumb and brace a column form.
- 03.08 Erect, plumb and brace a stair form.
- 03.09 Locate and install bulkheads and embedded forms.

04.0 Construct horizontal formwork--The student will be able to:

- 04.01 Identify the safety hazards associated with elevated deck formwork and explain how to eliminate them.
- 04.02 Identify the different types of elevated decks.
- 04.03 Identify the different types of flying form systems.
- 04.04 Identify different types of handset form systems.
- 04.05 Erect, plumb, brace and level different types of handset deck form systems.
- 04.06 Install edge forms, blockouts, embedments and construction joints.
- 04.07 Identify typical bridge and culvert form systems.

05.0 Erect and properly align tilt-up wall panels--The student will be able to:

- 05.01 Describe the different processes used in installing tilt-up wall panels.
- 05.02 Explain the importance of the casting bed.
- 05.03 Identify and install the various types of lifting eyes used in forming tilt-up panels.
- 05.04 Identify the special rigging requirements for tilt-up wall panels.
- 05.05 Identify the different methods of forming tilt-up wall panels.
- 05.06 Demonstrate the different methods of forming tilt-up wall panels.
- 05.07 Prepare for the erection of tilt-up wall panels.
- 05.08 Install proper bracing for tilt-up wall panels.
- 05.09 Install embedments, blockouts, architectural finishes, lifting devices and reinforcing materials using a set of construction drawings.
- 05.10 Describe the final grouting procedure.

06.0 Install drywall --The student will be able to:

- 06.01 Identify the different types of drywall and their uses.
- 06.02 Select the type and thickness of drywall required for specific installations.
- 06.03 Select fasteners for drywall installation.
- 06.04 Explain the fastener schedules for different types of drywall installations.
- 06.05 Perform single-layer and multi-layer drywall installations using different types of fastening systems, including:
 - a. Nails
 - b. Drywall screws
 - c. Adhesives
- 06.06 Install gypsum drywall on steel studs.
- 06.07 Explain how soundproofing is achieved in drywall installations.
- 06.08 Estimate material quantities for a drywall installation.

07.0 Install a suspended ceiling--The student will be able to:

- 07.01 Establish a level line.
- 07.02 Explain the common terms related to sound waves and acoustical ceiling materials.
- 07.03 Identify the different types of suspended ceilings.
- 07.04 Interpret plans related to ceiling layout.

- 07.05 Sketch the ceiling layout for a basic suspended ceiling.
 - 07.06 Perform a material takeoff for a suspended ceiling.
 - 07.07 Install selected suspended ceilings.
- 08.0 Interpret door and door hardware requirements based on plans and specifications--The student will be able to:
- 08.01 Identify various types of door jambs and frames and demonstrate the installation procedures for placing selected door jambs and frames in different types of interior partitions.
 - 08.02 Identify different types of interior doors.
 - 08.03 Identify different types of interior door hardware and demonstrate the installation procedures for selected types.
 - 08.04 List and identify specific items included on a typical door schedule.
 - 08.05 Explain the procedure for placing and hanging a specified door.
- 09.0 Install windows and exterior doors--The student will be able to:
- 09.01 Identify various types of fixed, sliding and swinging windows.
 - 09.02 Identify the parts of a window installation.
 - 09.03 State the requirements for a proper window installation.
 - 09.04 Install a pre-hung window.
 - 09.05 Identify the common types of exterior doors and explain how they are constructed.
 - 09.06 Identify the parts of a door installation.
 - 09.07 Identify the types of thresholds used with exterior doors.
 - 09.08 Install a pre-hung exterior door.
 - 09.09 Identify the various types of locksets used on exterior doors and explain how they are installed.
 - 09.10 Install a lockset.
- 10.0 Apply interior trim--The student will be able to:
- 10.01 Identify the different types of standard moldings and describe their uses.
 - 10.02 Make square and miter cuts using a miter box or power miter saw.
 - 10.03 Make coped joint cuts using a coping saw.
 - 10.04 Select and properly use fasteners to install trim.
 - 10.05 Install interior trim, including:
 - a. Door trim
 - b. Window trim
 - c. Base trim
 - d. Ceiling trim
 - 10.06 Estimate the quantities of different trim materials required for selected rooms.
- 11.0 Lay out and construct an exterior stair system--The student will be able to:
- 11.01 Identify the types of exterior stair systems.
 - 11.02 Identify the parts of an exterior stair system.
 - 11.03 Calculate the number of treads and risers for an exterior stair system.
 - 11.04 Lay out, cut and assemble an exterior stair system.

- 12.0 Apply exterior finishing--The student will be able to:
- 12.01 Describe the purpose of wall insulation and flashing.
 - 12.02 Install selected common cornices.
 - 12.03 Demonstrate lap and panel siding estimating methods.
 - 12.04 Describe the types and applications of common wood siding.
 - 12.05 Describe fiber-cement siding and its uses.
 - 12.06 Describe the types and styles of vinyl and metal siding.
 - 12.07 Describe the types and applications of stucco and masonry veneer finishes.
 - 12.08 Describe the types and applications of special exterior finish systems.
 - 12.09 Install three types of siding commonly used in your area.
- 13.0 Set up and install basic rigging and scaffolding--The student will be able to:
- 13.01 Identify and explain rigging equipment.
 - 13.02 Inspect rigging equipment, following safety precautions.
 - 13.03 Estimate size, weight and center of gravity.
 - 13.04 Tie knots.
 - 13.05 Identify and explain types of cranes.
 - 13.06 Rig and move materials and equipment, following safety precautions.
 - 13.07 Set up and install scaffolds, following safety precautions.
 - 13.08 Inspect various types of ladders and scaffolds, following safety precautions.
- 14.0 Erect, plumb and brace a simple concrete form with reinforcement--The student will be able to:
- 14.01 Identify the properties of cement.
 - 14.02 Describe the composition of concrete.
 - 14.03 Perform volume estimates for concrete quantity requirements.
 - 14.04 Identify types of concrete reinforcement materials and describe their uses.
 - 14.05 Identify various types of footings and explain their uses.
 - 14.06 Identify the parts of various types of forms.
 - 14.07 Explain the safety procedures associated with the construction and use of concrete forms.
- 15.0 Explain and demonstrate how to place reinforcing bars in walls, columns, beams, girders, joists and slabs--The student will be able to:
- 15.01 Describe the applications of reinforcing bars, the uses of reinforced structural concrete and the basic processes involved in placing reinforcing bars.
 - 15.02 Recognize and identify the bar bends standardized by the American Concrete Institution (ACI).
 - 15.03 Read and interpret bar lists and describe the information found on a bar list.
 - 15.04 List the types of ties used in securing reinforcing bars.
 - 15.05 State the tolerances allowed in the fabrication of reinforcing bars.
 - 15.06 Demonstrate the proper use of common ties for reinforcing bars.
 - 15.07 Describe methods by which reinforcing bars may be cut and bent in the field.
 - 15.08 Use the tools and equipment needed for installing reinforcing bars.
 - 15.09 Safely use selected tools and equipment to cut, bend and install reinforcing materials.
 - 15.10 Explain the necessity of concrete cover in placing reinforcing bars.

15.11 Identify lapped splices.

16.0 Explain the transport and placement of concrete--The student will be able to:

- 16.01 List various types of equipment used to transport and place concrete.
- 16.02 Describe the factors that contribute to the quality of concrete placement.
- 16.03 Demonstrate the correct methods for placing and consolidating concrete into forms.
- 16.04 Use a screed to strike off and level concrete to the proper grade in a form.
- 16.05 Use tools for placing, floating and finishing concrete.
- 16.06 Determine when conditions permit the concrete finishing operation to start.
- 16.07 Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
- 16.08 Properly care for and safely use hand and power tools used when working with concrete.

17.0 Demonstrate an understanding of trenching and excavation--The student will be able to:

- 17.01 Identify the different types, bearing capacities and classifications of soils.
- 17.02 Identify ways to increase soil density.
- 17.03 State the purpose of soil density (compaction) tests.
- 17.04 Explain the safety considerations for trenches and deep excavations.
- 17.05 Identify and describe groundwater mitigation methods.
- 17.06 Identify and describe rock mitigation techniques.

Course Number: BCV0128

Occupational Completion Point: B

Carpenter – 150 Hours – SOC Code 47-2031

18.0 Identify structural timber--The student will be able to:

- 18.01 Identify structural-timber components and heavy structural timber.

19.0 Use plans and specifications for form carpentry--The student will be able to:

- 19.01 Read an architect's scale for form carpentry job.
- 19.02 Determine dimensions from plans.
- 19.03 Relate information on plans and specifications to real parts, locations, hardware, and fasteners.

20.0 Explain or identify various forms--The student will be able to:

- 20.01 Identify styles of footings.
- 20.02 Explain and settings a pier footing form.
- 20.03 Explain how to strip a form for reuse.
- 20.04 Explain edge forms for a floor with or without foundation walls and for a stoop.
- 20.05 Explain various types of curb and gutter forms.
- 20.06 Identify various types of beams, columns, and slabs with various form systems (Burke, Symons, plywood, and 2'x 4').
- 20.07 Identify and explain the different types and uses of flying forms for decks and shear walls.

- 20.08 Explain concrete pressure and its implications for form work routines.
- 20.09 Identify form-work accessories such as snap-ties, wedges, pigs-feet, whalers, and stiffbacks for forming walls, beams, and columns with plywood and 2'x 4' material.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Surveying and Mapping Technology
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I150203
CIP Number	0615110200
Grade Level	30, 31
Standard Length	1350 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G SURVEY 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3031 - Surveying and Mapping 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

The purpose of this program is to prepare students for employment as a surveying and mapping technician.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

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

The content includes, but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, record keeping skills and mathematics, and use of surveying equipment to perform measurement activities.

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

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	SUR0130	Surveying Rodman	450 Hours	17-3031
B	SUR0132	Survey Assistant, Instrument	450 Hours	17-3031
C	SUR0134	Survey Party Chief	450 Hours	17-3031

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Measure land using chains and tape.
- 02.0 Perform rod and level activities.
- 03.0 Perform angle measurement activities.
- 04.0 Develop sketches and drawings.
- 05.0 Demonstrate science knowledge and skills.
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 07.0 Demonstrate mathematics knowledge and skills.
- 08.0 Describe the importance of professional ethics and legal responsibilities.
- 09.0 Demonstrate surveying related computer assisted drafting.
- 10.0 Demonstrate language arts knowledge and skills.
- 11.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 13.0 Use information technology tools.
- 14.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 15.0 Explain the importance of employability and entrepreneurship skills.
- 16.0 Measure land using chains and tape for verification.
- 17.0 Perform transit/ theodolite angle measurement activities.
- 18.0 Perform electronic distance measurement activities.

- 19.0 Perform land-surveying activities.
- 20.0 Perform construction stake out activities.
- 21.0 Solve problems using critical thinking skills, creativity and innovation.
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 23.0 Determine methods and procedures for establishing survey control.
- 24.0 Develop related sketches and drawing.
- 25.0 Compute volumes and areas of surfaces.
- 26.0 Prepare charts and tables.
- 27.0 Demonstrate survey related computer assisted drafting skills as listed.
- 28.0 Describe the importance of professional ethics and legal responsibilities.
- 29.0 Perform advanced land surveying activities.
- 30.0 Perform advanced construction stake out activities.
- 31.0 Perform supervisory functions.
- 32.0 Determine methods and procedures for establishing survey control.
- 33.0 Develop drawings.
- 34.0 Research previous survey evidence.
- 35.0 Read, interpret, and write descriptions of land.
- 36.0 Demonstrate surveying related computer assisted drafting procedure.
- 37.0 Discuss advanced surveying and mapping topics.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Surveying and Mapping Technology
PSAV Number: 1150203

Course Number: SUR0130
Occupational Completion Point: A
Surveyor Rodman – 450 Hours – SOC Code 17-3031

01.0 Measure land using chains and tape--The student will be able to:

- 01.01 Clear brush to establish line of sight.
- 01.02 Hold the chain/tape over a point.
- 01.03 Pull the chain/tape.
- 01.04 Wind the chain/tape on reel.
- 01.05 Set the marker.
- 01.06 Establish a line perpendicular to an existing line at a given point using a right angle prism.
- 01.07 Establish elevation using a hand (Locke) level.

02.0 Perform rod and level activities--The student will be able to:

- 02.01 Plumb the rod.
- 02.02 Obtain a rod reading using a target.
- 02.03 Obtain a rod reading with using a target.
- 02.04 Establish a turning point/benchmark.
- 02.05 Set up the level.
- 02.06 Set up reflector.
- 02.07 Test the level.

03.0 Perform angle measurement activities--The student will be able to:

- 03.01 Set up a transit/theodolite over a point.
- 03.02 Measure a horizontal angle.
- 03.03 Measure a vertical angle.
- 03.04 Lay out a horizontal angle.
- 03.05 Lay out a vertical angle.
- 03.06 Read a compass bearing.

04.0 Develop sketches and drawings--The student will be able to:

- 04.01 Make lettering sketches to identify items.

05.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 05.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 05.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 06.02 Locate, organize and reference written information from various sources. CM3.0
- 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 06.05 Apply active listening skills to obtain and clarify information. CM7.0
- 06.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

07.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 07.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 07.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 07.03 Construct charts/tables/graphs using functions and data. AF3.5
- 07.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 07.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 07.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.

08.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 08.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 08.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 08.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 08.04 Interpret and explain written organizational policies and procedures. ELR2.0

09.0 Demonstrate surveying related computer assisted drafting--The student will be able to:

- 09.01 Operate Computer Assisted Drafting (CAD) equipment and penpheracs.
- 09.02 Perform Applied CAD Basic Drafting Skills.
- 09.03 Generate simple assemblies, details and schematics.
- 09.04 Apply notes and special instructions.
- 09.05 Manipulate views.
- 09.06 Apply scaling.
- 09.07 Apply dimensioning.
- 09.08 Select appropriate line weight.
- 09.09 Generate simple layouts.
- 09.10 Interpret printed output.
- 09.11 Demonstrate post/processing file management skills.

- 10.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 10.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 10.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 10.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 11.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 11.01 Describe the nature and types of business organizations. SY1.0
- 11.02 Explain the effect of key organizational systems on performance and quality.
- 11.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 11.04 Explain the impact of the global economy on business organizations.

Course Number: SUR0132
Occupational Completion Point: B
Survey Assistant – 450 Hours – SOC Code 17-3031

- 12.0 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:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
- 12.02 Explain emergency procedures to follow in response to workplace accidents.
- 12.03 Create a disaster and/or emergency response plan. SHE2.0
- 12.04 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
- 12.05 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200)
- 13.0 Use information technology tools--The students will be able to:
- 13.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 14.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 14.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 14.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 14.03 Conduct and participate in meetings to accomplish work tasks. LT4.0

- 14.04 Employ mentoring skills to inspire and teach others. LT5.0
- 15.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 15.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 15.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 15.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 15.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 15.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 15.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 15.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 15.08 Research the benefits of ongoing professional development. ECD9.0
- 16.0 Measure land using chains and tape for verification--The student will be able to:
- 16.01 Test and standardize the chain/tape.
- 17.0 Perform transit/theodolite angle measurement activities--The student will be able to:
- 17.01 Adjust transit/theodolite leveling bubbles.
 - 17.02 Adjust transit/theodolite vertical cross-hair by double centering.
 - 17.03 Adjust transit/theodolite vertical cross-hair for vertical accuracy.
 - 17.04 Discuss digital technology that has replaced manual transit/theodolite angle measurement activities.
- 18.0 Perform electronic distance measurement activities--The student will be able to:
- 18.01 Test accuracy of instrument against a known point.
 - 18.02 Set up electronic instruments.
 - 18.03 Obtain scope distance and compute horizontal distance.
 - 18.04 Use of data collector.
 - 18.05 Set up reflector.
 - 18.06 Discuss pressure measurement in terms of PSI, inches of mercury, and KPA.
 - 18.07 Demonstrate the use of Global Positioning System (GPS).
 - 18.08 Obtain horizontal and vertical distances.
- 19.0 Perform land-surveying activities--The student will be able to:
- 19.01 Determine horizontal distance by the stadia method.
 - 19.02 Determine elevation by the stadia method.
 - 19.03 Locate detail by angle and distance using a transit/theodolite.
 - 19.04 Discuss the former method of locating detail by the use of a plane tape and alidade.
- 20.0 Perform construction stake out activities--The student will be able to:
- 20.01 Establish horizontal control.
 - 20.02 Establish vertical control.
 - 20.03 Stake out horizontal curves.

- 21.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 21.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 21.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 21.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 21.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 22.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 22.02 Describe the effect of money management on personal and career goals. FL3.0
 - 22.03 Develop a personal budget and financial goals. FL3.1
 - 22.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 22.05 Maintain financial records. FL3.3
 - 22.06 Read and reconcile financial statements. FL3.4
 - 22.07 Research, compare and contrast investment opportunities.
- 23.0 Determine methods and procedures for establishing survey control--The student will be able to:
- 23.01 Understand and apply methods of distance measurements.
 - 23.02 Understand and apply methods of angle measurements.
 - 23.03 Understand and apply azimuth determination.
- 24.0 Develop related sketches and drawing--The student will be able to:
- 24.01 Demonstrate inking procedures.
 - 24.02 Identify map symbolism.
 - 24.03 Define and interpret dimensioning.
 - 24.04 Write a brief but adequate property description.
- 25.0 Compute volumes and areas--The student will be able to:
- 25.01 Compute volumes of linear dimension surfaces.
 - 25.02 Compute volumes of curved surfaces.
 - 25.03 Compute an area by using trapezoids.
 - 25.04 Compute an area by using coordinates.
 - 25.05 Compute an area of a curved surface.
- 26.0 Prepare charts and tables--The student will be able to:
- 26.01 Understand and prepare curve information.
 - 26.02 Understand and prepare highway design information.
 - 26.03 Understand and prepare standard control information.
 - 26.04 Understand and prepare proper field notes.
 - 26.05 Understand and prepare proper legend information.

27.0 Demonstrate survey related computer assisted drafting skills as listed--The student will be able to:

- 27.01 Demonstrate data base management skills.
- 27.02 Generate simple isometric views.
- 27.03 Transfer of data collector information.
- 27.04 Create drawing from data collector information.
- 27.05 Develop execute lists using command language.

28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 28.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 28.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 28.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 28.04 Interpret and explain written organizational policies and procedures. ELR2.0

Course Number: SUR0134
Occupational Completion Point: C
Survey Party Chief – 450 Hours – SOC Code 17-3031

29.0 Perform advanced land surveying activities--The student will be able to:

- 29.01 Establish property concerns from deed descriptions or plat.
- 29.02 Secure a deed from the courthouse.

