Florida Department of Education
CLUSTER CURRICULUM FRAMEWORK

Cluster Title:	Pipe Trade Systems Technology	
Cluster Type:	Job Preparatory	
Occupational Area:	Industrial Education	
Components:	One Core, Two Programs, Six Occupational Completion Points	
	Secondary	PSAV
Grade Level	9-12, 30, 31	30, 31
Facility Code	203	203
CTSO	SkillsUSA-VICA	SkillsUSA-VICA
Coop Method	Yes	Yes
Apprenticeship	Yes	Yes

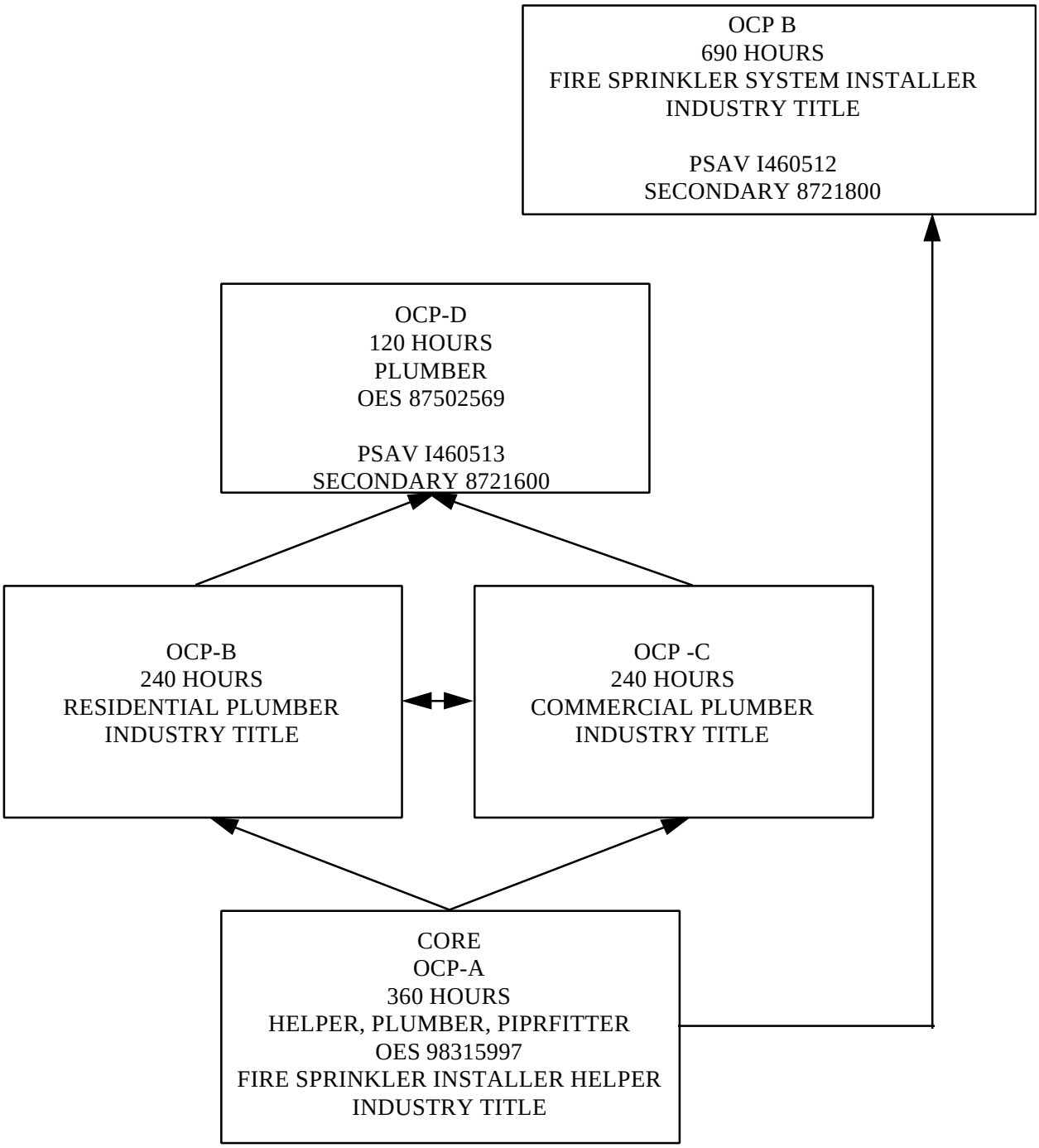
I. **PURPOSE:** The purpose of the programs in this cluster is to prepare students for employment or advanced training in a variety of pipe occupations.