30.0 Perform advanced construction stake out activities--The student will be able to:

- 30.01 Determine elevations for vertical curves.
- 30.02 Establish slope stakes.

31.0 Perform supervisory functions--The student will be able to:

- 31.01 Demonstrate equipment use.
- 31.02 Inventory field supplies and equipment.
- 31.03 Select equipment.
- 31.04 Evaluate personnel
- 31.05 Schedule work.
- 31.06 Perform mathematical checks on field work.
- 31.07 Keep field notes.

32.0 Determine advanced methods and procedures for establishing survey control--The student will be able to:

- 32.01 Understand and apply closure computations.
- 32.02 Understand and apply adjustment of data.
- 32.03 Layout of controls for photogramatic procedures.

- 33.0 Develop drawings--The student will be able to:
 - 33.01 Develop drawing from field notes.
- 34.0 Research previous survey evidence--The student will be able to:
 - 34.01 Be familiar with courthouse procedures.
 - 34.02 Conduct a title search.
 - 34.03 Demonstrate an understanding of deeds.
 - 34.04 Search for record evidence.
 - 34.05 Demonstrate proper resurvey processes.
- 35.0 Read, interpret, and write descriptions of land--The student will be able to:
 - 35.01 Prepare metes and bounds descriptions.
 - 35.02 Understand the U.S. Public Land Survey System.
 - 35.03 Understand and interpret sectionalized surveys.
 - 35.04 Understand and interpret sectional breakdowns.
 - 35.05 Understand and interpret standard deed information.
- 36.0 Demonstrate surveying related computer assisted drafting procedure--The student will be able to:
 - 36.01 Interpret printed output.
- 37.0 Discuss advanced surveying and mapping topics—The student will be able to:
 - 37.01 Explain the fundamentals of the Global Navigation Satellite System (GNSS) previously called the Global Positioning System (GPS).
 - 37.02 Explain Real Time Kinematic (RTK) GPS surveying.
 - 37.03 Explain the fundamentals of hydrographic surveying (sonar) use in terms of surveying applications.
 - 37.04 Explain the fundamentals of high definition laser scanning as a future goal to achieve and understand.
 - 37.05 Explain utility designating and utility excavation in terms of how it applies to the modern surveyor.
 - 37.06 Explain Geographic Information Systems (GIS) technology as it applies to the modern surveyor.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Electrician
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	I460314
CIP Number	0646030204
Grade Level	30,31
Standard Length	1500 Hours
Teacher Certification	ELECTRICAL @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-3013 – Helpers - Electricians 47-2111 - Electricians
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

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of a program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0603	Electrician Helper	300 Hours	47-3013
B	BCV0640	Residential Electrician	450 Hours	47-2111
C	BCV0652	Commercial Electrician	450 Hours	47-2111
D	BCV0667	Industrial Electrician	300 Hours	47-2111

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all

career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

This program (I460314) has a statewide articulation agreement approved by the Florida State Board of Education:

Building Construction Technology AAS/AS (0615.100101/1615.100101) – 3 credits

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

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate an understanding of basic electricity.
- 07.0 Read and interpret basic electric codes.
- 08.0 Apply mathematics knowledge and skills to electricity.
- 09.0 Demonstrate further understanding of electricity.
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate language arts knowledge and skills.
- 12.0 Demonstrate science knowledge and skills.
- 13.0 Demonstrate proficiency in electrical math problems and skills.
- 14.0 Use information technology tools.
- 15.0 Describe the importance of professional ethics and legal responsibilities.
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 17.0 Demonstrate Alternating-Current (AC) circuit skills.
- 18.0 Explain the importance of employability and entrepreneurship skills.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 21.0 Install residential wiring.
- 22.0 Install residential wiring systems.
- 23.0 Demonstrate proficiency in commercial wiring.

- 24.0 Demonstrate specialized electrical skills.
- 25.0 Demonstrate competency in industrial wiring.
- 26.0 Demonstrate competency in transformers.
- 27.0 Demonstrate competency in AC and DC motors.
- 28.0 Demonstrate competency in electrical and electronic control circuits and equipment.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Electrician
PSAV Number: I460314

Course Number: BCV0603
Occupational Completion Point: A
Electrician Helper – 300 Hours – SOC Code 47-3013

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Clean the work area and maintain it in a safe condition.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Identify and operate workplace-safety electrical devices.
 - 01.04 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.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Create a disaster and/or emergency response plan. SHE2.0
 - 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
 - 01.08 Describe "Right-to-Know" Law as recorded in (29 CFR.1910.1200)
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry--The student will be able to:
- 02.01 Identify and select tools, equipment, materials, and wires to complete a job.
 - 02.02 Drill holes in metal, wood, and concrete for electrical wiring.
 - 02.03 Lay out electrical devices, complying with regulations.
 - 02.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills--The student will be able to:
- 03.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
 - 03.02 Measure voltage, amperage, and resistance, using a Volt-Ohm Meter (VOM) and a Digital Volt-Ohm Meter (DVM).
 - 03.03 Analyze, and explain a series, series-parallel, and parallel circuit.
 - 03.04 Draw each type of circuit and calculate the circuit values.
 - 03.05 Explain and apply Ohm's Law.

- 03.06 Compute conductance and resistance of conductors and insulators.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 04.02 Locate, organize and reference written information from various sources. CM3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 05.0 Demonstrate mathematics knowledge and skills--The student will be able to:
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate an understanding of basic electricity--The student will be able to:
- 06.01 Explain the principles of electromagnetism.
 - 06.02 Explain the magnetic properties of circuits and devices.
 - 06.03 Relate electricity to the nature of matter.
 - 06.04 Describe various ways that electricity is produced.
- 07.0 Read and interpret basic electric codes--The student will be able to:
- 07.01 Describe the importance of following the local, state and national electric codes.
 - 07.02 Read and interpret basic electric codes, wiring plans and specifications.
 - 07.03 Identify licensure requirements for electrical occupations.
 - 07.04 Demonstrate knowledge of National Fire Protection Agency (NFPA) 70E and how it relates to job safety.
- 08.0 Apply mathematics knowledge and skills to electricity--The student will be able to:
- 08.01 Demonstrate Solve basic algebraic formulas related to electricity.
 - 08.02 Solve basic trigonometric functions related to electrical theory.
 - 08.03 Explain basic AC theory and solve related mathematical problems using appropriate test equipment.
 - 08.04 Solve math-related problems from measurements on training aids. (Optional)
- 09.0 Demonstrate further understanding of electricity--The student will be able to:
- 09.01 Explain molecular action as a result of temperature extremes, chemical reaction and moisture content.

- 09.02 Explain how voltage is produced by chemical, mechanical, thermal, photoelectric and piezo electric means.
- 09.03 Identify electrical symbols in construction documents.
- 10.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:
 - 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 10.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 11.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
 - 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 11.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 12.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
 - 12.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 12.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

Course Number: BCV0640

Occupational Completion Point: B

Residential Electrician – 450 Hours -- SOC Code 47-2111

- 13.0 Demonstrate proficiency in electrical math problems and skills--The student will be able to:
 - 13.01 Calculate wiring costs.
 - 13.02 Draw an industrial electrical-wiring plan.
 - 13.03 Describe the use of high-voltage test equipment.
 - 13.04 Describe how to test insulation.
 - 13.05 Describe how to balance a load.
 - 13.06 Use electrical related math skills.
- 14.0 Use information technology tools--The students will be able to:
 - 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0

- 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 14.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 15.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 15.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 15.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
- 16.02 Describe the effect of money management on personal and career goals. FL3.0
- 16.03 Develop a personal budget and financial goals. FL3.1
- 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 16.05 Maintain financial records. FL3.3
- 16.06 Read and reconcile financial statements. FL3.4
- 16.07 Research, compare and contrast investment opportunities.
- 17.0 Demonstrate Alternating-Current (AC) circuit skills--The student will be able to:
- 17.01 Identify the physical and electrical characteristics of capacitors and inductors.
- 17.02 Demonstrate proficiency in measuring, testing and connecting a transformer.
- 17.03 Apply the principles of transformers to AC circuits.
- 17.04 Identify the properties of an AC signal.
- 17.05 Identify AC sources.
- 17.06 Analyze and apply the principles of transformers to AC circuits.
- 17.07 Analyze polyphase circuits.
- 17.08 Install a simple polyphase circuit.
- 18.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 18.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 18.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 18.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
- 18.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
- 18.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
- 18.06 Identify and exhibit traits for retaining employment. ECD7.0
- 18.07 Identify opportunities and research requirements for career advancement.ECD8.0
- 18.08 Research the benefits of ongoing professional development. ECD9.0
- 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 19.01 Describe the nature and types of business organizations. SY1.0
 - 19.02 Explain the effect of key organizational systems on performance and quality.
 - 19.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 19.04 Explain the impact of the global economy on business organizations.
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 20.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 20.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 20.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 20.04 Employ mentoring skills to inspire and teach others. LT5.0
- 21.0 Install residential wiring--The student will be able to:
- 21.01 Identify residential-wiring requirements and specifications in accordance with a wiring plan.
 - 21.02 Draw a residential wiring plan, using electrical-wiring symbols.
 - 21.03 Identify and install a recessed lighting fixture, a fluorescent lighting fixture, and a surface lighting fixture according to the specifications, complying with the appropriate local, state, or national electric codes.
 - 21.04 Identify, install, and wire a duplex- receptacle-outlet circuit, a split-circuit duplex-receptacle-outlet circuit, and a special-purpose receptacle-outlet circuit according to the specifications, complying with the appropriate local, state, or national electric codes.
- 22.0 Install residential wiring systems--The student will be able to:
- 22.01 Install and wire a low-voltage signal system.
 - 22.02 Install conduit systems.
 - 22.03 Provide power for heating, ventilation, and air-conditioning equipment.
 - 22.04 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Service-entrance main panel
 - b. Service-entrance meter base
 - c. Alarm system/smoke detectors
 - 22.05 Demonstrate knowledge of the requirements for the installation of a swimming-pool electrical system.
 - 22.06 Connect single-phase and three-phase transformers.
 - 22.07 Troubleshoot residential electric circuits.

Course Number: BCV0652

Occupational Completion Point: C

Commercial Electrician – 450 Hours -- SOC Code 47-2111

- 23.0 Demonstrate proficiency in commercial wiring--The student will be able to:

- 23.01 Read and interpret a commercial wiring plan and specifications.
- 23.02 Draw a commercial electrical-wiring plan.
- 23.03 Select tools, equipment, materials, and wires to complete a job.
- 23.04 Install the following according to the plan and specifications, complying with appropriate electric codes:
 - a. Wire mold
 - b. Conduit, duct, and raceway systems
 - c. Conductors in a conduit
- 23.05 Describe the difference between a residential and a commercial lighting circuit.
- 23.06 Construct control circuits from schematics.
- 23.07 Describe high-voltage (over 600V) wiring requirements.
- 23.08 Demonstrate knowledge of installing wiring in hazardous areas.
- 23.09 Explain a commercial three-phase receptacle circuit, and an emergency-lighting system.
- 23.10 Explain commercial-service-entrance requirements.

24.0 Demonstrate specialized electrical skills--The student will be able to:

- 24.01 Explain solid-state control devices.
- 24.02 Explain data cable installation according to the plan and specifications.

Course Number: BCV0667

Occupational Completion Point: D

Industrial Electrician – 300 Hours – SOC Code 47-2111

25.0 Demonstrate competency in industrial wiring--The student will be able to:

- 25.01 Draw an industrial one-line power diagram.
- 25.02 Test insulation resistance using a megohmmeter.
- 25.03 Install a motor branch circuit.
- 25.04 Using the National Electrical Code (NEC), make the following required calculations:
 - a. Conductor size
 - b. Overcurrent protection
 - c. Overload protection
 - d. Short circuit protection
- 25.05 Install a 277 V lighting branch circuit.
- 25.06 Describe a bus duct power distribution system.
- 25.07 Describe fiber-optic installation requirements.
- 25.08 Demonstrate the use of industrial test equipment.
- 25.09 Install the following:
 - a. Disconnect switch - fused and unfused
 - b. Raceways
 - c. Emergency stop switch
 - d. Circuit breaker
 - e. Panelboard

26.0 Demonstrate competency in transformers--The student will be able to:

- 26.01 Explain the basic principles of mutual induction and transformer action.

- 26.02 Explain the operation and use of a current transformer.
 - 26.03 Explain the operation and use of a potential transformer.
 - 26.04 Explain the operation and use of a buck-boost transformer and when it is used.
 - 26.05 Explain and connect 3 phase transformers in both delta and wye configuration.
 - 26.06 Calculate the over current protection requirements for the primary and secondary.
 - 26.07 Explain what transformer impedance is and its importance.
- 27.0 Demonstrate competency in AC and DC motors--The student will be able to:
- 27.01 Install and connect the following types of DC motors:
 - a. Series
 - b. Shunt
 - c. Compound
 - 27.02 Install and connect the following types of single phase AC motors:
 - a. Capacitor-start
 - b. Capacitor-start and run
 - c. Split-phase inductor
 - d. Universal
 - e. Repulsion-start, induction-run
 - 27.03 Install and connect the following types of three phase AC motors:
 - a. Squirrel-cage induction
 - b. Wound-rotor
 - c. Synchronous
 - 27.04 Demonstrate the ability to select and connect a three-phase induction motor for either high or low voltage requirements.
- 28.0 Demonstrate competency in electrical and electronic control circuits and equipment--The student will be able to:
- 28.01 Draw an elementary motor control ladder diagram.
 - 28.02 Interpret symbols, read and troubleshoot from schematics and ladder diagrams.
 - 28.03 Describe the operation of the following overload relays:
 - a. Thermal
 - b. Magnetic
 - c. Thermal-magnetic
 - 28.04 Install a manual single phase and three phase control station.
 - 28.05 Install a three-phase magnetic starter.
 - 28.06 Install the following control devices:
 - a. Start/stop station
 - b. Forward/reverse/stop station
 - c. Hands/off/auto station
 - d. Start/jog/stop station
 - e. Limit switches
 - f. Pressure, temperature, level, and float switches
 - g. Pilot, run, and stop indicator lights
 - h. Control relay, and timing relays
 - i. Multi-motor push-button station
 - 28.07 Install, operate, and troubleshoot the following relay control circuits:
 - a. Start/stop
 - b. Forward/reverse

- c. Hands-off-auto
 - d. Start/jog
 - e. Automatic timed sequence, "ON" and "OFF" delays
 - f. Manually timed sequence, "ON" and "OFF" delays
 - g. Plugging
 - h. DC injection braking
- 28.08 Install, operate and troubleshoot the following electronic control equipment and circuits:
- a. Variable Frequency Drive (VFD)
 - b. DC drive
- 28.09 Explain the alternatives to relay logic control.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Commercial and Industrial Insulation
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I460407
CIP Number	0646041400
Grade Level	30, 31
Standard Length	1200 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶G BLDG CONST ¶ 7 ¶G INSULAT 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2131 - Insulation Workers, Floor, Ceiling, and Wall
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

The purpose of this program is to prepare students for employment or advanced training in the commercial and industrial insulation industry.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point that allows students to achieve the competencies necessary for employment in the industry.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0190	Insulation Worker 1	400 Hours	47-2131
	BCV0191	Insulation Worker 2	400 Hours	47-2131
	BCV0192	Insulation Worker 3	400 Hours	47-2131

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be

able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.fl DOE.org/workforce/dwdframe/artic_frame.asp.

Standards

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

- 01.0 Demonstrate knowledge and the use of Personal Protective Equipment (PPE).
- 02.0 Demonstrate state-of-the-art work practices.
- 03.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 04.0 Identify safety hazards and ways to protect against them.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Demonstrate language arts knowledge and skills.
- 07.0 Demonstrate mathematics knowledge and skills
- 08.0 Explain and demonstrate appropriate field safety rules and procedures.
- 09.0 Use information technology tools.
- 10.0 Describe the importance of professional ethics and legal responsibilities.
- 11.0 Demonstrate knowledge of the general applications and uses of commercial and industrial insulation.
- 12.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 13.0 Apply insulation theory to job needs.
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 16.0 Read and interpret blueprints and specifications.
- 17.0 Estimate and order materials for a job site.
- 18.0 Apply various insulation materials.
- 19.0 Install accessory materials for insulation.
- 20.0 Perform specialized insulation activities.
- 21.0 Demonstrate science knowledge and skills.
- 22.0 Solve problems using critical thinking skills, creativity and innovation.
- 23.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

**Program Title: Commercial and Industrial Insulation
PSAV Number: I460407**

**Course Number: BCV0190
Occupational Completion Point:
Insulation Worker 1 – 400 Hours – SOC Code SOC 47-2131**

01.0 Demonstrate a knowledge and the use of Personal Protective Equipment (PPE)--The student will be able to:

- 01.01 Evaluate the classes and characteristics of respirator types.
- 01.02 Identify the limitations of respirators.
- 01.03 Determine the proper selection, inspection, donning, use, maintenance, and storage procedures of respirators.
- 01.04 Perform positive- and negative-pressure fit checks.
- 01.05 Describe qualitative- and quantitative-fit testing procedures.
- 01.06 Identify the components of a proper respiratory-protection program.
- 01.07 Select and use personal protective clothing.
- 01.08 Use, handle, and store non-disposable clothing.
- 01.09 Examine work-area entry and exit procedures for personal protection.
- 01.10 Identify the activities that are prohibited for personal protection.
- 01.11 Identify individuals, such as family members, who may be exposed to hazardous materials.
- 01.12 Describe the regulations that relate to personal protective equipment.

02.0 Demonstrate state-of-the-art work practices--The student will be able to:

- 02.01 Display proper work practices for abatement activities.
- 02.02 Demonstrate the proper construction and maintenance of barriers and decontamination enclosure systems.
- 02.03 Position warning signs.
- 02.04 Demonstrate the proper lockout of electrical and ventilation systems.
- 02.05 Utilize negative-pressure exhaust-ventilation equipment.
- 02.06 Apply proper cleanup and disposal procedures.
- 02.07 Analyze emergency procedures for an unplanned release of materials.
- 02.08 Transport and dispose of materials safely.
- 02.09 Discuss recommended and prohibited work practices.
- 02.10 Explain new abatement-related techniques and methodologies.
- 02.11 Describe relevant federal, state, and local regulatory requirements, such as those of TSCA Title II, RCRA, EPA, and OSHA.

03.0 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:

- 03.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0

- 03.02 Explain emergency procedures to follow in response to workplace accidents.
- 03.03 Create a disaster and/or emergency response plan. SHE2.0
- 04.0 Identify safety hazards and ways to protect against them--The student will be able to:
- 04.01 Identify and describe the physical characteristics and appearance of hazardous materials used in the insulation industry.
- 04.02 Identify electrical, fire, and explosion hazards.
- 04.03 Describe heat stress and its symptoms and prevention's.
- 04.04 Discuss the possible presence of other contaminants and ways to protect against them.
- 04.05 Analyze work sites for hazardous conditions that could cause slips, trips, and falls.
- 04.06 Identify confined spaces where safety hazards may exist.
- 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. CM1.0
- 05.02 Locate, organize and reference written information from various sources. CM3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 05.05 Apply active listening skills to obtain and clarify information. CM7.0
- 05.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 06.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 06.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 06.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 06.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 07.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 07.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 07.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 07.03 Construct charts/tables/graphs using functions and data. AF3.5
- 07.04 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
- 07.05 Measure tolerances on horizontal and vertical surfaces, using centimeters, feet, and inches.
- 07.06 Determine the purchase price of items, including the applicable sales tax.
- 07.07 Compute federal, state, and local taxes.
- 08.0 Explain and demonstrate appropriate field safety rules and procedures--The student will be able to:

- 08.01 Utilize appropriate Personal Protective Equipment (PPE).
- 08.02 Apply first-aid procedures.
- 08.03 Set up warning signs, signals, and barricades.
- 08.04 Identify, select, and operate tools and equipment safely.
- 08.05 Erect and use ladders and scaffolding safely.
- 08.06 Transport and store materials safely and securely.
- 08.07 Follow Occupational Safety and Health Administration (OSHA) and Mining Safety and Health Act (MSHA) rules and regulations.
- 08.08 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
- 08.09 Describe the proper precautions for handling work-related chemicals and hazardous materials.
- 08.10 Locate and interpret regulating requirements.

Course Number: BCV0191

Occupational Completion Point:

Insulation Worker 2 – 400 Hours – SOC Code SOC 47-2131

09.0 Use information technology tools--The students will be able to:

- 09.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
- 09.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
- 09.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
- 09.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

10.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 10.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 10.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 10.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 10.04 Interpret and explain written organizational policies and procedures. ELR2.0

11.0 Demonstrate knowledge of the general applications and uses of commercial and industrial insulation--The student will be able to:

- 11.01 Describe the uses of insulation.
- 11.02 Identify insulation-bonding agents such as tapes and cements.
- 11.03 Describe the insulation needs of commercial mechanical systems on buildings, such as heating and air-conditioning units.
- 11.04 Describe the insulation needs of industrial mechanical systems such as boilers, turbines, and heat exchangers.

- 12.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 12.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 12.02 Describe the effect of money management on personal and career goals. FL3.0
 - 12.03 Develop a personal budget and financial goals. FL3.1
 - 12.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 12.05 Maintain financial records. FL3.3
 - 12.06 Read and reconcile financial statements. FL3.4
 - 12.07 Research, compare and contrast investment opportunities.
- 13.0 Apply insulation theory to job needs--The student will be able to:
- 13.01 Explain the concept and method of heat transfer.
 - 13.02 Identify factors of insulation.
 - 13.03 Analyze moisture effects on insulation materials.
 - 13.04 Identify the cause of vapor and different types of vapor barriers.
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 14.01 Describe the nature and types of business organizations. SY1.0
 - 14.02 Explain the effect of key organizational systems on performance and quality.
 - 14.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 14.04 Explain the impact of the global economy on business organizations.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 15.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 15.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 15.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 15.04 Employ mentoring skills to inspire and teach others. LT5.0
- 16.0 Read and interpret blueprints and specifications--The student will be able to:
- 16.01 Read and interpret job specifications.
 - 16.02 Analyze a plot plan.
 - 16.03 Verify a plan view.
 - 16.04 Determine a proper elevation section.
 - 16.05 Read and interpret an isometric drawing.
 - 16.06 Interpret a blueprint based on various scales.
 - 16.07 Identify column lines.
 - 16.08 Define blueprint symbols.
- 17.0 Estimate and order materials for a job site--The student will be able to:
- 17.01 Estimate the amount of insulation materials needed for a job site.

- 17.02 Identify and select accessory materials.
- 17.03 Order the appropriate insulation and accessory materials for the job site.
- 17.04 Calculate measurements for insulation.

18.0 Apply various insulation materials--The student will be able to:

- 18.01 Describe the uses of:
 - a. Fiberglass
 - b. Mineral wool
 - c. Cellular glass
 - d. Polyurethane (rigid)
 - e. Polystyrene (expanded and extended)
 - f. Cellular foam (flexible)
 - g. Calcium silicate
 - h. Expanded perlite
 - i. Ceramic fibers
 - j. Insulating cements
- 18.02 Install pipe coverings.
- 18.03 Install insulation to mechanical systems such as block boilers, tanks, flues, and environmental units.
- 18.04 Describe and install multi-layer applications.
- 18.05 Install board and block materials.
- 18.06 Apply blanket duct wrap.
- 18.07 Cut materials with appropriate tools and equipment.

Course Number: BCV0192

Occupational Completion Point: A

Insulation Worker 3 – 400 Hours – SOC Code 47-2131

19.0 Install accessory materials for insulation--The student will be able to:

- 19.01 Apply various adhesives.
- 19.02 Utilize cement bonding.
- 19.03 Install fasteners and clips.
- 19.04 Apply reinforcement materials.
- 19.05 Install mastics for vapor proofing.
- 19.06 Install protective jackets.
- 19.07 Describe the functions and uses of weather barriers.

20.0 Perform specialized insulation activities--The student will be able to:

- 20.01 Describe the uses of the following:
 - a. Insulated panels
 - b. Cryogenic insulation
 - c. Fire-protection materials
 - d. Acoustical insulation
 - e. Temperature refractory insulation
- 20.02 Install the following:
 - a. Insulated panels
 - b. Cryogenic insulation
 - c. Fire-protection materials

- d. Acoustical insulation
 - e. Temperature refractory insulation
 - 20.03 Install removable insulation blankets (pads).
 - 20.04 Apply sprayed, formed, and foam insulation's.
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 21.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 21.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
 - 21.03 Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury.
- 22.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 22.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 22.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 22.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 22.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 23.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 23.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 23.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 23.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 23.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
 - 23.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
 - 23.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 23.07 Identify opportunities and research requirements for career advancement. ECD8.0
 - 23.08 Research the benefits of ongoing professional development. ECD9.0
 - 23.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0
 - 23.10 Demonstrate knowledge of "Right-to-Know" Law.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Roofing
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I460410
CIP Number	0646041000
Grade Level	30, 31
Standard Length	450 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G ROOFING 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2181 - Roofers
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

The purpose of this program is to prepare students for employment as roofers.

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

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction with one occupational completion point that allows students to achieve the competencies necessary for employment in the industry.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0144	Roofer	450 Hours	47-2181

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential

Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 8, and Reading 8. 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

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.fl DOE.org/workforce/dwdframe/artic_frame.asp.

Standards

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

- 01.0 Read and interpret blueprints and schematics
- 02.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 03.0 Demonstrate language arts knowledge and skills.
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 05.0 Demonstrate use and care of hand tools and equipment.
- 06.0 Develop work estimates.
- 07.0 Describe the importance of professional ethics and legal responsibilities.
- 08.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 09.0 Identify types of roofing decks.
- 10.0 Install shingle roofs.
- 11.0 Install build-up roofing.
- 12.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 14.0 Install single-ply roofing.
- 15.0 Install clay tile roofing.
- 16.0 Demonstrate safe work habits.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Solve problems using critical thinking skills, creativity and innovation.
- 20.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Roofing
PSAV Number: I460410

Course Number: BCV0144
Occupational Completion Point: A
Roofer – 450 Hours – SOC Code 47-2181

- 01.0 Read and interpret blueprints and schematics--The student will be able to:
- 01.01 Read and interpret the individual scales of the architect scale.
 - 01.02 Read and interpret the individual scales of the engineers scale.
 - 01.03 Identify and interpret architectural drawings.
 - 01.04 Identify and read lines in the alphabet of lines.
 - 01.05 Demonstrate knowledge and proficiency of commonly used symbols and abbreviations.
 - 01.06 Read and interpret basic dimensions of linear, angular and circular types.
 - 01.07 Determine area from given dimensions.
 - 01.08 Demonstrate knowledge and proficiency of tolerance dimensions.
 - 01.09 Convert blueprint dimensions to actual distance.
 - 01.10 Define/identify the various blueprint/schematic terms.
- 02.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 02.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
 - 02.02 Locate, organize and reference written information from various sources. CM3.0
 - 02.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
 - 02.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
 - 02.05 Apply active listening skills to obtain and clarify information. CM7.0
 - 02.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
 - 02.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 03.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 03.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
 - 03.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
 - 03.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 04.0 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:

- 04.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 04.02 Explain emergency procedures to follow in response to workplace accidents.
 - 04.03 Create a disaster and/or emergency response plan. SHE2.0
 - 04.04 Demonstrate knowledge of the "Right-To-Know Law".
- 05.0 Demonstrate use and care of hand tools and equipment--The student will be able to:
- 05.01 Identify basic hand tools.
 - 05.02 Identify basic rules concerning safe use and care of tools and equipment.
 - 05.03 Select correct tools for the selected skills.
 - 05.04 Demonstrate the safe and correct use of each item of tools and equipment.
 - 05.05 Select and demonstrate proper use of the types of ladders.
 - 05.06 Demonstrate proper procedures in erecting a scaffold.
- 06.0 Develop work estimates--The student will be able to:
- 06.01 Solve material and cost estimating problems.
 - 06.02 Estimate time and wage costs to complete a specified job.
 - 06.03 Develop cost comparison of performing versus contracting.
 - 06.04 Determine materials and supplies according to blueprints.
 - 06.05 Convert required materials and supplies to appropriate measure - square feet, squares, board feet, etc.
 - 06.06 Prepare an order for materials and supplies.
- 07.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 07.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 07.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 07.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
 - 07.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 08.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 08.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 08.02 Describe the effect of money management on personal and career goals. FL3.0
 - 08.03 Develop a personal budget and financial goals. FL3.1
 - 08.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 08.05 Maintain financial records. FL3.3
 - 08.06 Read and reconcile financial statements. FL3.4
 - 08.07 Research, compare and contrast investment opportunities.
- 09.0 Identify types of roofing decks--The student will be able to:
- 09.01 Identify purposes of a roof.
 - 09.02 Identify roofing members.

- 09.03 Describe the seven roofing styles.
- 09.04 Lay out and demonstrate models of roof styles.
- 10.0 Install shingle roofs--The student will be able to:
 - 10.01 Identify and select the most commonly used shingles.
 - 10.02 Demonstrate cutting of roofing paper.
 - 10.03 Demonstrate application of roofing paper.
 - 10.04 Demonstrate use of nails and staples in attaching roof paper.
 - 10.05 Demonstrate attachment of wood shingles.
 - 10.06 Demonstrate use of punch for hole punching wood shingles.
 - 10.07 Demonstrate attachment of fiberglass shingles.
 - 10.08 Demonstrate attachment of asphalt shingles.
 - 10.09 Select, prepare and install flashing materials.
 - 10.10 Select and demonstrate use of fasteners for each shingle type.
 - 10.11 Describe roofing paper and its uses.
 - 10.12 Locate and repair leaks.
- 11.0 Install build-up roofing--The student will be able to:
 - 11.01 Describe characteristics of "build-up" roofs.
 - 11.02 Identify, select and describe materials for "build-up" roof.
 - 11.03 Demonstrate application of tar or asphalt to roof base.
 - 11.04 Demonstrate step-by-step procedure for installation.
 - 11.05 Select and prepare flashing materials including gravel stop fascia.
 - 11.06 Select and demonstrate use of fasteners.
 - 11.07 Demonstrate construction and attachment of pre-fabricated roof sections.
 - 11.08 Locate and repair leaks.
- 12.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
 - 12.01 Describe the nature and types of business organizations. SY1.0
 - 12.02 Explain the effect of key organizational systems on performance and quality.
 - 12.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 12.04 Explain the impact of the global economy on business organizations.
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 13.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 13.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 13.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 13.04 Employ mentoring skills to inspire and teach others. LT5.0
- 14.0 Install single-ply roofing--The student will be able to:
 - 14.01 Describe and apply criteria for single-ply roofs.
 - 14.02 Demonstrate cutting of roofing paper.

- 14.03 Demonstrate installation of roofing paper.
- 14.04 Demonstrate use of nails and staples in attaching roofing paper.
- 14.05 Select and prepare flashing materials for installation.
- 14.06 Demonstrate installation of roofing materials with appropriate fasteners.
- 14.07 Describe roofing paper and its uses.
- 14.08 Locate and repair leaks.

- 15.0 Install clay tile roofing--The student will be able to:
 - 15.01 Describe and apply criteria for using clay tile.
 - 15.02 Demonstrate cutting of roofing paper.
 - 15.03 Demonstrate installation of roofing paper.
 - 15.04 Demonstrate use of nails and staples in attaching roofing paper.
 - 15.05 Select and prepare flashing materials for installation.
 - 15.06 Demonstrate use of punch in preparing holes for attaching tile roofing.
 - 15.07 Locate and repair leaks.

- 16.0 Demonstrate safe work habits--The student will be able to:
 - 16.01 Describe requirements and use of portable and fixed access to upper level worksite.
 - 16.02 Identify kinds of scaffolding procedures and requirements.
 - 16.03 Identify housekeeping and general safety hazards while performing at elevated levels.
 - 16.04 Identify requirements of medical and first aid services.
 - 16.05 Demonstrate basic first aid procedures.
 - 16.06 List and describe uses of personal protection devices and activities.
 - 16.07 Identify and describe the classes and types of fires.
 - 16.08 Identify and describe the types of fire extinguishers.
 - 16.09 Operate a fire extinguisher.

- 17.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
 - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 17.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 17.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 17.04 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
 - 17.05 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
 - 17.06 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
 - 17.07 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
 - 17.08 Demonstrate an understanding of federal, state and local taxes and their computations.

- 18.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
 - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1

- 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.AF4.3
 - 18.03 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
 - 18.04 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.
 - 18.05 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 19.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
 - 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
 - 19.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
 - 19.04 Conduct technical research to gather information necessary for decision-making.PS4.0
- 20.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 20.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
 - 20.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
 - 20.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 20.04 Maintain a career portfolio to document knowledge, skills, and experience.ECD5.0
 - 20.05 Evaluate and compare employment opportunities that match career goals.ECD6.0
 - 20.06 Identify and exhibit traits for retaining employment. ECD7.0
 - 20.07 Identify opportunities and research requirements for career advancement.ECD8.0
 - 20.08 Research the benefits of ongoing professional development. ECD9.0
 - 20.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Industrial Pipefitter
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I460514
CIP Number	0646050303
Grade Level	30, 31
Standard Length	600 Hours
Teacher Certification	PLUMBIN @7 7G BLDG CONST ¶ 7 ¶G TEC CONSTR ¶ 7 ¶G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2152 - Plumbers, Pipefitters, and Steamfitters
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

The purpose of the program is to prepare students for employment in a variety of industrial pipefitting occupations.

This program focuses on broad, transferable skills, stresses understanding of the pipe fitting industry, and demonstrates elements of the Pipe Fitting Trades industry; such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer. It is recommended that students complete the indicated sequence or demonstrate a mastery of the student performance standards contained in an occupational completion point before advancing to the next level in the program.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	BCV0568	Industrial Pipefitter Helper	300 Hours	47-2152
B	BCV0569	Industrial Pipefitter	300 Hours	47-2152

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

Students enrolled in an apprenticeship program for the Industrial Pipe Fitter Technology Program should become journeyman when they complete the apprenticeship program if they meet the program requirements and pass all examinations administered during the apprenticeship period.

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

(http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Apply safety rules and procedures.
- 02.0 Demonstrate science knowledge and skills.
- 03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 04.0 Apply proper use and care of hand tools.
- 05.0 Apply proper use and care of power tools.
- 06.0 Accomplish threaded pipe fabrications.
- 07.0 Demonstrate language arts knowledge and skills.
- 08.0 Solve problems using critical thinking skills, creativity and innovation.
- 09.0 Apply proper use and care of ladders and scaffolds.
- 10.0 Apply proper use and care of motorized equipment.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 12.0 Identify and explain excavations.
- 13.0 Identify and explain underground pipe.

- 14.0 Identify and explain intermediate excavations.
- 15.0 Describe the importance of professional ethics and legal responsibilities.
- 16.0 Perform underground pipe installation.
- 17.0 Use information technology tools.
- 18.0 Understand drawings and detail sheets.
- 19.0 Identify and explain piping systems.
- 20.0 Demonstrate mathematics knowledge and skills.
- 21.0 Use pipefitter trade math.
- 22.0 Identify and explain socket weld pipe fabrication.
- 23.0 Identify and explain butt weld pipe fabrication.
- 24.0 Identify, select, use and maintain rigging.
- 25.0 Identify and use pipe hangers and supports.
- 26.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Read advanced blue print.
- 30.0 Explain the importance of employability and entrepreneurship skills.
- 31.0 Read, interpret pipefitting standards and specifications.
- 32.0 Use, explain, perform and calculate advanced trade math.
- 33.0 Identify, explain, and use motorized equipment.
- 34.0 Accomplish above ground pipe installation.
- 35.0 Identify and install valves.
- 36.0 Field route and accomplish vessel trim.
- 37.0 Identify, explain, select, install spring can supports.
- 38.0 Test piping systems and equipment.
- 39.0 Accomplish basic plumbing.
- 40.0 Plan work activities.
- 41.0 Accomplish advanced pipe fabrication.
- 42.0 Perform NDE testing.
- 43.0 Accomplish stress-relieving and aligning.
- 44.0 Identify and use steam traps.
- 45.0 Identify and use inline components.
- 46.0 Use and fabricate special piping.
- 47.0 Accomplish hot taps.
- 48.0 Maintain valves.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Industrial Pipefitter
PSAV Number: I460514

Course Number: BCV0568
Occupational Completion Point: A
Industrial Pipefitter Helper – 300 Hours – SOC Code 47-2152

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 Practice maintaining 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 Locate and use Materials Safety Data Sheets (MSDS).

02.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 02.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 02.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

03.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 03.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
- 03.02 Locate, organize and reference written information from various sources. CM3.0
- 03.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 03.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 03.05 Apply active listening skills to obtain and clarify information. CM7.0
- 03.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 03.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

04.0 Apply proper use and care of hand tools--The student will be able to:

- 04.01 Explain general hand tool safety.
- 04.02 Use and care for pipefitter vises and stands.
- 04.03 Use and care for pipe wrenches.

- 04.04 Use and care for levels.
- 04.05 Use and care for pipe fabrication tools.
- 04.06 Use and care for pipe cutting tools.
- 04.07 Use and care for benders and flaring tools.