This cluster of programs 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.

II. **CLUSTER STRUCTURE:** This cluster is a planned sequence of instruction consisting of a core (occupational completion point A) and two programs with four additional 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 of either of the programs; Plumbing Technology and Fire Sprinkler Systems Technology.

THE FOLLOWING DIAGRAM ILLUSTRATES
THE PROGRAM STRUCTURE

PIPE TRADES SYSTEMS TECHNOLOGY CLUSTER



At the secondary level, this cluster of programs consists of the following courses, which include the core:

PLUMBING TECHNOLOGY PROGRAM - 7 Secondary Credits

PROGRAM NUMBER 8721600

COURSES
8721610 - Plumbing Technology 1 (150)
8721620 - Plumbing Technology 2 (150) [360] OCP A
8721630 - Plumbing Technology 3 (150)
8721640 - Plumbing Technology 4 (150) [240] OCP B
8721650 - Plumbing Technology 5 (150)
8721660 - Plumbing Technology 6 (150) [240] OCP C
8721670 - Plumbing Technology 7 (150) [120] OCP D

FIRE SPRINKLER SYSTEMS TECHNOLOGY PROGRAM - 7 Secondary Credits

PROGRAM NUMBER 8721800

COURSES
8721610 - Plumbing Technology 1 (150)
8721620 - Plumbing Technology 2 (150) [360] OCP A
8721830 - Fire Sprinkler Systems Technology 3 (150)
8721840 - Fire Sprinkler Systems Technology 4 (150)
8721850 - Fire Sprinkler Systems Technology 5 (150)
8721860 - Fire Sprinkler Systems Technology 6 (150)
8721870 - Fire Sprinkler Systems Technology 7 (150) [690] OCP B

Note: Students enrolled in an apprenticeship program for the Fire Sprinkler Systems Technology Program should become journeys when they complete the apprenticeship program if they meet the program requirements and pass all examinations administered during the apprenticeship period.

III. **LABORATORY ACTIVITIES**: Classroom shop, and laboratory activities are an integral part of this cluster. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes found in the industry. Equipment and supplies should be provided to enhance hands-on experiences for students in the chosen occupation. A generic equipment list for the programs in this cluster is available.

IV. **SPECIAL NOTE: SkillsUSA**-VICA, Inc. is the appropriate Career and Technical Student Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills. Career and Technical Student Organizations, when provided, shall be an integral part of the career and technical instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC.

The programs in this cluster may be offered in Postsecondary Adult Vocational (PSAV) courses. Vocational credit shall be awarded to the student on a transcript in accordance with Section 230.643, F.S.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects

equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

In accordance with Rule 6A-10.040, FAC, the minimum basic-skills grade levels required for adult vocational students to complete this program are: Mathematics 9.0, Language 9.0, Reading 9.0. These grade-level numbers correspond to grade-equivalent scores obtained on one of the state-designated basic-skills examinations. If a student does not meet the basic-skills level required for completion of the program, remediation should be provided concurrently through Vocational Preparatory Instruction (VPI). Please refer to the Rule for exemptions.

When a secondary student with a disability is enrolled in a vocational class with modifications to the curriculum framework, the particular outcomes and student performance standards, which the student must master to earn credit, must be specified on an individual basis. The job or jobs for which the student is being trained should be reflected in the student's desired postschool outcome statement on the Transition Individual Educational Plan (Transition IEP).

To be transferable statewide between institutions, this program/course 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 program or course articulation agreements with each other.

To accomplish the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies, instructional strategies for this program must include methods that require students to identify, organize, and use resources appropriately; to work with each other cooperatively and productively; to acquire and use information; to understand social, organizational, and technological systems; and to work with a variety of tools and equipment. Instructional strategies must also incorporate methods to improve students' personal qualities and higher-order thinking skills.