05.0 Apply proper use and care of power tools--The student will be able to:

- 05.01 Explain and perform power tool safety.
- 05.02 Cut pipe using a portable band saw.
- 05.03 Identify and explain types of portable grinders.
- 05.04 Use and care for portable grinders.
- 05.05 Identify and explain pipe-threading machines.
- 05.06 Use and care for pipe threading machines.
- 05.07 Perform special threading applications.
- 05.08 Identify and explain portable power drives.
- 05.09 Operate portable power drives.
- 05.10 Identify and explain types of power bevellers.

06.0 Accomplish threaded pipe fabrication--The student will be able to:

- 06.01 Identify and explain the materials used in threaded systems.
- 06.02 Identify and explain pipefittings.
- 06.03 Read and interpret screwed fitting joint drawings.
- 06.04 Identify and explain types of threads.
- 06.05 Determine pipe lengths between fittings.
- 06.06 Perform threaded pipe assembly techniques.

07.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0

- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 07.03 Present information formally and informally for specific purposes and audiences. AF2.9

08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0

09.0 Apply proper use and care of ladders and scaffolds--The student will be able to:

- 09.01 Use and care for ladders.
- 09.02 Use and care for tubular buck scaffolds.
- 09.03 Use and care for pole scaffolds (OES).
- 09.04 Use and care for rolling scaffolds.

- 10.0 Apply proper use and care of motorized equipment--The student will be able to:
- 10.01 Use and care for engine-driven generators.
 - 10.02 Use and care for portable air compressors.
 - 10.03 Identify and explain portable pumps.
 - 10.04 Identify and explain forklift trucks (OSHA).
 - 10.05 Identify and explain hydraulic cranes.
- 11.0 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:
- 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 11.02 Explain emergency procedures to follow in response to workplace accidents.
 - 11.03 Create a disaster and/or emergency response plan. SHE2.0
- 12.0 Identify and explain excavations--The student will be able to:
- 12.01 Explain properties of soil.
 - 12.02 Identify and explain types of soils.
 - 12.03 Explain excavation safety.
 - 12.04 Explain sloping requirements for different types of solid.
 - 12.05 Explain excavation support systems.
 - 12.06 Identify and explain bedding materials.
- 13.0 Identify and explain underground pipe--The student will be able to:
- 13.01 Identify and explain the types of underground piping materials.
 - 13.02 Identify the size classifications of underground pipe.
 - 13.03 Identify and explain the use of underground pipefittings.
 - 13.04 Explain the joining methods for underground pipe.
 - 13.05 Explain the storage and handling requirements of underground pipe.
- 14.0 Identify and explain intermediate excavations--The student will be able to:
- 14.01 Identify and explain the use of shoring materials.
 - 14.02 Identify and explain the use of pre-manufactured support systems.
 - 14.03 Install a vertical shore to be used for shoring.
 - 14.04 Determine the overall fall of a sewer line.
 - 14.05 Determine and set the grade and elevation of a trench.
 - 14.06 Explain backfilling procedures.
- 15.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
 - 15.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
 - 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2

- 15.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 16.0 Perform underground pipe installation--The student will be able to:
- 16.01 Identify and explain underground pipe installation guidelines.
 - 16.02 Install cast iron pipe.
 - 16.03 Install ductile iron pipe.
 - 16.04 Install vitrified clay pipe.
 - 16.05 Install concrete pipe.
 - 16.06 Install carbon steel pipe.
 - 16.07 Install fiberglass pipe.
 - 16.08 Install thermoplastic pipe.
- 17.0 Use information technology tools--The students will be able to:
- 17.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 17.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 18.0 Use drawings and detail sheets--The student will be able to:
- 18.01 Identify and explain parts of drawings.
 - 18.02 Identify and explain types of drawings.
 - 18.03 Make field sketches.
- 19.0 Identify and explain piping systems--The student will be able to:
- 19.01 Identify and explain the types of piping systems.
 - 19.02 Identify piping systems according to color-coding.
 - 19.03 Explain thermal expansion.
 - 19.04 Explain types and applications of pipe insulation.
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 20.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 20.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 20.03 Construct charts/tables/graphs using functions and data. AF3.5
- 21.0 Use pipefitter trade math--The student will be able to:
- 21.01 Identify and explain the use of special measuring devices.
 - 21.02 Use tables of weights and measurements.
 - 21.03 Use ratios and proportions.
 - 21.04 Solve basic algebra problems.
 - 21.05 Solve area problems.

- 21.06 Solve volume problems.
- 21.07 Solve circumference problems.
- 21.08 Solve right triangles.

22.0 Identify and explain socket weld pipe fabrication--The student will be able to:

- 22.01 Identify and explain types of socket weld piping materials.
- 22.02 Identify and explain socket weld fittings.
- 22.03 Read and interpret socket weld piping drawings.
- 22.04 Determine pipe lengths between socket weld fittings.
- 22.05 Fabricate socket weld fittings to pipe.

23.0 Identify and explain butt weld pipe fabrications--The student will be able to:

- 23.01 Identify butt weld piping materials.
- 23.02 Identify butt weld fittings.
- 23.03 Read and interpret butt weld piping drawings.
- 23.04 Set up oxyacetylene equipment.
- 23.05 Cut plate steel using an oxyacetylene torch.
- 23.06 Bevel plate steel using and oxyacetylene torch.
- 23.07 Cut holes using an oxyacetylene torch.
- 23.08 Cut pipe using an oxyacetylene torch.
- 23.09 Prepare by beveling pipe ends for set-up.
- 23.10 Determine pipe lengths between fittings.
- 23.11 Select and install backing rings.
- 23.12 Use and care for clamps and alignment tools.
- 23.13 Perform alignment procedures for various types of fittings.

24.0 Identify, select, use and maintain rigging--The student will be able to:

- 24.01 Select, inspect, use and maintain a block and tackle hoist.
- 24.02 Select, inspect, use and maintain chain hoists.
- 24.03 Select, inspect, use and maintain come-alongs.
- 24.04 Select, inspect, use and maintain jacks.
- 24.05 Select, inspect, use and maintain a tugger.
- 24.06 Identify and explain heavy rigging hardware.
- 24.07 Inspect heavy rigging hardware.
- 24.08 Read and interpret lifting capacity charts.
- 24.09 Explain load balancing.
- 24.10 Rig pipe and valves.
- 24.11 Plan a rigging job.

25.0 Identify and use pipe hangers and supports--The student will be able to:

- 25.01 Identify types of pipe hangers and supports.
- 25.02 Identify and interpret pipe support drawings and symbols.
- 25.03 Determine field placement of hangers.
- 25.04 Identify and install concrete fasteners.
- 25.05 Fabricate angle iron brackets to support pipe.

- 26.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 26.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 26.02 Describe the effect of money management on personal and career goals. FL3.0
 - 26.03 Develop a personal budget and financial goals. FL3.1
 - 26.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 26.05 Maintain financial records. FL3.3
 - 26.06 Read and reconcile financial statements. FL3.4
 - 26.07 Research, compare and contrast investment opportunities.

Course Number: BCV0569**Occupational Completion Point: B****Industrial Pipefitter – 300 Hours – SOC Code 47-2152**

- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 27.01 Describe the nature and types of business organizations. SY1.0
 - 27.02 Explain the effect of key organizational systems on performance and quality.
 - 27.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
 - 27.04 Explain the impact of the global economy on business organizations.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 28.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 28.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 28.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 28.04 Employ mentoring skills to inspire and teach others. LT5.0
- 29.0 Read advanced blueprints--The student will be able to:
- 29.01 Identify symbols and abbreviations on P & IDs.
 - 29.02 Identify piping arrangement drawings.
 - 29.03 Read and interpret coordinates, control points, and elevation.
 - 29.04 Read and interpret P & IDs, plan views, and section views.
 - 29.05 Identify isometric drawings.
 - 29.06 Read isometric drawings taken from plan views.
 - 29.07 Draw isometric drawings.
- 30.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:
- 30.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0
 - 30.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
 - 30.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
 - 30.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0

- 30.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 30.06 Identify and exhibit traits for retaining employment. ECD7.0
- 30.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 30.08 Research the benefits of ongoing professional development. ECD9.0
- 30.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

31.0 Read and interpret pipefitting standards and specifications--The student will be able to:

- 31.01 Read and interpret pipefitting standards and codes.
- 31.02 Read and interpret pipefitting specifications.
- 31.03 Identify pipe and components according to specifications.

32.0 Use, explain, perform, and calculate advanced trade math--The student will be able to:

- 32.01 Use tables of equivalents.
- 32.02 Use unit conversion tables.
- 32.03 Explain thermal expansion.
- 32.04 Perform right angle trigonometry.
- 32.05 Calculate take-outs using trigonometry.

33.0 Identify, explain, and use motorized equipment--The student will be able to:

- 33.01 Identify and explain types of manlifts.
- 33.02 Explain manlift safety rules and hazards.
- 33.03 Inspect scissors-type and telescoping boom manlifts.
- 33.04 Explain the use of cable lifts.
- 33.05 Identify and explain the use of hydrostatic pumps.
- 33.06 Identify and explain the use of hydroblaster pumps.
- 33.07 Identify and explain the use of drain cleaners.
- 33.08 Identify and explain the use of pipeline side boom tractors.
- 33.09 Use construction trucks and trailers.

34.0 Accomplish above ground pipe installation--The student will be able to:

- 34.01 Store pipe and materials.
- 34.02 Identify types of flanges.
- 34.03 Identify types of gaskets and bolts used with flanges.
- 34.04 Explain the location of flange bolt holes.
- 34.05 Install pipe with flanged connections.
- 34.06 Lay out and install pipe sleeves and floor penetrations.
- 34.07 Read and interpret spool sheets.
- 34.08 Explain how to erect spools in piping systems.

35.0 Identify and install valves--The student will be able to:

- 35.01 Identify types of valves that start and stop flow.
- 35.02 Identify types of valves that regulate flow.
- 35.03 Identify valves that relieve pressure.
- 35.04 Identify valves that regulate the direction of flow.
- 35.05 Identify types of valve actuators.

- 35.06 Explain how to properly store and handle valves.
- 35.07 Explain valve locations and positions.
- 35.08 Install valves with threaded ends.
- 35.09 Install valves with welded ends.
- 35.10 Install valves with flanged ends.

36.0 Field route and accomplish vessel trim--The student will be able to:

- 36.01 Secure the work area.
- 36.02 Determine field run specifications.
- 36.03 Determine the required rigging equipment based on weight, location, and configuration.
- 36.04 Determine the load weight for erection equipment.
- 36.05 Determine the support needs.
- 36.06 Select and install erection materials.
- 36.07 Perform screw pipe assembly.
- 36.08 Perform socket weld pipe assembly.
- 36.09 Perform butt weld pipe assembly.
- 36.10 Fabricate the field run of piping.
- 36.11 Erect vessel trim.

37.0 Identify, explain, select, and install spring can supports--The student will be able to:

- 37.01 Explain standard practice document MSS SP-58.
- 37.02 Identify and explain the types of spring can supports.
- 37.03 Identify and explain the types of variable spring can supports.
- 37.04 Identify and explain the types of constant spring can supports.
- 37.05 Explain how to select spring can supports.
- 37.06 Explain the storing and handling procedures for spring can supports.
- 37.07 Explain how to install spring can supports.
- 37.08 Maintain spring can supports.

38.0 Test piping systems and equipment--The student will be able to:

- 38.01 Perform pretest requirements.
- 38.02 Perform service and flow tests.
- 38.03 Perform head pressure tests.
- 38.04 Perform hydrostatic tests.
- 38.05 Explain how to perform steam blow tests.

39.0 Accomplish basic plumbing--The student will be able to:

- 39.01 Identify and explain the basic materials used in manufacturing plumbing fixtures.
- 39.02 Identify drainage fixture unit ratings for given type of plumbing fixtures.
- 39.03 Identify and explain the operation of lavatories and sinks.
- 39.04 Identify and explain water closets, urinals and bidets.
- 39.05 Identify and explain drinking fountains and water coolers.
- 39.06 Identify and explain mop sinks, service basins, and floor drains.
- 39.07 Identify and explain the basic considerations for plumbing fixture installations.
- 39.08 Identify cast iron soil pipe fittings.
- 39.09 Assemble cast iron soil pipe with lead-and-oakum joints.

- 39.10 Assemble cast iron soil pipe with compression joints.
- 39.11 Assemble cast iron soil pipe with no-hub joints.

40.0 Plan work activities--The student will be able to:

- 40.01 Plan daily work activities.
- 40.02 Coordinate work activities with other crafts.
- 40.03 Ensure safe working conditions.
- 40.04 Determine material requirements.
- 40.05 Secure equipment and materials.
- 40.06 Prepare to perform a task.
- 40.07 Sequence operations specific to the task.
- 40.08 Field-verify the installation.

41.0 Accomplish advanced pipe fabrication--The student will be able to:

- 41.01 Calculate simple piping offsets.
- 41.02 Calculate three line, 45 degree, equal-spread offsets around a vessel.
- 41.03 Calculate three line, 45 degree, unequal-spread offsets.
- 41.04 Fabricate tank heating coils.
- 41.05 Perform mitering procedures.
- 41.06 Layout three and four piece mitered turns.
- 41.07 Layout 45 degree laterals using reference.
- 41.08 Fabricate dummy legs and trunions out of pipe using references.
- 41.09 Perform geometric layout of pipe laterals and supports.

42.0 Perform NDE testing--The student will be able to:

- 42.01 Identify potential hazards for testing.
- 42.02 Identify types of NDE testing.
- 42.03 Prepare welds for NDE testing.
- 42.04 Perform visual inspections.

43.0 Accomplish stress relieving and aligning--The student will be able to:

- 43.01 Explain thermal expansion.
- 43.02 Perform stress-relief procedures.
- 43.03 Explain grouting.
- 43.04 Explain types of misalignment.
- 43.05 Align pipe flanges to equipment nozzles.

44.0 Identify and use steam traps--The student will be able to:

- 44.01 Identify types of steam traps.
- 44.02 Install steam traps.
- 44.03 Troubleshoot steam trap systems.

45.0 Identify and use inline components--The student will be able to:

- 45.01 Identify the potential hazards associated with in-line components.
- 45.02 Identify in-line special components.

- 45.03 Explain how to store and handle in-line special components.
- 46.0 Use and fabricate special piping--The student will be able to:
 - 46.01 Install flared and compression joints using copper tubing.
 - 46.02 Solder and braze joints using copper tubing.
 - 46.03 Bend pipe to a specified radius.
 - 46.04 Install glass-lines pipe.
 - 46.05 Explain how to install hydraulic fitted compression joints.
 - 46.06 Install grooved pipe couplings.
- 47.0 Accomplish hot taps--The student will be able to:
 - 47.01 Explain hot tap safety and potential hazards.
 - 47.02 Identify and install fittings used with hot taps.
 - 47.03 Explain the use of hot tap machines.
 - 47.04 Identify and explain the use of stopples.
- 48.0 Maintain valves--The student will be able to:
 - 48.01 Remove and install threaded valves.
 - 48.02 Remove and install flanged valves.
 - 48.03 Replace valve stem o-rings.
 - 48.04 Replace bonnet gaskets.
 - 48.05 Explain the purpose of valve packing.
 - 48.06 Repack a valve.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Refrigeration Technology
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I470202
CIP Number	0647020103
Grade Level	30, 31
Standard Length	1350 Hours
Teacher Certification	AC HEAT MECH @7 7G REFRIG MECH 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
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

The purpose of this program is to prepare students for employment or advanced training in the refrigeration industry.

This program focuses on broad, transferable skills, stresses the understanding of the refrigeration industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, the underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ACR0041	Air Conditioning, Refrigeration and Heating Helper	250 Hours	49-9021
B	ACR0043	Air Conditioning, Refrigeration and Heating Mechanic Assistant	250 Hours	49-9021
C	ACR0047	Air Conditioning, Refrigeration and Heating Mechanic 1	250 Hours	49-9021
	ACR0049	Air Conditioning, Refrigeration and Heating Mechanic 2	250 Hours	
D	ACR0045	Refrigeration Mechanic	350 Hours	49-9021

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment.
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 09.0 Troubleshoot and wire electrical motors and their components.

- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems.
- 12.0 Explain the function of basic electronics.
- 13.0 Demonstrate language arts knowledge and skills.
- 14.0 Use information technology tools.
- 15.0 Solve problems using critical thinking skills, creativity and innovation.
- 16.0 Read construction documents.
- 17.0 Demonstrate science knowledge and skills.
- 18.0 Explain the properties of matter and heat behavior.
- 19.0 Analyze fluids, pressures, refrigerants, and related codes.
- 20.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 23.0 Select appropriate commercial compressors.
- 24.0 Test and adjust commercial evaporative condensers.
- 25.0 Maintain, test, and troubleshoot commercial evaporators.
- 26.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 30.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 31.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 32.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 33.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 34.0 Demonstrate a working knowledge of refrigerants and oils.
- 35.0 Interpret, use and modify construction drawings and specifications.
- 36.0 Conduct system startup and shutdown.
- 37.0 Design heating and cooling systems.
- 38.0 Use combustion-type heating servicing and testing equipment.
- 39.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 40.0 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 41.0 Maintain, troubleshoot, and repair commercial heating systems.
- 42.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems.
- 43.0 Demonstrate knowledge of retail refrigeration systems.
- 44.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 45.0 Develop an understanding of hydronic systems.
- 46.0 Develop an understanding of steam systems.
- 47.0 Determine the properties of air.
- 48.0 Use a pressure enthalpy chart to diagram refrigerant cycles.
- 49.0 Explain the standards for and ways to measure indoor-air quality.

- 50.0 Operate environmental control systems as used in commercial heating and air-conditioning systems.
- 51.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications.
- 52.0 Maintain and repair thermal storage systems.
- 53.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems.
- 54.0 Calculate commercial heating and air-conditioning loads.
- 55.0 Install air distribution systems.
- 56.0 Evaluate commercial airside systems.
- 57.0 Balance an air distribution system.
- 58.0 Select energy conservation equipment.
- 59.0 Analyze building management systems.
- 60.0 Recommend alternative heating and cooling systems for various case studies.
- 61.0
- 62.0 Demonstrate a working knowledge of electrical generation and distribution components for commercial heating and air conditioning systems.
- 63.0 Demonstrate a working knowledge of refrigeration-system vibration and insulation.
- 64.0 Apply commercial refrigeration-pipe sizing and troubleshooting procedures.
- 65.0 Use refrigeration-systems skills in commercial applications.
- 66.0 Demonstrate a working knowledge of refrigerated storage systems.
- 67.0 Diagnose, maintain, and repair ice-making systems.
- 68.0 Use refrigeration electrical-system skills in commercial applications.
- 69.0 Maintain and troubleshoot commercial refrigeration systems.