Florida Department of Education
INTENDED OUTCOMES

Program Title: **Plumbing Technology**

	Secondary	PSAV
Program Numbers	**8721600**	**I460513**
CIP Number	0646.050302	0646.050302
Grade Level	9-12, 30, 31	30, 31
Length	7 Credits	960 Hours
Certification	PLUMBIN @7 G TECH CONSTR ¶7¶G BLDG CONST ¶7¶G	PLUMBIN @7 G TECH CONSTR ¶7¶G BLDG CONST ¶7¶G
Basic Skills		
Math		9
Language		9
Reading		9

INTENDED OUTCOMES: After successfully completing the appropriate course(s) for each occupational completion point of this program, the student will be able to perform the following:

OCCUPATIONAL COMPLETION POINT - DATA CODE - A - (360 hours)
HELPER, PLUMBER, PIPEFITTER - OES CODE 98315997

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 Demonstrate communication skills.
11.0 Demonstrate an understanding of entrepreneurship.
12.0 Demonstrate positive human relation skills.

OCCUPATIONAL COMPLETION POINT - DATA CODE - B - (240 hours)
RESIDENTIAL PLUMBER - INDUSTRY TITLE

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.

OCCUPATIONAL COMPLETION POINT - DATA CODE - C - (240 hours)
COMMERCIAL PLUMBER - INDUSTRY TITLE

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.

OCCUPATIONAL COMPLETION POINT - DATA CODE - D - (120 hours)
PLUMBER - OES 87502569

26.0 Demonstrate knowledge of the process of installing a medical gas system. (Optional)
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. (Optional)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Plumbing Technology
Secondary Number: 8721600
Postsecondary Number: I460513

OCCUPATIONAL COMPLETION POINT - DATA CODE - A
PLUMBER HELPER - OES 98315997

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 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 Describe 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 Explain 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 "Florida's Right-to-Know" Law as recorded in the Florida Statutes, Chapter 442.

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.
09.13 Demonstrate competence in job-interview techniques.
09.14 Demonstrate knowledge of how to make job changes appropriately.

10.0 DEMONSTRATE COMMUNICATION SKILLS--The student will be able to:

10.01 Ask and answer questions coherently and concisely.
10.02 Read and follow written instructions and listen to and follow 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 Discuss the advantages and disadvantages of business ownership.
11.04 Discuss 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.

OCCUPATIONAL COMPLETION POINT - DATA CODE - B
RESIDENTIAL PLUMBER - INDUSTRY TITLE

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 hot-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.

OCCUPATIONAL COMPLETION POINT - DATA CODE - C
COMMERCIAL PLUMBER - INDUSTRY TITLE

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 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 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.

OCCUPATIONAL COMPLETION POINT - DATA CODE - D
PLUMBER - OES 87502569

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.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721610
Course Title: Plumbing Technology 1
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, safety precautions, basic-math applications, standards and codes, and human relations.

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. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8), (LA.B.2.4.4)
01.02 Describe career ladders (entry-, intermediate-, and technical-level careers) in each of the pipe-trade-industry programs and preparation requirements. (AT.1.1.4.1), (LA.C.3.4.2)
01.03 Describe advanced-training opportunities, including apprenticeship programs in each of the pipe-trade-industry programs. (AT.1.1.4.3), (LA.C.3.4.2)

02.0 DEMONSTRATE A BASIC KNOWLEDGE OF THE PIPE-TRADE INDUSTRY --The student will be able to:

02.01 Discuss the history of the pipe trades. (AT.1.1.4.1), (LA.C.3.4.4)
02.02 Identify pipes, fittings, materials, and equipment related pipe trades. (AT.4.1.4.4), (SC.A.1.4.2), (LA.B.2.4.1), (LA.B.2.4.4)
02.03 Identify fixtures and appliances for plumbing, fire-sprinkler fitting, pipe fitting and gas fitting jobs. (AT.4.1.4.4), (LA.B.2.4.1), (LA.B.2.4.4)
02.04 Define terms used in the pipe-trade industry. (AT.4.1.4.4)

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. (AT.4.1.4.4), (SC.A.1.4.2), (LA.B.2.4.1), (LA.B.2.4.4)
03.02 Demonstrate the procedures/techniques for the selection, use, care and storage of tools and equipment. (AT.4.1.4.4)
03.03 Compare the various tools used for plumbing. (AT.4.1.4.4)
03.04 Identify tools and equipment and the safety hazards associated with them. (AT.4.1.4.4), (LA.A.2.4.4), (LA.B.2.4.1),(LA.B.2.4.4)

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. (HE.B.1.4.2), (AT.8.1.4.3), ((LA.C.3.4.2)
04.02 Observe safety precautions. (HE.B.1.4.2), (AT.8.1.4.3)

04.03 Identify safe working practices and safe working conditions in the pipe-trade industry. (HE.B.1.4.2), (AT.8.1.4.3), (LA.A.2.4.4)
04.04 Demonstrate cardiopulmonary resuscitation (CPR) techniques. (HE.B.1.4.5), (AT.8.1.4.1)
04.05 Demonstrate an understanding of when and how to use first aid. (HE.B.1.4.5), (AT.8.1.4.1)

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. (MA.B.1.4.1)
05.02 Measure tolerances on horizontal and vertical surfaces, using millimeters, centimeters, feet, and inches. (MA.B.4.4.1)
05.03 Solve pipe-trade-related basic math problems, such as piping offset and metric conversion. (MA.B.4.4.2)
05.04 Calculate material length and bend pipe by hand or with a pipe-bending machine and tools. (MA.B.2.4.1)

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, fire-sprinkler fitting, gas fitting, and/or pipe fitting. (AT.8.1.4.3), (LA.B.2.4.1), (LA.B.2.4.4), (LA.C.3.4.2)
08.02 Read and interpret current standards and codes for plumbing, fire-sprinkler fitting, gas fitting, and/or pipe fitting. (AT.8.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8)
08.03 Read and interpret basic building codes in the pipe-trade industry. (AT.8.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8)

12.0 DEMONSTRATE POSITIVE HUMAN-RELATIONS SKILLS--The student will be able to:

12.01 Exercise self-control. (HE.B.3.4.5), (AT.9.1.4.2), (HE.B.3.4.5), (AT.9.1.4.2)
12.02 Identify and demonstrate appropriate responses to criticism. (HE.B.3.4.5), (AT.9.1.4.2), (LA.B.2.4.1), (LA.C.1.4.4)
12.03 Recognize basic human-relations skills as they relate to success in the pipe-trade industry. (HE.B.3.4.5), (AT.9.1.4.1)
12.04 Resolve conflicts in a positive, professional manner. (HE.B.3.4.4), (AT.9.1.4.1), (LA.C.1.4.3)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721620
Course Title: Plumbing Technology 2
Course Credit: 1

COURSE DESCRIPTION:

The purpose of this course is to develop the competencies essential to pipe trades. These competencies relate to safety, pipe-trade-related math applications, basic science, standards and codes, employability skills, entrepreneurship and communication.

06.0 DEMONSTRATE AN UNDERSTANDING OF BASIC SCIENCE--The student will be able to:

- 06.01 Describe molecular action as a result of temperature and pressure extremes, chemical reaction, and moisture content. (SC.A.1.4.4), (SC.A.1.4.2), (LA.B.2.4.1), (LA.B.2.4.4), (LA.C.3.4.2)
- 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. (HE.A.1.4.2), (AT.8.1.4.1), (LA.B.2.4.4)
- 06.03 Discuss environmental concerns related to hazardous waste and chemical disposal. (AT.8.1.4.4), (SC.G.2.4.6), (LA.C.3.4.2)
- 06.04 Explain pressure measurement in terms of pounds per square inch (PSI) and inches of mercury. (AC.A.1.4.4)
- 06.05 Explain pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and KPA. (SC.A.1.4.4)
- 06.06 Explain how to use alternating-current meters and instruments in the pipe trades.

09.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

- 09.01 Demonstrate productive work habits and positive attitudes. (AT.9.1.4.1), (HE.B.1.4.1)
- 09.02 Identify the ethical and responsible practices expected of pipe-trade-industry employees. (AT.9.1.4.1), (LA.B.2.4.1)
- 09.03 Demonstrate acceptable personal-hygiene habits and a professional appearance. (AT.9.1.4.1), (HE.A.1.4.1)
- 09.04 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks. (AT.9.1.4.2), (HE.B.3.4.2)
- 09.05 Explain the importance of taking pride in the quality of work performed. (AT.9.1.4.1)
- 09.06 Describe the importance of a drug-free workplace and the industry's policies toward drug use. (AT.1.1.4.1), (HE.A.1.4.2), (LA.C.3.4.2)
- 09.07 Describe the importance of maintaining a good driver's record and the ramifications of a poor driving record on employment opportunities. (HE.B.1.4.1), (LA.C.3.4.2)
- 09.08 Describe "Florida's Right-to-Know" Law as recorded in the Florida Statutes, Chapter 442. (AT.8.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6), (LA.C.3.4.2)
- 09.09 Conduct a job search and identify advanced-training opportunities, including an apprenticeship program. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6)