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**Florida Department of Education
Student Performance Standards**

Program Title: Commercial Refrigeration Technology
PSAV Number: I470202

Course Number: ACR0041
Occupational Completion Point: A
A/C, Refrigeration and Heating Helper – 250 Hours – SOC Code 49-9021

Course Number: ACR0041
Occupational Completion Point: A
A/C, Refrigeration and Heating Helper – 250 Hours – SOC Code 49-9021

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan. SHE 2.0
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 02.01 Identify and use
 - a. Basic hand tools and tool accessories
 - b. Power tools (electric, mechanical, and pneumatic, if available)
 - c. Pipe and tube-working tools of the trade
 - d. Specialized tools of the trade

- 02.02 Apply appropriate care and maintenance procedures for tools and tool accessories, following the directions in the tool-equipment manufacturer's manual.
- 03.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF 3.0
- 03.01 Demonstrate knowledge of arithmetic operations. AF 3.2
- 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
- 03.03 Construct charts/tables/graphs using functions and data. AF 3.5
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 04.02 Locate, organize and reference written information from various sources. CM 3.0
- 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment--The student will be able to:
- 05.01 Explain the principles of electricity.
- 05.02 Explain single- and three-phase power distribution.
- 05.03 Define and explain watts, ohms, volts, and amps.
- 05.04 Identify and explain electrical measuring tools and devices.
- 05.05 Explain the standards for and ways to measure watts, resistance, voltage, and amperage, using appropriate instruments or devices.
- 05.06 Identify and explain appropriate electrical wiring symbols.
- 05.07 Draw and explain a wiring schematic diagram for a control system.
- 05.08 Create a wiring schematic for each of the following, using all components and symbols for safe and effective operation and interpretation:
- An air-conditioner
 - An electric furnace
 - A heat pump
 - An oil furnace (optional)
 - A gas furnace
- 05.09 Explain codes and standards and safety requirements for working with the electrical components used in heating, air conditioning, and refrigeration.
- 05.10 Troubleshoot protection devices, such as fuses and breakers.
- 05.11 Interpret tables and charts from the National Electrical Codes (NEC).
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components--The student will be able to:

- 06.01 Identify and explain the operations of electrical control systems and their components (zone damper motors, dual fuel lock out controls, outdoor thermostats/low ambient controls, defrost controls/timers, and auxiliary heating controls).
 - 06.02 Identify, install, and troubleshoot controls for heating, air-conditioning, and refrigeration systems.
 - 06.03 Explain the operation of different types of electromechanical thermostats.
 - 06.04 Wire basic heating, air-conditioning, and refrigeration systems.
 - 06.05 Troubleshoot operational problems for different types of electromechanical thermostats.
 - 06.06 Explain the electrical and mechanical operations of the basic heat pump.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
- 07.01 Determine wire sizes and voltage drops.
 - 07.02 Describe the operation of various types of transformers.
 - 07.03 Draw and identify various power-transformers.
 - 07.04 Test, size, and replace protection devices such as fuses and breakers, motor starters, and overloads.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems--The student will be able to:
- 08.01 Explain how alternating current is developed and draw a sine wave.
 - 08.02 Identify single-phase and three-phase wiring arrangements.
 - 08.03 Explain how phase shift occurs in inductors and capacitors.
 - 08.04 Describe the types of capacitors and their applications.
 - 08.05 Explain the operation of single-phase and three-phase induction motors.
 - 08.06 Identify the various types of single-phase motors and their applications.
 - 08.07 State and demonstrate the safety precautions, such as lock out / tag out, which must be followed when working with electrical equipment.
 - 08.08 Explain how the electric company uses a demand meter.
 - 08.09 Identify and explain the operations and applications of various types of electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.10 Maintain, test, and troubleshoot various types of commercial electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.11 Demonstrate the proper use of motor testing equipment.
- 09.0 Troubleshoot and wire electrical motors and their components--The student will be able to:
- 09.01 Identify and explain the functions of various types of motors and their components.
 - 09.02 Troubleshoot, test, and analyze motors, using various methods.
 - 09.03 Identify, troubleshoot, and wire various types of electric motors.
 - 09.04 Reverse the rotation of a motor.

- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems--The student will be able to:
- 10.01 Explain the basic principles and functions of Direct Digital Control (DDC).
 - 10.02 Explain basic solid-state circuits and boards.
 - 10.03 Identify, test, and replace circuits and boards.
 - 10.04 Identify and explain the functions of a building-management system.
 - 10.05 Program a programmable thermostat.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems --The student will be able to:
- 11.01 Explain how the principles of designing an electrical system for residential heating and air-conditioning systems apply to commercial heating and air-conditioning systems.
 - 11.02 Define and compare single- and multiphase voltage and current related to commercial heating and air-conditioning systems.
 - 11.03 Calculate various circuit loads in commercial heating and air-conditioning applications using Ohm's law.
 - 11.04 Troubleshoot electrical circuits for commercial heating and air-conditioning systems
- 12.0 Explain the function of basic electronics--The student will be able to:
- 12.01 Explain the basic theory of electronics and semiconductors.
 - 12.02 Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.
 - 12.03 Identify different types of resistors and explain how their resistance values can be determined.
 - 12.04 Describe the operation and function of thermistors and cad cells.
 - 12.05 Test semiconductor components.
 - 12.06 Identify the connectors on a personal computer.
- 13.0 Demonstrate language arts knowledge and skills--The student will be able to: ECD10.0
AF 2.0
- 13.01 Locate, comprehend and evaluate key elements of oral and written information. AF 2.4
 - 13.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF 2.5
 - 13.03 Present information formally and informally for specific purposes and audiences. AF 2.9
- 14.0 Use information technology tools--The student will be able to:
- 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT 1.0
 - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
 - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
 - 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

15.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:

- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS 1.0
- 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 15.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

Course Number: ACR0043

Occupational Completion Point: B

A/C, Refrigeration and Heating Mechanic Assistant – 250 Hours – SOC Code 49-9021

16.0 Read construction documents--The student will be able to:

- 16.01 Recognize and identify basic construction drawing terms, components and symbols.
- 16.02 Relate information on construction drawings to actual locations on the print.
- 16.03 Recognize different classifications of construction drawings.
- 16.04 Interpret and use drawing dimensions.

17.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:

- 17.01 Explain the basic principles of heating, ventilation and air-conditioning.
- 17.02 Identify educational paths to career opportunities in the HVAC profession.
- 17.03 Identify and explain the four major refrigeration components.
- 17.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
- 17.05 Differentiate between air-conditioning and refrigeration.
- 17.06 Differentiate between split systems and package systems.
- 17.07 Describe the benefits of conditioned air and environments.
- 17.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
- 17.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
- 17.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
- 17.11 Identify various professional organizations, associations, and societies, and explain their purposes.

18.0 Demonstrate science knowledge and skills--The student will be able to: AF 4.0

- 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF 4.1
- 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF 4.3

- 19.0 Explain the properties of matter and heat behavior--The student will be able to:
- 19.01 Describe and explain freezing point, critical temperature, and absolute zero.
 - 19.02 Describe matter, heat, and heat transfer.
 - 19.03 Differentiate between heat and temperature.
 - 19.04 Explain and distinguish among the characteristics of the three states of matter.
 - 19.05 Explain the relationship between temperature and humidity.
 - 19.06 Differentiate between latent heat and sensible heat.
- 20.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:
- 20.01 Identify the refrigeration cycle.
 - 20.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
 - 20.03 Define and explain "pressure," "fluid," and "temperature."
 - 20.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
 - 20.05 Identify and explain the classifications, properties, and uses of different refrigerants.
 - 20.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
 - 20.07 Define and identify "color-coding" of refrigerant cylinders.
 - 20.08 Compare Pressure and Temperature (P/T) charts.
 - 20.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
 - 20.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 21.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 21.01 Explain the types, operation, use, and maintenance requirements of
 - a. Compressors (such as reciprocating, rotary, screw, and scroll)
 - b. Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - c. Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
 - 21.02 Evaluate metering-device performance.
 - 21.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
 - 21.04 Analyze the operating condition of a compressor.
 - 21.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
 - 21.06 Identify the location and explain the uses of refrigerant flow accessories.
 - 21.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
 - 21.08 Evaluate system performance.
- 22.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:

- 22.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 22.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR 1.1
- 22.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
- 22.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The student will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 23.02 Describe the effect of money management on personal and career goals. FL 3.0
- 23.03 Develop a personal budget and financial goals. FL 3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
- 23.05 Maintain financial records. FL 3.3
- 23.06 Read and reconcile financial statements. FL 3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Select appropriate commercial compressors--The student will be able to:
- 24.01 Compare commercial-compressor requirements with those for residential and light commercial heating and air-conditioning systems.
- 24.02 Select appropriate commercial compressors for cooling requirements.
- 24.03 Describe the mechanical operation for each type of compressor.
- 24.04 Explain compressor lubrication methods.
- 24.05 Explain methods used to control compressor capacity.
- 24.06 Describe how compressor protection devices operate.
- 24.07 Perform the common procedures used when field servicing open and semi-hermetic compressors.
- 25.0 Test and adjust commercial evaporative condensers--The student will be able to:
- 25.01 Determine the proper air and fluid flow for commercial evaporative condensers.
- 25.02 Test and adjust the airflow for proper temperature difference.
- 25.03 Test and adjust the water flow for proper GPM and temperature difference.
- 25.04 Check for proper water treatment.
- 26.0 Maintain, test, and troubleshoot commercial evaporators--The student will be able to:
- 26.01 Determine the operational requirements for evaporators used in commercial heating and air-conditioning applications.
- 26.02 Select appropriate evaporators for commercial heating and air-conditioning systems.
- 26.03 Maintain, test, and adjust various commercial heating and air-conditioning accessories.
- 27.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:

- 27.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 27.02 Bend tubing, using tube benders.
 - 27.03 Connect tubing, using
 - a. Flared fittings
 - b. Compression fittings
 - 27.04 Connect tubing, using solderless connectors.
 - 27.05 Connect tubing, using a swaged-joint connection.
 - 27.06 Identify and use various types of torches.
 - 27.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 27.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 27.09 Braze tubing.
 - 27.10 Silver-braze brass, steels, and copper.
 - 27.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 27.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 27.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 27.14 Maintain project time and materials lists.
 - 27.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 28.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 28.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD 7.0
 - 28.07 Identify opportunities and research requirements for career advancement. ECD 8.0
 - 28.08 Research the benefits of ongoing professional development. ECD 9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:

- 30.01 Describe the nature and types of business organizations. SY1.0
- 30.02 Explain the effect of key organizational systems on performance and quality.
- 30.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 30.04 Explain the impact of the global economy on business organizations.

Course Number: ACR0047**Occupational Completion Point:****A/C, Refrigeration and Heating Mechanic 1 – 270 Hours – SOC Code 49-9021**

- 31.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
 - 31.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
 - 31.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
 - 31.03 Explain pressure and temperature drops.
- 32.0 Utilize and operate mechanical refrigeration servicing and testing equipment--The student will be able to:
 - 32.01 Identify the effects of superheat and sub-cooling on a system.
 - 32.02 Identify and explain the functions of servicing and testing equipment (such as vacuum pumps, micron gauges, EPA-approved equipment, leak detectors, and charging systems).
 - 32.03 Operate a refrigerant recovery system.
 - 32.04 Explain the standards for and ways to measure, test, maintain, and evacuate a mechanical heating, air-conditioning, and refrigeration system.
 - 32.05 Evacuate the refrigerant system with various vacuum methods.
 - 32.06 Demonstrate compliance with Environmental Protection Agency (EPA) rules and regulations and, if possible, take the EPA test.
 - 32.07 Charge various air-conditioning and mechanical refrigeration systems by various methods.
 - 32.08 Demonstrate the effects of superheat and sub-cooling on a system utilizing test equipment (such as thermometers and gages)
- 33.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures--The student will be able to:
 - 33.01 Read and comply with dispatch orders.
 - 33.02 Explain local codes and ordinances.
 - 33.03 Select and use appropriate tools and safety practices to test equipment.
 - 33.04 Determine the electrical requirements of equipment.
 - 33.05 Assist in the installation of a heating and air-conditioning system to the manufacturer's installation and operation specifications, using a practical knowledge of duct fabrication methods.
 - 33.06 Determine the proper charge in a residential air-conditioning unit and adjust superheat.
 - 33.07 Determine the temperature drop across the evaporator.

- 33.08 Determine the temperature rise across the condenser.
 - 33.09 Write a service report.
 - 33.10 Apply good customer-relations skills.
- 34.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:
- 34.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
 - 34.02 Determine the start-up and checkout procedures recommended by different manufacturers.
 - 34.03 Determine the electrical requirements of equipment.
 - 34.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
 - 34.05 Determine the temperature drop across the outdoor coil on a heat pump.
 - 34.06 Determine the temperature rise across the indoor coil on a heat pump.
 - 34.07 Test for a proper refrigerant charge in a residential heat pump.
 - 34.08 Apply good customer-relations skills.
- 35.0 Demonstrate a working knowledge of refrigerants and oils--The student will be able to:
- 35.01 Identify the refrigerants in common use and state the types of applications in which each is used.
 - 35.02 Explain the effects of releasing refrigerants into the atmosphere.
 - 35.03 Explain how refrigerants are classified by their chemical composition.
 - 35.04 Describe the color-coding scheme used to identify refrigerant cylinders.
 - 35.05 Describe how azeotropes and near-azeotropes differ from each other and from so-called pure refrigerants.
 - 35.06 Interpret a P-T chart for an azeotrope refrigerant.
 - 35.07 Calculate superheat and subcooling.
 - 35.08 Demonstrate refrigerant leak detecting methods.
 - 35.09 Identify the different types of oils used in refrigeration systems and explain their relationships to the various refrigerants.
 - 35.10 Explain how to add and remove oil from a system.
 - 35.11 Describe how to test oil for contamination.
- 36.0 Interpret, use and modify construction drawings and specifications--The student will be able to:
- 36.01 Read mechanical plans within a set of construction drawings explain their relationship.
 - 36.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
 - 36.03 Interpret specification documents and apply them to the plans.
 - 36.04 Interpret shop drawings and apply them to the plans and specifications.
 - 36.05 Develop a field set of as-built drawings.

- 36.06 Identify the steps required for transferring design information to component production.
- 36.07 List and classify materials most commonly used in HVAC systems.
- 37.0 Conduct system startup and shutdown--The student will be able to:
 - 37.01 Start up and shut down an air handler and related forced-air distribution system.
 - 37.02 Test compressor oil for acid contamination.
 - 37.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.
- 38.0 Design heating and cooling systems--The student will be able to:
 - 38.01 Identify and describe the steps in the system design process.
 - 38.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
 - 38.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
 - 38.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
 - 38.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
 - 38.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
 - 38.07 Identify the various types of duct systems and explain why and where each type is used.
 - 38.08 Demonstrate the effect of fittings and transitions on duct system design.
 - 38.09 Use a friction loss chart and duct sizing table to size duct.
 - 38.10 Install insulation and vapor barriers used in duct systems.
 - 38.11 Following proper design principles select and install refrigerant and condensate piping.

Course Number: ACR0049

Occupational Completion Point: C

A/C, Refrigeration and Heating Mechanic 2 – 270 Hours – SOC Code 49-9021

- 39.0 Use combustion-type heating servicing and testing equipment--The student will be able to:
 - 39.01 Explain combustion theory and the safety precautions for using combustion-type-heating servicing and testing equipment.
 - 39.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
 - 39.03 Use the servicing and testing equipment.
 - 39.04 Test, analyze, and troubleshoot combustion-type-heating systems.
- 40.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems--The student will be able to:
 - 40.01 Identify and discuss the safety and regulation issues and concerns.

- 40.02 Explain the operations of various types of gas valves and regulators (such as low-voltage, line-voltage, pneumatic, solenoid, and gas and pressure regulators).
 - 40.03 Identify and size various types of gas valves and regulators.
 - 40.04 Determine the application of gas valves and regulators.
 - 40.05 Troubleshoot gas valves and regulators.
- 41.0 Maintain, test, and adjust commercial heating and air-conditioning accessories--The student will be able to
- 41.01 Compare commercial accessories with residential and light- commercial-heating and air-conditioning accessories.
 - 41.02 Select the heating and air-conditioning accessories appropriate for various commercial applications.
 - 41.03 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 42.0 Maintain, troubleshoot, and repair commercial heating systems--The student will be able to:
- 42.01 Identify the components of various commercial heating systems.
 - 42.02 Explain the operational principles of various commercial heating systems.
 - 42.03 Test and analyze heating air-distribution systems.
 - 42.04 Maintain, troubleshoot, and repair various commercial heating systems, such as:
 - a. A gas furnace and boiler
 - b. An oil furnace and boiler
 - c. An electric furnace
 - d. Electric heaters
 - e. A heat pump
 - f. Solar-heating systems
- 43.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems--The student will be able to:
- 43.01 Follow safety precautions.
 - 43.02 Describe new technologies in heating, air-conditioning, and refrigeration installation, including
 - a. Variable-speed motors
 - b. Heat-pipe systems
 - c. Desiccant systems
 - d. Gas-driven heating systems
 - 43.03 Lay out, construct, and troubleshoot comfort systems.
 - 43.04 Test and analyze systems.
 - 43.05 Test and analyze heat-recovery systems.
- 44.0 Demonstrate knowledge of retail refrigeration systems--The student will be able to:
- 44.01 Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
 - 44.02 Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
 - 44.03 Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.

- 44.04 Identify and describe the supporting components and accessories used in retail refrigeration systems.
 - 44.05 Describe the various methods of defrost used in retail refrigeration systems.
 - 44.06 Identify and describe the applications for the various types of retail refrigeration systems.
 - 44.07 Describe the control system components used in retail refrigeration systems.
 - 44.08 Explain the operating sequence of a retail refrigeration system.
 - 44.09 Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.
- 45.0 Demonstrate knowledge of commercial and industrial refrigeration systems--The student will be able to:
- 45.01 Identify different types of refrigerated coolers and display cases and describe each one's common application.
 - 45.02 Compare the basic components used in commercial/industrial refrigeration systems with those used in retail refrigeration systems.
 - 45.03 Identify single, multiple, and satellite compressor systems. Describe the applications, installation considerations, and advantages and disadvantages of each type.
 - 45.04 Identify packaged condensing units and unit coolers. Describe their applications, operation, and installation considerations.
 - 45.05 Identify two-stage compressors and explain their operation and applications.
 - 45.06 Identify the various accessories used in commercial refrigeration systems. Explain why each is used and where it should be installed in the system.
 - 45.07 Identify the various refrigeration control devices. Explain the purpose of each type and how it works.
 - 45.08 Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.
- 46.0 Develop an understanding of hydronic systems--The student will be able to:
- 46.01 Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
 - 46.02 Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 46.03 Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 46.04 Describe the safety precautions used when working with hot-water/chilled-water systems.
 - 46.05 Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
 - 46.06 Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.
 - 46.07 Explain the principles involved, and describe the procedures used, in balancing hydronic systems.
 - 46.08 Select, calibrate, and properly use the tools and instruments needed to balance hydronic systems.
 - 46.09 Read the pressure across a water system circulating pump.
- 47.0 Develop an understanding of steam systems--The student will be able to:

- 47.01 Explain the terms and concepts used when working with steam-heating systems.
- 47.02 Identify major components of steam heating systems and explain the purpose of each.
- 47.03 Describe the basic steam-heating cycle.
- 47.04 Safely perform selected operating procedures on low-pressure steam boilers and systems.
- 47.05 Install and maintain selected steam traps.
- 47.06 Identify the common piping configurations used with steam-heating systems.