09.10 Secure information about a job. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6)
09.11 Identify documents that may be required for an application for a job or an apprenticeship program. (AT.1.1.4.1), (LA.B.2.4.1), (LA.B.2.4.4)
09.12 Complete a job-application form.
09.13 Demonstrate competence in job-interview techniques. (LA.C.3.4.4)
09.14 Demonstrate knowledge of how to make job changes appropriately. (AT.1.1.4.1)

10.0 DEMONSTRATE COMMUNICATION SKILLS--The student will be able to:

10.01 Ask and answer questions coherently and concisely. (LA.C.3.4.1)
10.02 Read and follow written instructions and listen to and follow oral instructions. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8), (LA.C.1.4.1)
10.03 Give reports orally and in writing. (LA.C.3.4.4)
10.04 Read and interpret reading materials related to the pipe-trade industry. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8)
10.05 Find information in technical literature such as a manufacturer's manual. (LA.A.2.4.4), (LA.A.2.4.6)
10.06 Read and interpret graphs, charts, diagrams, and tables commonly used in the pipe-trade industry/occupation area. (LA.A.2.4.4), (LA.A.2.4.6)
10.07 Write logical and understandable statements or phrases, and accurately fill out the forms/invoices commonly used in the pipe-trade industry. (LA.B.1.4.3)
10.08 Communicate job-related information and coordinate with other trades. (LLA.C.3.4.2), (LA.D.2.4.4)
10.09 Demonstrate appropriate telephone communication skills. (LA.C.1.4.1), (LA.C.1.4.3)
10.10 Demonstrate trade-related computer skills. (AT.5.2.4.3)

07.0 READ AND INTERPRET BLUEPRINTS AND JOB SPECIFICATIONS--The student will be able to:

07.01 Read and interpret measuring devices. (MA.B.4.4.2)
07.02 Draw and interpret basic isometric sketches.
07.03 Identify the basic symbols used in the pipe trades. (LA.A.2.4.4), (LA.A.2.4.6), (LA.B.2.4.4)
07.04 Read and interpret manufacturers' schematics and specifications. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8)

11.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

11.01 Define "entrepreneurship." (SS.D.1.4.2)
11.02 Describe the importance of entrepreneurship to the American economy and the role of small business in the free-enterprise system. (SS.D.2.4.4), (LA.C.3.4.2)
11.03 Discuss the advantages and disadvantages of business ownership. (AT.2.3.4.2), (LA.C.1.4.3), (LA.C.3.4.2)
11.04 Discuss the risks involved in the ownership of a business. (AT.2.3.4.1), (LA.C.1.4.3), (LA.C.3.4.2)
11.05 Identify the personal characteristics of a successful entrepreneur. (SS.D.1.4.2)
11.06 Identify the business skills, including computer skills, needed to operate a business efficiently and effectively. (AT.5.2.4.3), (LA.B.2.4.4)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721630
Course Title: Plumbing Technology 3
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies relating to blueprint and job specifications, building codes in the pipe trades, plumbing pipe-cutting-and-joining skills.

13.0 DEMONSTRATE KNOWLEDGE OF BASIC PLUMBING SKILLS--The student will be able to:

13.01 Explain the basic theory and principles of plumbing. (AT.4.1.4.4)
13.02 Identify: (AT.4.1.4.4)
a. Pipe and fitting (LA.B.2.4.4)
b. Pipe-joining methods (LA.B.2.4.4)
c. Plumbing fixtures, appliances, materials, and equipment (SC.A.1.4.2), LA.B.2.4.4)
d. Valves by type, size, materials, and application (SC.A.1.4.2), (LA.B.2.4.4)

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: (AT.4.1.4.4)
a. Brazing (AT.4.1.4.4)
b. Clamping (AT.4.1.4.4)
c. Compression (AT.4.1.4.4)
d. Threading (AT.4.1.4.4)
e. Flange (AT.4.1.4.4)
f. Flaring (AT.4.1.4.4)
g. Gasket joint (AT.4.1.4.4)
h. Gluing (AT.4.1.4.4)
i. Lead-oakum joint (AT.4.1.4.4)
j. Soldering (AT.4.1.4.4)
k. Welding (AT.4.1.4.4)
14.02 Measure, mark, and cut different types of pipes, using various pipe cutters, such as: (MA.B.4.4.2)
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. (AT.4.1.4.4)
14.04 Demonstrate proficiency in using the tools, following safety practices and procedures. (AT.8.1.4.3)

15.0 DEMONSTRATE A KNOWLEDGE OF PLUMBING CODES--The student will be able to:

15.01 Describe and explain the purpose of plumbing codes (AT.8.1.4.3), (LA.C.3.4.2)
15.02 Apply the basic theory and principles of plumbing in relation to the codes. (AT.8.1.4.3)
15.03 Read and locate information in the applicable plumbing codes. (AT.8.1.4.3)
15.04 Define and explain the terms used in the plumbing codes. (AT.8.1.4.3)
15.05 Explain why the code may supersede the manufacturer's specifications. (AT.8.1.4.3)

16.0 READ AND INTERPRET BLUEPRINTS AND SPECIFICATIONS--The student will be able to:

16.01 Recognize and identify plumbing symbols. (AT.4.1.4.4), (LA.A.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6)
16.02 Identify basic plumbing systems from the blueprint. (AT.4.1.4.4), (LA.A.2.4.4), (LA.A.2.4.6)
16.03 From the blueprints and specifications, identify the plumbing fixtures and materials required for the plumbing job. (AT.4.1.4.4), (LA.A.2.4.4), (LA.A.2.4.6)
16.04 Relate the blueprint to all applicable (local, state, and federal) plumbing codes. (AT.4.1.4.4), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8)
16.05 Cross-reference all working drawings to determine the location and elevation of the piping system and duct work. (AT.4.1.4.4), (LA.A.2.4.7), (LA.A.2.4.8)
16.06 Demonstrate trade-related computer skills for blueprints and specifications. (AT.4.1.4.4)(LA.A.2.4.4), (LA.A.2.4.6)

17.0 LAY OUT AND COORDINATE A JOB--The student will be able to:

17.01 Identify specifications. (AT.4.1.4.4), (SC.H.3.4.6)
17.02 Make a list of materials required to lay out a job. (AT.4.1.4.4), (SC.3.4.6)
17.03 Determine the work aids required and the sequence of installations, according to building plans, specifications, and working drawings. (AT.4.1.4.4), (SC.H.3.4.6)
17.04 Inspect structures to prevent a weakening of the structure resulting from the installation of pipes. (AT.4.1.4.4), (SC.H.3.4.6)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721640
Course Title: Plumbing Technology 4
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

17.0 LAY OUT AND COORDINATE A JOB--The student will be able to:

17.05 Coordinate with other crafts. (AT.1.1.4.1)
17.06 Install high- and low-pressure pipe systems. (4.1.4.4)

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. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8)
18.02 Install building drain, waste, vent, storm drainage, and water-heating-and-circulating systems. (AT.4.1.4.4)
18.03 Install distribution systems. (AT.4.1.4.4)
18.04 Install a temporary water service with backflow prevention. (AT.4.1.4.4)
18.05 Test and inspect the first rough. (AAT.4.1.4.4), (SC.H.3.4.6)

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. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7), (LA.A.2.4.8), (AT.4.1.4.4)
19.02 Cut openings in walls and floors to accommodate the pipe and fittings. (AT.4.1.4.4)
19.03 Install hangers and supports. (AT.4.1.4.4)
19.04 Install building-drain, waste, vent, storm-drainage, and water-heating-and-circulating systems, including both tubs and spas. (AT.4.1.4.4)
19.05 Install distribution systems. (AT.4.1.4.4)
19.06 Test and inspect the second rough. (SC.H.3.4.6)

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. (AT.4.1.4.4)
20.02 Trim out and install job-site fixtures, appliances, and equipment, which include:
a. Closet flanges (AT.4.1.4.4)
b. Supply stops on water pipes (AT.4.1.4.4)
c. Lavatory (AT.4.1.4.4)
d. Water closets (AT.4.1.4.4)
e. Showers (AT.4.1.4.4)
f. Kitchen sinks (AT.4.1.4.4)

g. Garbage disposal (AT.4.1.4.4)
h. Ice makers (AT.4.1.4.4)
i. Dishwashers (AT.4.1.4.4)
j. Water heaters (AT.4.1.4.4)

20.03 Install backflow assemblies as required. (AT.4.1.4.4)
20.04 Test and inspect the final installation. (AT.4.1.4.4), (SC.H.3.4.6)

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. (AT.4.1.4.4), (SC.H.3.4.6), (LA.B.1.4.3)
21.02 Analyze problems, identify the causes, and devise plans of action. (AT.1.1.4.2), (SC.H.3.4.6)
21.03 Identify obstacles, generate alternatives, and choose the best alternatives. (AT.1.1.4.2), (SC.H.3.4.6)
21.04 Create new and better ways to perform tasks, applying the latest ideas to putting work in place. (AAT.1.1.4.2), (SC.H.3.4.6)
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. (AT.1.1.4.3), (SC.H.3.4.6)
21.06 Resolve customer complaints in a positive, professional manner. (HE.B.3.4.4), (AT.9.1.4.1)
21.07 Prepare a job ticket. (LA.B.1.4.3)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721650
Course Title: Plumbing Technology 5
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies relating to installing hot water heating, interceptors and separators.