Course Number: ACR0044

Occupational Completion Point: D

A/C, Refrigeration and Heating Technician – 350 Hours – SOC Code 49-9021

48.0 Determine the properties of air--The student will be able to:

- 48.01 Explain the principles of psychrometrics.
- 48.02 Identify and explain the components and uses of a psychrometric meter.
- 48.03 Identify indoor-air-quality concerns as related to psychrometrics.
- 48.04 Determine the properties of air, using a psychrometric chart.
- 48.05 Follow safety precautions.
- 48.06 Identify and explain the different types and benefits of
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems
- 48.07 Fabricate, operate, maintain, and troubleshoot
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems

49.0 Use a pressure enthalpy chart to diagram refrigerant cycles--The student will be able to:

- 49.01 Identify all components of the pressure enthalpy chart.
- 49.02 Define "enthalpy" and "entropy."
- 49.03 Diagram several refrigerant cycles, using the pressure enthalpy chart.

50.0 Explain the standards for and ways to measure indoor-air quality--The student will be able to:

- 50.01 Define indoor-air quality.
- 50.02 Identify and explain the codes and standards regarding indoor-air quality.
- 50.03 Select and use indoor-air-quality measuring devices.
- 50.04 Explain the standards for and ways to measure indoor-air quality, using various methods.

51.0 Operate environmental control systems as used in commercial heating and air-conditioning systems--The student will be able to:

- 51.01 Identify and explain the various types of environmental control systems and their sequences of operation as used in commercial heating and air-conditioning systems.

- 51.02 Maintain, test, and troubleshoot various types of environmental control systems as used in commercial heating and air-conditioning systems.
- 52.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications--The student will be able to:
 - 52.01 Identify pneumatic control systems.
 - 52.02 Demonstrate the ability to maintain and troubleshoot pneumatic control systems.
- 53.0 Maintain and repair thermal storage systems--The student will be able to:
 - 53.01 Apply appropriate codes, standards, and safety practices.
 - 53.02 Describe the benefits and limitations of each type.
 - 53.03 Explain the operational principles of a thermal storage system.
 - 53.04 Identify and explain various types of thermal storage systems.
 - 53.05 Maintain, troubleshoot, and test various types of thermal storage systems.
- 54.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems--The student will be able to:
 - 54.01 Keep a record of the installation, maintenance, and repair of commercial heating and air-conditioning systems.
 - 54.02 Apply local and national codes and safety practices.
 - 54.03 Lay out a commercial heating and air-conditioning system.
 - 54.04 Lay out a typical split commercial air-conditioning system.
 - 54.05 Lay out a typical split commercial heating system.
 - 54.06 Maintain, test, analyze, and repair various types of commercial heating and air-conditioning systems.
 - 54.07 Maintain, troubleshoot, and repair water-cooled condensers
- 55.0 Calculate commercial heating and air-conditioning loads--The student will be able to:
 - 55.01 Explain conduction as a heat-load source.
 - 55.02 Describe the implications of conducting and the resistance values for different types of construction materials.
 - 55.03 Define "U" value (BTU/hr/ft²F).
 - 55.04 Define "K" value (°Fft²hr/BTU).
 - 55.05 Define "C" value (°Fft²hr/BTU).
 - 55.06 Define "R" value (°Fft²hr/BTU).
 - 55.07 Interpret heat-transfer tables ("U," "K," "C," and "R").
 - 55.08 Locate the total heat-transfer value of any surface (R) - (U).
 - 55.09 Explain infiltration and exfiltration/ventilation as a heat-load source.
 - 55.10 Explain a product heat-load source.
 - 55.11 Explain miscellaneous loads (people, motors, and equipment) as heat-load sources.
 - 55.12 Explain the purpose of vapor barriers.
 - 55.13 Interpret tables of specific heat values as applied to commercial heating and air-conditioning systems.
 - 55.14 Calculate and design systems.
 - 55.15 Calculate cooling and heating equipment sizes.

55.16 Design and identify methods of installing air-movement systems.

56.0 Install air distribution systems--The student will be able to:

56.01 Describe airflow and pressures in a basic forced-air distribution system.

56.02 Explain the differences between propeller and centrifugal fans and blowers.

56.03 Identify the various types of duct systems and explain why and where each type is used.

56.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.

56.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.

56.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.

56.07 Demonstrate or explain the use and installation of dampers used in duct systems.

56.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.

56.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.

56.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.

57.0 Evaluate commercial airside systems--The student will be able to:

57.01 Identify the differences in various types of commercial all-air systems.

57.02 Identify the type of building in which a particular type of system is used.

57.03 Explain the typical range of capacities for a commercial air system.

58.0 Balance an air distribution system--The student will be able to:

58.01 Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.

58.02 Explain the fan and pump laws.

58.03 Use a psychrometric chart to evaluate air properties and changes in air properties.

58.04 Explain the principles involved in the balancing of air and water distribution systems.

58.05 Define common terms used by manufacturers when describing grilles, registers, and diffusers.

58.06 Identify and use the tools and instruments needed to balance air distribution systems.

58.07 Change the speed of an air distribution system supply fan.

59.0 Select energy conservation equipment--The student will be able to:

59.01 Identify and explain the operation of energy conservation equipment.

59.02 Operate selected energy conservation equipment.

60.0 Analyze building management systems--The student will be able to:

- 60.01 Identify the major components of a building management system and describe how they fit together.
- 60.02 Operate a basic direct digital controller.
- 61.0 Recommend alternative heating and cooling systems for various case studies--The student will be able to:
 - 61.01 Describe alternative technologies for heating such as in-floor, direct-fired makeup unit (DFMU), solar, air turnover, corn or wood pellet burners, waste oil/multi-fuel and fireplace inserts.
 - 61.02 Describe alternative technologies for heating such as ductless systems, computer rooms, chilled beams and multi-zone.

Course Number: ACR0045

Occupational Completion Point: D

Refrigeration Mechanic – 350 Hours – SOC Code 49-9021

- 62.0 Demonstrate a working knowledge of electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
 - 62.01 Calculate loads, and design and lay out a commercial refrigeration system.
 - 62.02 Identify and explain commercial refrigeration-pressure-regulation devices, controls, and components.
 - 62.03 Install, service, and repair ice machines and specialty refrigeration systems.
 - 62.04 Test and troubleshoot refrigerant-pressure-regulating devices, controls, and components.
 - 62.05 Apply local and national codes and mechanical safety practices.
- 63.0 Demonstrate a working knowledge of refrigeration-system vibration and insulation--The student will be able to:
 - 63.01 Describe the applications of vibration eliminators.
 - 63.02 Identify and select the correct insulation for commercial application.
- 64.0 Apply commercial refrigeration pipe sizing and troubleshooting procedures--The student will be able to:
 - 64.01 Determine the capacities of refrigerant lines, including the amounts they will hold, equivalent lengths of fittings, and the total effective length for various pipelines.
 - 64.02 Identify and apply industry-approved installation procedures.
 - 64.03 Troubleshoot refrigeration-pipe-sizing problems.
 - a. Explain the use of traps in suction-line risers.
 - b. Explain pressure drop.
 - c. Calculate pressure drop in liquid-line risers.
 - d. Size double risers, hot-gas lines, and liquid lines from condenser to receiver.
- 65.0 Use refrigeration-systems skills in commercial applications--The student will be able to:
 - 65.01 Identify and apply the safety practices used with commercial refrigeration systems.
 - 65.02 Apply refrigeration-systems skills to commercial refrigeration systems.

- a. Perform dehydration, evacuation, and recovery procedures.
- b. Interpret blueprints and mechanical drawings.
- c. Service and charge a refrigeration system.
- d. Test, analyze, and replace compressors.
- e. Retrofit alternative refrigerants and oils.

66.0 Demonstrate a working knowledge of refrigerated storage systems--The student will be able to:

- 66.01 Identify and differentiate among various types of cases, such as service cases and self-service cases.
- 66.02 Explain the operation of
 - a. Air-screen freezers
 - b. Glass-door freezers
 - c. Coffin cases
 - d. Walk-in coolers
- 66.03 Differentiate among medium-temperature, low-temperature, and ultralow-temperature systems.
- 66.04 Explain various defrost methods.
- 66.05 Maintain, test, and troubleshoot defrost components.
- 66.06 Identify and explain the components of various refrigerated storage systems.
- 66.07 Maintain, test, and troubleshoot various refrigerated storage system components.

67.0 Diagnose, maintain, and repair ice-making systems--The student will be able to:

- 67.01 Identify and explain various types and operations of ice-making systems.
- 67.02 Maintain, test, troubleshoot, and repair various types of ice-making systems, following the manufacturers' recommendations.
- 67.03 Identify and explain the different types of water-treatment methods and systems.
- 67.04 Analyze water to identify water problems and the proper treatments.

68.0 Use refrigeration electrical-system skills in commercial applications--The student will be able to:

- 68.01 Apply electrical safety practices for commercial refrigeration systems.
- 68.02 Apply refrigeration electrical-system skills to commercial refrigeration systems:
 - a. Interpret symbols of electrical components and diagrams.
 - b. Interpret schematics and diagrams.
 - c. Apply electrical theory and calculations.
 - d. Explain the principles of designing electrical systems.
 - e. Test and troubleshoot single- and three-phase motors.
- 68.03 Test the solid-state components used in commercial refrigeration systems.
- 68.04 Troubleshoot and diagnose the electrical circuits used in commercial refrigeration systems.
- 68.05 Test and troubleshoot the thermostatic controls used in commercial refrigeration systems.

69.0 Maintain and troubleshoot commercial refrigeration systems--The student will be able to:

- 69.01 Follow appropriate safety precautions for commercial refrigeration systems.

- 69.02 Identify and explain the operations of various types of commercial refrigeration systems and applications, such as single, multiplex, and cascade systems.
- 69.03 Maintain and troubleshoot various types of commercial refrigeration systems.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Air-Conditioning, Refrigeration and Heating Technology
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	I470203
CIP Number	0647020106
Grade Level	30, 31
Standard Length	1350 Hours
Teacher Certification	AC HEAT ME @7 7G REFRG MECH 7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
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

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning (A/C), and refrigeration and ventilation industry. This program prepares students for employment as A/C, Refrigeration and Heating Helper, A/C, Refrigeration and Heating Mechanic Assistant, A/C, Refrigeration and Heating Mechanic, A/C, Refrigeration and Heating Technician, and Refrigeration Technician

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 Architecture and Construction 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 Architecture and Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ACR0041	Air-Conditioning, Refrigeration and Heating Helper	250 Hours	49-9021
B	ACR0043	Air-Conditioning, Refrigeration and Heating Mechanic Assistant	250 Hours	49-9021
C	ACR0047	Air-Conditioning, Refrigeration and Heating Mechanic 1	250 Hours	49-9021
	ACR0049	Air-Conditioning, Refrigeration and Heating Mechanic 2	250 Hours	
D	ACR0044	Air-Conditioning, Refrigeration and Heating Technician	350 Hours	49-9021

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 9, and Reading 9. 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

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.

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment.
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 09.0 Troubleshoot and wire electrical motors and their components.

- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems.
- 12.0 Explain the function of basic electronics.
- 13.0 Demonstrate language arts knowledge and skills.
- 14.0 Use information technology tools.
- 15.0 Solve problems using critical thinking skills, creativity and innovation.
- 16.0 Read construction documents.
- 17.0 Demonstrate science knowledge and skills.
- 18.0 Explain the properties of matter and heat behavior.
- 19.0 Analyze fluids, pressures, refrigerants, and related codes.
- 20.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories.
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 23.0 Select appropriate commercial compressors.
- 24.0 Test and adjust commercial evaporative condensers.
- 25.0 Maintain, test, and troubleshoot commercial evaporators.
- 26.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.0 Explain the importance of employability and entrepreneurship skills.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
- 30.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 31.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 32.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 33.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 34.0 Demonstrate a working knowledge of refrigerants and oils.
- 35.0 Interpret, use and modify construction drawings and specifications.
- 36.0 Conduct system startup and shutdown.
- 37.0 Design heating and cooling systems.
- 38.0 Use combustion-type heating servicing and testing equipment.
- 39.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 40.0 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 41.0 Maintain, troubleshoot, and repair commercial heating systems.
- 42.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems.
- 43.0 Demonstrate knowledge of retail refrigeration systems.
- 44.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 45.0 Develop an understanding of hydronic systems.
- 46.0 Develop an understanding of steam systems.
- 47.0 Determine the properties of air.
- 48.0 Use a pressure enthalpy chart to diagram refrigerant cycles.
- 49.0 Explain the standards for and ways to measure indoor-air quality.

- 50.0 Operate environmental control systems as used in commercial heating and air-conditioning systems.
- 51.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications.
- 52.0 Maintain and repair thermal storage systems.
- 53.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems.
- 54.0 Calculate commercial heating and air-conditioning loads.
- 55.0 Install air distribution systems.
- 56.0 Evaluate commercial airside systems.
- 57.0 Balance an air distribution system.
- 58.0 Select energy conservation equipment.
- 59.0 Analyze building management systems.
- 60.0 Recommend alternative heating and cooling systems for various case studies.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Air Conditioning, Refrigeration and Heating Technology
PSAV Number: I470203

Course Number: ACR0041
Occupational Completion Point: A
A/C, Refrigeration and Heating Helper – 250 Hours – SOC Code 49-9021

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance --The student will be able to:
- 01.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0.
 - 01.02 Explain the reasons for regular safety meetings and for company safety policies.
 - 01.03 Explain the need for employee-background checks and medical examinations.
 - 01.04 Identify and use appropriate fire extinguishers and other such safety devices.
 - 01.05 Identify and follow emergency and rescue procedures.
 - 01.06 Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
 - 01.07 Understand and apply Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Department of Transportation (DOT) hazardous materials safety requirements.
 - 01.08 Apply specific safety and recovery practices for refrigerants used in the industry.
 - 01.09 Apply specific safety practices as they relate to handling and storing cylinders and materials.
 - 01.10 Select and wear proper protective clothing and equipment.
 - 01.11 Identify and use specific safety practices when using soldering and brazing skills.
 - 01.12 Identify and use OSHA practices when working with heating, air-conditioning, and refrigeration systems and equipment.
 - 01.13 Follow safety precautions when using hand and power tools.
 - 01.14 Demonstrate an understanding of first aid, Cardiopulmonary Resuscitation (CPR) and the use of portable defibrillators.
 - 01.15 Explain emergency procedures to follow in response to workplace accidents.
 - 01.16 Create a disaster and/or emergency response plan. SHE 2.0
- 02.0 Identify, use, and maintain the tools and tool accessories used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 02.01 Identify and use
 - a. Basic hand tools and tool accessories
 - b. Power tools (electric, mechanical, and pneumatic, if available)
 - c. Pipe and tube-working tools of the trade
 - d. Specialized tools of the trade
 - 02.02 Apply appropriate care and maintenance procedures for tools and tool accessories, following the directions in the tool-equipment manufacturer's manual.

- 03.0 Demonstrate mathematics knowledge and skills--The student will be able to: AF 3.0
- 03.01 Demonstrate knowledge of arithmetic operations. AF 3.2
 - 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF 3.4
 - 03.03 Construct charts/tables/graphs using functions and data. AF 3.5
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The student will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
 - 04.02 Locate, organize and reference written information from various sources. CM 3.0
 - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
 - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
 - 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
 - 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
 - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning, and refrigeration equipment--The student will be able to:
- 05.01 Explain the principles of electricity.
 - 05.02 Explain single- and three-phase power distribution.
 - 05.03 Define and explain watts, ohms, volts, and amps.
 - 05.04 Identify and explain electrical measuring tools and devices.
 - 05.05 Explain the standards for and ways to measure watts, resistance, voltage, and amperage, using appropriate instruments or devices.
 - 05.06 Identify and explain appropriate electrical wiring symbols.
 - 05.07 Draw and explain a wiring schematic diagram for a control system.
 - 05.08 Create a wiring schematic for each of the following, using all components and symbols for safe and effective operation and interpretation:
 - a. An air-conditioner
 - b. An electric furnace
 - c. A heat pump
 - d. An oil furnace (optional)
 - e. A gas furnace
 - 05.09 Explain codes and standards and safety requirements for working with the electrical components used in heating, air conditioning, and refrigeration.
 - 05.10 Troubleshoot protection devices, such as fuses and breakers.
 - 05.11 Interpret tables and charts from the National Electrical Codes (NEC).
- 06.0 Troubleshoot heating, air-conditioning, and refrigeration electrical control systems and their components--The student will be able to:
- 06.01 Identify and explain the operations of electrical control systems and their components (zone damper motors, dual fuel lock out controls, outdoor thermostats/low ambient controls, defrost controls/timers, and auxiliary heating controls).

- 06.02 Identify, install, and troubleshoot controls for heating, air-conditioning, and refrigeration systems.
 - 06.03 Explain the operation of different types of electromechanical thermostats.
 - 06.04 Wire basic heating, air-conditioning, and refrigeration systems.
 - 06.05 Troubleshoot operational problems for different types of electromechanical thermostats.
 - 06.06 Explain the electrical and mechanical operations of the basic heat pump.
- 07.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems--The student will be able to:
- 07.01 Determine wire sizes and voltage drops.
 - 07.02 Describe the operation of various types of transformers.
 - 07.03 Draw and identify various power-transformers.
 - 07.04 Test, size, and replace protection devices such as fuses and breakers, motor starters, and overloads.
- 08.0 Maintain, test, and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems--The student will be able to:
- 08.01 Explain how alternating current is developed and draw a sine wave.
 - 08.02 Identify single-phase and three-phase wiring arrangements.
 - 08.03 Explain how phase shift occurs in inductors and capacitors.
 - 08.04 Describe the types of capacitors and their applications.
 - 08.05 Explain the operation of single-phase and three-phase induction motors.
 - 08.06 Identify the various types of single-phase motors and their applications.
 - 08.07 State and demonstrate the safety precautions, such as lock out / tag out, which must be followed when working with electrical equipment.
 - 08.08 Explain how the electric company uses a demand meter.
 - 08.09 Identify and explain the operations and applications of various types of electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.10 Maintain, test, and troubleshoot various types of commercial electrical motors and their components as used in commercial heating and air-conditioning systems.
 - 08.11 Demonstrate the proper use of motor testing equipment.
- 09.0 Troubleshoot and wire electrical motors and their components--The student will be able to:
- 09.01 Identify and explain the functions of various types of motors and their components.
 - 09.02 Troubleshoot, test, and analyze motors, using various methods.
 - 09.03 Identify, troubleshoot, and wire various types of electric motors.
 - 09.04 Reverse the rotation of a motor.
- 10.0 Operate solid-state electronics as used in heating, air-conditioning, and refrigeration systems--The student will be able to:
- 10.01 Explain the basic principles and functions of Direct Digital Control (DDC).
 - 10.02 Explain basic solid-state circuits and boards.

- 10.03 Identify, test, and replace circuits and boards.
- 10.04 Identify and explain the functions of a building-management system.
- 10.05 Program a programmable thermostat.
- 11.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning, and refrigeration systems --The student will be able to:
- 11.01 Explain how the principles of designing an electrical system for residential heating and air-conditioning systems apply to commercial heating and air-conditioning systems.
- 11.02 Define and compare single- and multiphase voltage and current related to commercial heating and air-conditioning systems.
- 11.03 Calculate various circuit loads in commercial heating and air-conditioning applications using Ohm's law.
- 11.04 Troubleshoot electrical circuits for commercial heating and air-conditioning systems
- 12.0 Explain the function of basic electronics--The student will be able to:
- 12.01 Explain the basic theory of electronics and semiconductors.
- 12.02 Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.
- 12.03 Identify different types of resistors and explain how their resistance values can be determined.
- 12.04 Describe the operation and function of thermistors and cad cells.
- 12.05 Test semiconductor components.
- 12.06 Identify the connectors on a personal computer. ECD10.0
- 13.0 Demonstrate language arts knowledge and skills--The student will be able to: AF 2.0
- 13.01 Locate, comprehend and evaluate key elements of oral and written information. AF 2.4
- 13.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF 2.5
- 13.03 Present information formally and informally for specific purposes and audiences. AF 2.9
- 14.0 Use information technology tools--The student will be able to:
- 14.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT 1.0
- 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 15.0 Solve problems using critical thinking skills, creativity and innovation--The student will be able to:

- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS 1.0
- 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 15.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

Course Number: ACR0043**Occupational Completion Point: B****A/C, Refrigeration and Heating Mechanic Assistant – 250 Hours – SOC Code 49-9021**16.0 Read construction documents--The student will be able to:

- 16.01 Recognize and identify basic construction drawing terms, components and symbols.
- 16.02 Relate information on construction drawings to actual locations on the print.
- 16.03 Recognize different classifications of construction drawings.
- 16.04 Interpret and use drawing dimensions.

17.0 Describe the history and concepts of heating, air-conditioning, and refrigeration--The student will be able to:

- 17.01 Explain the basic principles of heating, ventilation and air-conditioning.
- 17.02 Identify educational paths to career opportunities in the HVAC profession.
- 17.03 Identify and explain the four major refrigeration components.
- 17.04 Identify and explain the characteristics of a compression-cycle refrigerant system.
- 17.05 Differentiate between air-conditioning and refrigeration.
- 17.06 Differentiate between split systems and package systems.
- 17.07 Describe the benefits of conditioned air and environments.
- 17.08 Discuss the impact of heating, air-conditioning, and refrigeration on society.
- 17.09 Discuss current issues and concerns (such as indoor-air quality, the ozone layer, and computer technology) in the heating, air-conditioning, and refrigeration industry and in the environment and explain their future ramifications.
- 17.10 Describe the purpose and requirements of local, state, and federal heating, air-conditioning, and refrigeration codes and standards and of the manufacturer's installation instructions.
- 17.11 Identify various professional organizations, associations, and societies, and explain their purposes.

18.0 Demonstrate science knowledge and skills--The student will be able to: AF 4.0

- 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF 4.1
- 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF 4.3

19.0 Explain the properties of matter and heat behavior--The student will be able to:

- 19.01 Describe and explain freezing point, critical temperature, and absolute zero.
- 19.02 Describe matter, heat, and heat transfer.

- 19.03 Differentiate between heat and temperature.
- 19.04 Explain and distinguish among the characteristics of the three states of matter.
- 19.05 Explain the relationship between temperature and humidity.
- 19.06 Differentiate between latent heat and sensible heat.
- 20.0 Analyze fluids, pressures, refrigerants, and related codes--The student will be able to:
- 20.01 Identify the refrigeration cycle.
- 20.02 Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
- 20.03 Define and explain "pressure," "fluid," and "temperature."
- 20.04 Explain the standards for and ways to measure and calculate absolute and gauge pressures.
- 20.05 Identify and explain the classifications, properties, and uses of different refrigerants.
- 20.06 Explain how fluids react and flow in a closed versus an open environment or vessel.
- 20.07 Define and identify "color-coding" of refrigerant cylinders.
- 20.08 Compare Pressure and Temperature (P/T) charts.
- 20.09 Explain the proper methods of transferring, storing, and recovering refrigerants.
- 20.10 Explain the effects of an improper refrigerant and contaminants in a system.
- 21.0 Evaluate heating, air-conditioning, and refrigeration system components and accessories--The student will be able to:
- 21.01 Explain the types, operation, use, and maintenance requirements of
- Compressors (such as reciprocating, rotary, screw, and scroll)
 - Condensers and evaporators (such as evaporative condensers, evaporative coils, shell and tube, tube within a tube, and fin and tube)
 - Metering devices (such as adjusting automatic and thermostatic expansion valves, fixed orifices, and other devices available on the local market)
- 21.02 Evaluate metering-device performance.
- 21.03 Explain the methods of compression, lubrication, and compressor loading and unloading.
- 21.04 Analyze the operating condition of a compressor.
- 21.05 Test, troubleshoot, and correct the causes of mechanical problems in a heating, air-conditioning, and refrigeration system.
- 21.06 Identify the location and explain the uses of refrigerant flow accessories.
- 21.07 Identify the location and explain the uses of heating, air-conditioning, and refrigeration-system accessories (such as receivers, dryers/filters, solenoid valves, heat exchangers, accumulators, suction filter, oil separators, evaporator pressure-regulating valve, crankcase pressure-regulating valves, hot gas bypass valves and check valves).
- 21.08 Evaluate system performance.
- 22.0 Describe the importance of professional ethics and legal responsibilities--The student will be able to:
- 22.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 22.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR 1.1

- 22.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
- 22.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies--The student will be able to:
- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 23.02 Describe the effect of money management on personal and career goals. FL 3.0
- 23.03 Develop a personal budget and financial goals. FL 3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
- 23.05 Maintain financial records. FL 3.3
- 23.06 Read and reconcile financial statements. FL 3.4
- 23.07 Research, compare and contrast investment opportunities.
- 24.0 Select appropriate commercial compressors--The student will be able to:
- 24.01 Compare commercial-compressor requirements with those for residential and light commercial heating and air-conditioning systems.
- 24.02 Select appropriate commercial compressors for cooling requirements.
- 24.03 Describe the mechanical operation for each type of compressor.
- 24.04 Explain compressor lubrication methods.
- 24.05 Explain methods used to control compressor capacity.
- 24.06 Describe how compressor protection devices operate.
- 24.07 Perform the common procedures used when field servicing open and semi-hermetic compressors.
- 25.0 Test and adjust commercial evaporative condensers--The student will be able to:
- 25.01 Determine the proper air and fluid flow for commercial evaporative condensers.
- 25.02 Test and adjust the airflow for proper temperature difference.
- 25.03 Test and adjust the water flow for proper GPM and temperature difference.
- 25.04 Check for proper water treatment.
- 26.0 Maintain, test, and troubleshoot commercial evaporators--The student will be able to:
- 26.01 Determine the operational requirements for evaporators used in commercial heating and air-conditioning applications.
- 26.02 Select appropriate evaporators for commercial heating and air-conditioning systems.
- 26.03 Maintain, test, and adjust various commercial heating and air-conditioning accessories.
- 27.0 Fabricate and service the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry--The student will be able to:
- 27.01 Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- 27.02 Bend tubing, using tube benders.
- 27.03 Connect tubing, using

- a. Flared fittings
 - b. Compression fittings
 - 27.04 Connect tubing, using solderless connectors.
 - 27.05 Connect tubing, using a swaged-joint connection.
 - 27.06 Identify and use various types of torches.
 - 27.07 Identify, select, and use appropriate brazing alloys, materials, and skills.
 - 27.08 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products, from heat.
 - 27.09 Braze tubing.
 - 27.10 Silver-braze brass, steels, and copper.
 - 27.11 Demonstrate an understanding of the procedures for installing pipe and tubing insulation.
 - 27.12 Explain the procedures required for installing heating, air-conditioning, refrigerant, and ventilation accessories.
 - 27.13 Fabricate and leak-test the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
 - 27.14 Maintain project time and materials lists.
 - 27.15 Demonstrate proper safety measures when fabricating and servicing piping, tubing and fittings.
- 28.0 Explain the importance of employability and entrepreneurship skills--The student will be able to:
- 28.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
 - 28.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
 - 28.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
 - 28.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
 - 28.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
 - 28.06 Identify and exhibit traits for retaining employment. ECD 7.0
 - 28.07 Identify opportunities and research requirements for career advancement. ECD 8.0
 - 28.08 Research the benefits of ongoing professional development. ECD 9.0
 - 28.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The student will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 29.04 Employ mentoring skills to inspire and teach others. LT5.0
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment--The student will be able to:
- 30.01 Describe the nature and types of business organizations. SY1.0
 - 30.02 Explain the effect of key organizational systems on performance and quality.

- 30.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
- 30.04 Explain the impact of the global economy on business organizations.

Course Number: ACR0047**Occupational Completion Point:****A/C, Refrigeration and Heating Mechanic 1 – 270 Hours – SOC Code 49-9021**

- 31.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing--The student will be able to:
- 31.01 Identify and explain various types of heating, air-conditioning, and refrigeration piping.
- 31.02 Identify basic principles of sizing various heating, air conditioning, refrigeration and ventilation for various tasks.
- 31.03 Explain pressure and temperature drops.
- 32.0 Utilize and operate mechanical refrigeration servicing and testing equipment--The student will be able to:
- 32.01 Identify the effects of superheat and sub-cooling on a system.
- 32.02 Identify and explain the functions of servicing and testing equipment (such as vacuum pumps, micron gauges, EPA-approved equipment, leak detectors, and charging systems).
- 32.03 Operate a refrigerant recovery system.
- 32.04 Explain the standards for and ways to measure, test, maintain, and evacuate a mechanical heating, air-conditioning, and refrigeration system.
- 32.05 Evacuate the refrigerant system with various vacuum methods.
- 32.06 Demonstrate compliance with Environmental Protection Agency (EPA) rules and regulations and, if possible, take the EPA test.
- 32.07 Charge various air-conditioning and mechanical refrigeration systems by various methods.
- 32.08 Demonstrate the effects of superheat and sub-cooling on a system utilizing test equipment (such as thermometers and gages)
- 33.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures--The student will be able to:
- 33.01 Read and comply with dispatch orders.
- 33.02 Explain local codes and ordinances.
- 33.03 Select and use appropriate tools and safety practices to test equipment.
- 33.04 Determine the electrical requirements of equipment.
- 33.05 Assist in the installation of a heating and air-conditioning system to the manufacturer's installation and operation specifications, using a practical knowledge of duct fabrication methods.
- 33.06 Determine the proper charge in a residential air-conditioning unit and adjust superheat.
- 33.07 Determine the temperature drop across the evaporator.
- 33.08 Determine the temperature rise across the condenser.
- 33.09 Write a service report.
- 33.10 Apply good customer-relations skills.

34.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems--The student will be able to:

- 34.01 Identify and explain:
 - a. Air-to-air heat-pump systems
 - b. Water-to-air heat-pump systems
 - c. Water-to-water heat-pump systems
 - d. Air-to-ground heat-pump systems (geothermal)
 - e. Open-loop heat-pump systems
 - f. Closed-loop heat-pump systems
- 34.02 Determine the start-up and checkout procedures recommended by different manufacturers.
- 34.03 Determine the electrical requirements of equipment.
- 34.04 Select and use appropriate tools, instruments, and test equipment, following safety precautions.
- 34.05 Determine the temperature drop across the outdoor coil on a heat pump.
- 34.06 Determine the temperature rise across the indoor coil on a heat pump.
- 34.07 Test for a proper refrigerant charge in a residential heat pump.
- 34.08 Apply good customer-relations skills.

35.0 Demonstrate a working knowledge of refrigerants and oils--The student will be able to:

- 35.01 Identify the refrigerants in common use and state the types of applications in which each is used.
- 35.02 Explain the effects of releasing refrigerants into the atmosphere.
- 35.03 Explain how refrigerants are classified by their chemical composition.
- 35.04 Describe the color-coding scheme used to identify refrigerant cylinders.
- 35.05 Describe how azeotropes and near-azeotropes differ from each other and from so-called pure refrigerants.
- 35.06 Interpret a P-T chart for an azeotrope refrigerant.
- 35.07 Calculate superheat and subcooling.
- 35.08 Demonstrate refrigerant leak detecting methods.
- 35.09 Identify the different types of oils used in refrigeration systems and explain their relationships to the various refrigerants.
- 35.10 Explain how to add and remove oil from a system.
- 35.11 Describe how to test oil for contamination.

36.0 Interpret, use and modify construction drawings and specifications--The student will be able to:

- 36.01 Read mechanical plans within a set of construction drawings explain their relationship.
- 36.02 Compare mechanical plans with the actual installation of duct and pipe runs, fittings, and sections.
- 36.03 Interpret specification documents and apply them to the plans.
- 36.04 Interpret shop drawings and apply them to the plans and specifications.
- 36.05 Develop a field set of as-built drawings.
- 36.06 Identify the steps required for transferring design information to component production.
- 36.07 List and classify materials most commonly used in HVAC systems.

37.0 Conduct system startup and shutdown--The student will be able to:

- 37.01 Start up and shut down an air handler and related forced-air distribution system.
- 37.02 Test compressor oil for acid contamination.
- 37.03 Add or remove oil from a semi-hermetic or open reciprocating compressor.

38.0 Design heating and cooling systems--The student will be able to:

- 38.01 Identify and describe the steps in the system design process.
- 38.02 From construction drawings or an actual job site, obtain information needed to complete heating and cooling load estimates.
- 38.03 Identify the factors that affect heat gains and losses to a building and describe how these factors influence the design process.
- 38.04 With instructor supervision, complete a load estimate to determine the heating and/or cooling load of a building.
- 38.05 State the principles that affect the selection of equipment to satisfy the calculated heating and/or cooling load.
- 38.06 With instructor supervision, select heating and/or cooling equipment using manufacturers' product data.
- 38.07 Identify the various types of duct systems and explain why and where each type is used.
- 38.08 Demonstrate the effect of fittings and transitions on duct system design.
- 38.09 Use a friction loss chart and duct sizing table to size duct.
- 38.10 Install insulation and vapor barriers used in duct systems.
- 38.11 Following proper design principles select and install refrigerant and condensate piping.

Course Number: ACR0049

Occupational Completion Point: C

A/C, Refrigeration and Heating Mechanic 2 – 270 Hours – SOC Code 49-9021

39.0 Use combustion-type heating servicing and testing equipment--The student will be able to:

- 39.01 Explain combustion theory and the safety precautions for using combustion-type-heating servicing and testing equipment.
- 39.02 Identify and explain the various types of combustion-type heating servicing and testing equipment (such as draft gauge, U-tube manometer, sling psychrometer, millivolt meter, and oil-furnace testing equipment).
- 39.03 Use the servicing and testing equipment.
- 39.04 Test, analyze, and troubleshoot combustion-type-heating systems.

40.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems--The student will be able to:

- 40.01 Identify and discuss the safety and regulation issues and concerns.
- 40.02 Explain the operations of various types of gas valves and regulators (such as low-voltage, line-voltage, pneumatic, solenoid, and gas and pressure regulators).
- 40.03 Identify and size various types of gas valves and regulators.
- 40.04 Determine the application of gas valves and regulators.

- 40.05 Troubleshoot gas valves and regulators.
- 41.0 Maintain, test, and adjust commercial heating and air-conditioning accessories--The student will be able to
 - 41.01 Compare commercial accessories with residential and light- commercial-heating and air-conditioning accessories.
 - 41.02 Select the heating and air-conditioning accessories appropriate for various commercial applications.
 - 41.03 Maintain, test, and adjust commercial heating and air-conditioning accessories.
- 42.0 Maintain, troubleshoot, and repair commercial heating systems--The student will be able to:
 - 42.01 Identify the components of various commercial heating systems.
 - 42.02 Explain the operational principles of various commercial heating systems.
 - 42.03 Test and analyze heating air-distribution systems.
 - 42.04 Maintain, troubleshoot, and repair various commercial heating systems, such as:
 - a. A gas furnace and boiler
 - b. An oil furnace and boiler
 - c. An electric furnace
 - d. Electric heaters
 - e. A heat pump
 - f. Solar-heating systems
- 43.0 Install, maintain and repair heating, air-conditioning, and refrigeration systems--The student will be able to:
 - 43.01 Follow safety precautions.
 - 43.02 Describe new technologies in heating, air-conditioning, and refrigeration installation, including
 - a. Variable-speed motors
 - b. Heat-pipe systems
 - c. Desiccant systems
 - d. Gas-driven heating systems
 - 43.03 Lay out, construct, and troubleshoot comfort systems.
 - 43.04 Test and analyze systems.
 - 43.05 Test and analyze heat-recovery systems.
- 44.0 Demonstrate knowledge of retail refrigeration systems--The student will be able to:
 - 44.01 Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
 - 44.02 Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
 - 44.03 Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.
 - 44.04 Identify and describe the supporting components and accessories used in retail refrigeration systems.
 - 44.05 Describe the various methods of defrost used in retail refrigeration systems.