22.0 DEMONSTRATE A 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. (AT.1.1.4.1)
22.03 Identify the equipment and materials needed for the job in accordance with job specifications and plumbing codes. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8)
22.04 Test and inspect the system. (AT.4.1.4.4), (SC.H.3.4.6)

23.0 DEMONSTRATE KNOWLEDGE OF THE PROCESS OF INSTALLING INTERCEPTORS AND SEPARATORS--The student will be able to:

23.01 Identify and explain various types of interceptors and separators. (SC.A.1.4.4)
23.02 Explain the theory and function of various interceptors and separators. (AC.A.1.4.4)
23.03 Install and maintain:
a. Lint traps and grease traps (AT.4.1.4.4)
b. Gas and oil separators (AT.4.1.4.4)
c. Sand and sediment interceptors (AT.4.1.4.4)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721660
Course Title: Plumbing Technology 6
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies in installing storm drainage, backflow and cross connection control.

24.0 DEMONSTRATE 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. (AT.4.1.44
24.02 Size and lay out a storm-drainage system. (AT.1.1.4.1)
24.03 Identify and select the materials needed to install a storm-drainage system in accordance with job specifications and plumbing codes. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8), (LA.B.2.4.4)
24.04 Lay out a job on site according to job specifications and plumbing codes, coordinating with other trades. (AT.1.1.4.1), (LA.A.2.4.4), (LA.A.2.4.7)
24.05 Install distribution systems. (AT.4.1.4.4)
24.06 Illustrate roof drains, leaders, and drainage systems.
24.07 Test, and inspect the systems. (AT.4.1.4.4), (SC.H.3.4.6)

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. (AT.4.1.4.4)
25.02 Describe the importance of backflow and cross-connection control to the health of the public. (AT.4.1.4.4)
25.03 Identify the proper devices and assemblies for individual applications. (AT.4.1.4.4), (LA.B.2.4.4)
25.04 Explain the "degree of hazard" principle and how it relates to the installation of devices and assemblies. (AT.8.1.4.2)

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721670
Course Title: Plumbing Technology 7
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.

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 explain procedures for:
a. Installing a medical gas system in a health-care facility according to applicable plumbing codes (AT.8.1.4.3)
b. Connecting medical equipment, safety devices, and controls (AT.8.1.4.3)
c. Testing and inspecting medical gas systems to make sure there is no cross connection and the system is pure (AT.8.1.4.3), (SC.A.1.4.4)

27.0 DESCRIBE A LIQUID PROPANE GAS (LPG) SYSTEM--The student will be able to:

27.01 Identify materials required for LPG installation. (AT.8.1.4.3), (LA.C.3.4.2)
27.02 Explain how to size, and lay out a job on site according to plumbing codes and specifications codes, coordinating with other trades. (AT.8.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.8)
27.03 Explain distribution systems, including equipment, safety devices, and controls. (AT.8.1.4.3)
27.04 Explain how to inspect the systems. (AT.8.1.4.3)

28.0 REPAIR, SERVICE, AND MAINTAIN PLUMBING SYSTEMS--The student will be able to:

28.01 Troubleshoot and diagnose plumbing systems. (AT.4.1.4.4), (AC.A.1.4.4)
28.02 Repair and replace water service and sanitary lines. (AT.4.1.4.4)
28.03 Repair and replace water closets, ball cocks, flush valves, floats, lift rods, ball stoppers, and trip levers. (AT.4.1.4.4)
28.04 Repair leaks in traps and faucets. (AT.4.1.4.4)
28.05 Repair and replace sink strainers. (AT.4.1.4.4)
28.06 Repair and replace water heaters. (AT.4.1.4.4)
28.07 Replace and repair fixture water-supply pipes. (AT.4.1.4.4)
28.08 Reseal water closets to flanges. (AT.4.1.4.4)
28.09 Test and inspect repaired systems. (AC.A.1.4.4)
28.10 Clear obstructions from kitchen sink, water closet, bathtub, lavatory, and sewer lines, using chemicals and tools. (AT.4.1.4.4)