- 44.06 Identify and describe the applications for the various types of retail refrigeration systems.
 - 44.07 Describe the control system components used in retail refrigeration systems.
 - 44.08 Explain the operating sequence of a retail refrigeration system.
 - 44.09 Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.
- 45.0 Demonstrate knowledge of commercial and industrial refrigeration systems--The student will be able to:
- 45.01 Identify different types of refrigerated coolers and display cases and describe each one's common application.
 - 45.02 Compare the basic components used in commercial/industrial refrigeration systems with those used in retail refrigeration systems.
 - 45.03 Identify single, multiple, and satellite compressor systems. Describe the applications, installation considerations, and advantages and disadvantages of each type.
 - 45.04 Identify packaged condensing units and unit coolers. Describe their applications, operation, and installation considerations.
 - 45.05 Identify two-stage compressors and explain their operation and applications.
 - 45.06 Identify the various accessories used in commercial refrigeration systems. Explain why each is used and where it should be installed in the system.
 - 45.07 Identify the various refrigeration control devices. Explain the purpose of each type and how it works.
 - 45.08 Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.
- 46.0 Develop an understanding of hydronic systems--The student will be able to:
- 46.01 Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
 - 46.02 Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 46.03 Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual-temperature water systems.
 - 46.04 Describe the safety precautions used when working with hot-water/chilled-water systems.
 - 46.05 Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
 - 46.06 Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.
 - 46.07 Explain the principles involved, and describe the procedures used, in balancing hydronic systems.
 - 46.08 Select, calibrate, and properly use the tools and instruments needed to balance hydronic systems.
 - 46.09 Read the pressure across a water system circulating pump.
- 47.0 Develop an understanding of steam systems--The student will be able to:
- 47.01 Explain the terms and concepts used when working with steam-heating systems.

- 47.02 Identify major components of steam heating systems and explain the purpose of each.
- 47.03 Describe the basic steam-heating cycle.
- 47.04 Safely perform selected operating procedures on low-pressure steam boilers and systems.
- 47.05 Install and maintain selected steam traps.
- 47.06 Identify the common piping configurations used with steam-heating systems.

Course Number: ACR0044

Occupational Completion Point: D

A/C, Refrigeration and Heating Technician – 350 Hours – SOC Code 49-9021

48.0 Determine the properties of air--The student will be able to:

- 48.01 Explain the principles of psychrometrics.
- 48.02 Identify and explain the components and uses of a psychrometric meter.
- 48.03 Identify indoor-air-quality concerns as related to psychrometrics.
- 48.04 Determine the properties of air, using a psychrometric chart.
- 48.05 Follow safety precautions.
- 48.06 Identify and explain the different types and benefits of
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems
- 48.07 Fabricate, operate, maintain, and troubleshoot
 - a. Air-filtration systems
 - b. Air-handling systems
 - c. Ventilation systems

49.0 Use a pressure enthalpy chart to diagram refrigerant cycles--The student will be able to:

- 49.01 Identify all components of the pressure enthalpy chart.
- 49.02 Define "enthalpy" and "entropy."
- 49.03 Diagram several refrigerant cycles, using the pressure enthalpy chart.

50.0 Explain the standards for and ways to measure indoor-air quality--The student will be able to:

- 50.01 Define indoor-air quality.
- 50.02 Identify and explain the codes and standards regarding indoor-air quality.
- 50.03 Select and use indoor-air-quality measuring devices.
- 50.04 Explain the standards for and ways to measure indoor-air quality, using various methods.

51.0 Operate environmental control systems as used in commercial heating and air-conditioning systems--The student will be able to:

- 51.01 Identify and explain the various types of environmental control systems and their sequences of operation as used in commercial heating and air-conditioning systems.
- 51.02 Maintain, test, and troubleshoot various types of environmental control systems as used in commercial heating and air-conditioning systems.

- 52.0 Maintain and troubleshoot pneumatic control systems for commercial heating and air-conditioning applications--The student will be able to:
- 52.01 Identify pneumatic control systems.
 - 52.02 Demonstrate the ability to maintain and troubleshoot pneumatic control systems.
- 53.0 Maintain and repair thermal storage systems--The student will be able to:
- 53.01 Apply appropriate codes, standards, and safety practices.
 - 53.02 Describe the benefits and limitations of each type.
 - 53.03 Explain the operational principles of a thermal storage system.
 - 53.04 Identify and explain various types of thermal storage systems.
 - 53.05 Maintain, troubleshoot, and test various types of thermal storage systems.
- 54.0 Maintain, troubleshoot, and repair commercial heating and air-conditioning systems--The student will be able to:
- 54.01 Keep a record of the installation, maintenance, and repair of commercial heating and air-conditioning systems.
 - 54.02 Apply local and national codes and safety practices.
 - 54.03 Lay out a commercial heating and air-conditioning system.
 - 54.04 Lay out a typical split commercial air-conditioning system.
 - 54.05 Lay out a typical split commercial heating system.
 - 54.06 Maintain, test, analyze, and repair various types of commercial heating and air-conditioning systems.
 - 54.07 Maintain, troubleshoot, and repair water-cooled condensers
- 55.0 Calculate commercial heating and air-conditioning loads--The student will be able to:
- 55.01 Explain conduction as a heat-load source.
 - 55.02 Describe the implications of conducting and the resistance values for different types of construction materials.
 - 55.03 Define "U" value (BTU/hr/ft²F).
 - 55.04 Define "K" value (°Fft²hr/BTU).
 - 55.05 Define "C" value (°Fft²hr/BTU).
 - 55.06 Define "R" value (°Fft²hr/BTU).
 - 55.07 Interpret heat-transfer tables ("U," "K," "C," and "R").
 - 55.08 Locate the total heat-transfer value of any surface (R) - (U).
 - 55.09 Explain infiltration and exfiltration/ventilation as a heat-load source.
 - 55.10 Explain a product heat-load source.
 - 55.11 Explain miscellaneous loads (people, motors, and equipment) as heat-load sources.
 - 55.12 Explain the purpose of vapor barriers.
 - 55.13 Interpret tables of specific heat values as applied to commercial heating and air-conditioning systems.
 - 55.14 Calculate and design systems.
 - 55.15 Calculate cooling and heating equipment sizes.
 - 55.16 Design and identify methods of installing air-movement systems.

56.0 Install air distribution systems--The student will be able to:

- 56.01 Describe airflow and pressures in a basic forced-air distribution system.
- 56.02 Explain the differences between propeller and centrifugal fans and blowers.
- 56.03 Identify the various types of duct systems and explain why and where each type is used.
- 56.04 Demonstrate or explain the installation of metal, fiberboard, and flexible duct.
- 56.05 Demonstrate or explain the installation of fittings and transitions used in duct systems.
- 56.06 Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
- 56.07 Demonstrate or explain the use and installation of dampers used in duct systems.
- 56.08 Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
- 56.09 Identify instruments used to make measurements in air systems and explain the use of each instrument.
- 56.10 Make basic temperature, air pressure, and velocity measurements in an air distribution system.

57.0 Evaluate commercial airside systems--The student will be able to:

- 57.01 Identify the differences in various types of commercial all-air systems.
- 57.02 Identify the type of building in which a particular type of system is used.
- 57.03 Explain the typical range of capacities for a commercial air system.

58.0 Balance an air distribution system--The student will be able to:

- 58.01 Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.
- 58.02 Explain the fan and pump laws.
- 58.03 Use a psychrometric chart to evaluate air properties and changes in air properties.
- 58.04 Explain the principles involved in the balancing of air and water distribution systems.
- 58.05 Define common terms used by manufacturers when describing grilles, registers, and diffusers.
- 58.06 Identify and use the tools and instruments needed to balance air distribution systems.
- 58.07 Change the speed of an air distribution system supply fan.

59.0 Select energy conservation equipment--The student will be able to:

- 59.01 Identify and explain the operation of energy conservation equipment.
- 59.02 Operate selected energy conservation equipment.

60.0 Analyze building management systems--The student will be able to:

- 60.01 Identify the major components of a building management system and describe how they fit together.
- 60.02 Operate a basic direct digital controller.

61.0 Recommend alternative heating and cooling systems for various case studies--The student will be able to:

- 61.01 Describe alternative technologies for heating such as in-floor, direct-fired makeup unit (DFMU), solar, air turnover, corn or wood pellet burners, waste oil/multi-fuel and fireplace inserts.
- 61.02 Describe alternative technologies for heating such as ductless systems, computer rooms, chilled beams and multi-zone.

2013 – 2014

**Florida Department of Education
Curriculum Framework**

Program Title: Structural Steel Work
Program Type: Career Preparatory
Career Cluster: Architecture & Construction

PSAV	
Program Number	I480519
CIP Number	0648051100
Grade Level	30, 31
Standard Length	1200 Hours
Teacher Certification	TEC CONSTR ¶ 7 ¶ G BLDG CONST ¶ 7 ¶ G STRL STEEL 7G METAL WORK @7
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2221 - Structural Iron and Steel 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: 8 Language: 8 Reading: 8

Purpose

The purpose of this program is to prepare students for initial employment as a structural steel worker.

This program focuses on broad, transferable skills, stresses the understanding of all aspects of the ironwork and structural steelwork 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.

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 Architecture & Construction 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 Architecture & Construction career cluster.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. The sequence a student takes to achieve the competencies necessary for employment in the industry can vary. However students will be required to take the safety precautions outcomes for each OCP he or she takes.

When offered at the postsecondary adult career and technical level, 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 program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	PMT0061	Reinforcing Steel Worker	300 Hours	47-2221
B	PMT0062	Ornamental Steel Worker	300 Hours	47-2221
C	PMT0063	Certified Structural Steel Worker	300 Hours	47-2221
D	PMT0064	Structural Steel Worker	300 Hours	47-2221

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

Career and Technical Student Organization (CTSO)

SkillsUSA, Inc. 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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

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, Language 8, and Reading 8. 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

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.

Standards

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

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, select, and use tools and equipment.
- 03.0 Demonstrate science knowledge and skills.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Demonstrate language arts knowledge and skills.
- 07.0 Fabricate reinforcing steel.
- 08.0 Solve problems using critical thinking skills, creativity and innovation.
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 11.0 Use information technology tools.
- 12.0 Erect ornamental iron.
- 13.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 14.0 Identify access structures.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

- 16.0 Read and interpret blueprints.
- 17.0 Erect steel fences.
- 18.0 Perform certified welding operations to industry standards.
- 19.0 Erect structural steel.
- 20.0 Perform rigging operations.
- 21.0 Apply metal decking and sheeting.
- 22.0 Identify the proper use of a fiber line.
- 23.0 Explain the importance of employability and entrepreneurship skills.

2013 – 2014

**Florida Department of Education
Student Performance Standards**

Program Title: Structural Steel Work
PSAV Number: I480519

Course Number: PMT0061
Occupational Completion Point: A
Reinforcing Steel Worker – 300 Hours – SOC Code 47-2221

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Identify the most common causes of accidents to ironworkers.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Apply safety procedures and precautions.
 - 01.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and explain the proper precautions required for handling such materials.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Demonstrate the procedures of basic first aid and Cardiopulmonary Resuscitation (CPR).
 - 01.07 Explain Occupational Safety and Health Administration (OSHA) and Mining Safety and Health Act (MSHA) rules and regulations.
 - 01.08 Create a disaster and/or emergency response plan. SHE2.0
- 02.0 Identify, select, and use tools and equipment--The student will be able to:
- 02.01 Identify the tools and equipment used for ironwork.
 - 02.02 Select and safely use the tools and equipment needed for a specific job.
 - 02.03 Service, maintain, and store tools and equipment.
 - 02.04 Use equipment manuals.
- 03.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 03.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
 - 03.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 04.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
 - 04.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
 - 04.03 Construct charts/tables/graphs using functions and data. AF3.5
 - 04.04 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.

- 04.05 Measure tolerance(s) on horizontal and vertical surfaces, using centimeters, feet, and inches.
- 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. CM1.0
- 05.02 Locate, organize and reference written information from various sources. CM3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
- 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
- 05.05 Apply active listening skills to obtain and clarify information. CM7.0
- 05.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
- 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0
- 06.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0
- 06.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 06.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF 2.5
- 06.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 07.0 Fabricate reinforcing steel--The student will be able to:
- 07.01 Fabricate reinforcing steel, using various math formulas.
- 07.02 Erect, place, and tie reinforcing steel, applying math functions.
- 08.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
- 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
- 08.04 Conduct technical research to gather information necessary for decision-making. PS4.0
- 09.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
- 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 09.04 Interpret and explain written organizational policies and procedures. ELR2.0
- 10.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 10.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 10.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 10.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
- 10.04 Employ mentoring skills to inspire and teach others. LT5.0

Course Number: PMT0062

Occupational Completion Point: B

Ornamental Steel Worker – 300 Hours – SOC Code 47-2221

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
 - 01.01 Identify the most common causes of accidents to ironworkers.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Apply safety procedures and precautions.
 - 01.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and explain the proper precautions required for handling such materials.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Demonstrate the procedures of basic first aid and Cardiopulmonary Resuscitation (CPR).
 - 01.07 Explain Occupational Safety and Health Administration (OSHA) and Mining Safety and Health Act (MSHA) rules and regulations.
 - 01.08 Create a disaster and/or emergency response plan. SHE2.0
- 11.0 Use information technology tools--The students will be able to:
 - 11.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0
 - 11.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
 - 11.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
 - 11.04 Employ collaborative/groupware applications to facilitate group work. IT4.0
- 12.0 Erect ornamental iron--The student will be able to:
 - 12.01 Use squares, levels, transits, rulers, and other tools for preparing layout work.
 - 12.02 Identify various types of doors and frames that are used in ironworking.
 - 12.03 Erect doors and frames.
 - 12.04 Identify different types of:
 - a. gratings
 - b. grills
 - c. handrails
 - d. stairways
 - e. rails

- f. elevators
- g. stone settings
- h. glass
- i. caulking and sealants
- j. curtain walls
- 12.05 Install different types of:
 - a. gratings
 - b. grills
 - c. handrails
 - d. stairways
- 13.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
 - 13.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
 - 13.02 Describe the effect of money management on personal and career goals. FL3.0
 - 13.03 Develop a personal budget and financial goals. FL3.1
 - 13.04 Complete financial instruments for making deposits and withdrawals. FL3.2
 - 13.05 Maintain financial records. FL3.3
 - 13.06 Read and reconcile financial statements. FL3.4
 - 13.07 Research, compare and contrast investment opportunities.
- 14.0 Identify access structures--The student will be able to:
 - 14.01 Identify access structures, such as stairwells, platforms, and ladders.
 - 14.02 Identify the methods of rigging access structures.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
 - 15.05 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
 - 15.06 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
 - 15.07 Conduct and participate in meetings to accomplish work tasks. LT4.0
 - 15.08 Employ mentoring skills to inspire and teach others. LT5.0
- 16.0 Read and interpret blueprints--The student will be able to:
 - 16.01 Identify and interpret the different types of blueprints.
 - 16.02 Identify and interpret blueprint symbols, abbreviations, markings, and details.
 - 16.03 Identify and interpret control and measurement lines.
 - 16.04 Translate a blueprint into practical use.
 - 16.05 Draw conclusions or make inferences from data.
- 17.0 Erect steel fences--The student will be able to:
 - 17.01 Lay out steel fences.
 - 17.02 Erect steel fences.

Course Number: PMT0063
Occupational Completion Point: C
Certified Structural Steel Welder – 300 Hours – SOC Code 47-2221

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Identify the most common causes of accidents to ironworkers.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Apply safety procedures and precautions.
 - 01.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and explain the proper precautions required for handling such materials.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Demonstrate the procedures of basic first aid and Cardiopulmonary Resuscitation (CPR).
 - 01.07 Explain Occupational Safety and Health Administration (OSHA) and Mining Safety and Health Act (MSHA) rules and regulations.
 - 01.08 Create a disaster and/or emergency response plan. SHE2.0
- 18.0 Perform certified welding operations to industry standards--The student will be able to:
- 18.01 Identify the types of welds and welding processes.
 - 18.02 Identify the types of welding machines, rods, and wires.
 - 18.03 Demonstrate and perform the practical application of various types of cutting processes.
 - 18.04 Demonstrate the practical application of various types of welding procedures on ferrous and nonferrous metals.
 - 18.05 Explain molecular action as a result of temperature extremes, chemical reaction, and moisture content.

Course Number: PMT0064
Occupational Completion Point: D
Structural Steel Worker – 300 Hours – SOC Code 47-2221

- 01.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The student will be able to:
- 01.01 Identify the most common causes of accidents to ironworkers.
 - 01.02 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
 - 01.03 Apply safety procedures and precautions.
 - 01.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and explain the proper precautions required for handling such materials.
 - 01.05 Explain emergency procedures to follow in response to workplace accidents.
 - 01.06 Demonstrate the procedures of basic first aid and Cardiopulmonary Resuscitation (CPR).

- 01.07 Explain Occupational Safety and Health Administration (OSHA) and Mining Safety and Health Act (MSHA) rules and regulations.
- 01.08 Create a disaster and/or emergency response plan. SHE2.0
- 01.09 Describe "Right-to-Know" Law.

19.0 Erect structural steel--The student will be able to:

- 19.01 Identify various connections of beams, columns, and any other structural members.
- 19.02 Execute connections of beams, columns, and other structural members.
- 19.03 Demonstrate the proper method of hooking steel beams and columns for hoisting in a building erection.
- 19.04 Demonstrate the correct hand signals for all cranes, derricks, and gin poles.
- 19.05 Identify various types of cranes, derricks, and gin poles.
- 19.06 Identify the types of splices used for all phases of wire rope.
- 19.07 Demonstrate the different types of splicing for wire rope.
- 19.08 Explain the principles of freestanding towers, guy towers and methods of erecting them.

20.0 Perform rigging operations--The student will be able to:

- 20.01 Explain pressure measurement in terms of Pounds per Square Inch (PSI).
- 20.02 Identify rigging hardware and its proper uses.
- 20.03 Describe and perform rigging applications.
- 20.04 Identify different types of blocks and their safe working load.
- 20.05 Compute the mechanical advantages of compound tackle systems.
- 20.06 Reeve and lace wire rope through the blocks and sheaves.
- 20.07 Identify the types of slings and their uses.
- 20.08 Identify the center of gravity and picking points for heavy loads.
- 20.09 Identify the methods of hoisting heavy loads correctly into place.

21.0 Apply metal decking and sheeting--The student will be able to:

- 21.01 Identify the various types of metal decking and sheeting.
- 21.02 Describe the proper handling and placing of metal decking sheeting.
- 21.03 Apply proper placement or erection techniques for metal decking and sheeting.

22.0 Identify the proper use of a fiber line--The student will be able to:

- 22.01 Identify the different types of fiber line.
- 22.02 Explain the effects of climate on fiber line.
- 22.03 Identify various types of knots, their uses, and advantages and disadvantages of each.
- 22.04 Make various splices, knots, bends, and hitches.

23.0 Explain the importance of employability and entrepreneurship skills--The students will be able to:

- 23.01 Identify and demonstrate positive work behaviors needed to be employable.ECD1.0
- 23.02 Develop personal career plan that includes goals, objectives, and strategies.ECD2.0
- 23.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0

- 23.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
- 23.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
- 23.06 Identify and exhibit traits for retaining employment. ECD7.0
- 23.07 Identify opportunities and research requirements for career advancement. ECD8.0
- 23.08 Research the benefits of ongoing professional development. ECD9.0
- 23.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0