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. (AT.8.1.4.3), (LA.A.2.4.6), (LA.A.2.4.7), (LA.C.3.4.2)
29.02 Excavate from the house drain to a sewer main. (AT.4.1.4.4)
29.03 Connect the house drain to the sewer main. (AT.4.1.4.4)
29.04 Test, and inspect the system. (SC.A.1.4.4)

Florida Department of Education
INTENDED OUTCOMES

Program Title: **Fire Sprinkler Systems Technology**

	Secondary	PSAV
Program Numbers	**8721800**	**I460512**
CIP Number	0646.050202	0646.050202
Grade Level	9-12,30,31	30-31
Length	7 Credits	1050 Hours
Certification	PLUMBIN @7 G TEC CONSTR¶7 ¶G BLDG CONSTR ¶7 ¶G	PLUMBIN @7 G TEC CONSTR ¶7 ¶G BLDG CONSTR ¶7 ¶G
Basic Skills		
Math		9
Language		9
Reading		9

INTENDED OUTCOMES: After successfully completing the appropriate course(s) for each occupational completion point of this program, the student will be able to perform the following:

OCCUPATIONAL COMPLETION POINT - DATA CODE - A (360 hours)
FIRE SPRINKLER INSTALLER HELPER - INDUSTRY TITLE

01.1 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 job specifications.
08.0 Read and interrupt basic pipe-trade codes.
09.0 Demonstrate employability skills.
10.0 Demonstrate communication skills.
11.0 Demonstrate an understanding of entrepreneurship.
12.0 Demonstrate positive human-relations skills.

OCCUPATIONAL COMPLETION POINT - DATA CODE - B (690 hours)
FIRE SPRINKLER SYSTEM INSTALLER - INDUSTRY TITLE

13.0 Demonstrate a basic knowledge of fire-sprinkler systems.
14.0 Perform pipe-joining skills.
15.0 Read and interrupt fire-sprinkler blueprints and specifications.
16.0 Install underground.
17.0 Trim out a fire-sprinkler system.
18.0 Repair, service, and maintain fire-sprinkler systems.
19.0 Demonstrate knowledge of fire protection.
20.0 Apply the knowledge of water-supply requirements for a fire-sprinkler system.
21.0 Demonstrate the installation of a wet system.
22.0 Demonstrate the installation of a dry system.
23.0 Demonstrate the installation of preaction and deluge systems.
24.0 Demonstrate the installation of a combined dry-pipe and preaction system.
25.0 Demonstrate the installation of an antifreeze system.

26.0 Demonstrate the installation of a standpipe system.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Fire Sprinkler Systems Technology
Secondary Number: 8721800
Postsecondary Number: I460512

OCCUPATIONAL COMPLETION POINT - DATA CODE - A
FIRE SPRINKLER INSTALLER HELPER - INDUSTRY TITLE

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 industries 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, fire-sprinkler fitting, 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 Describe molecular action as a result of temperature and pressure extremes, chemical reaction, and moisture content.
06.02 Draw conclusions or make inferences from data, such as temperature or pressure conversion.
06.03 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.
06.04 Discuss environmental concerns related to hazardous waste and chemical disposal.
06.05 Explain 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, fire-sprinkler fitting, gas fitting, and pipe fitting.
08.02 Read and interpret basic building codes in the pipe-trade industry.

09.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

09.01 Conduct a job search and identify advanced-training opportunities, including an apprenticeship program.
09.02 Secure information about a job.
09.03 Identify documents that may be required for an application for a job or an apprenticeship program.
09.04 Complete a job-application form.
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 the ethical and responsible practices expected of pipe-trade-industry employees.
09.09 Demonstrate acceptable personal-hygiene habits 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 the industry's policies toward drug use.
09.13 Describe the importance of maintaining a good driver's record and the ramifications of a poor driving record on employment opportunities.
09.14 Describe "Florida's Right-to-Know" Law as recorded in the Florida Statutes, Chapter 442.

10.0 DEMONSTRATE COMMUNICATION SKILLS--The student will be able to:

10.01 Ask and answer questions coherently and concisely.
10.02 Read and follow written instructions and listen to and follow 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 Discuss the advantages and disadvantages of business ownership.
11.04 Discuss 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 customer complaints in a positive, professional manner.

OCCUPATIONAL COMPLETION POINT - DATA CODE - B
FIRE SPRINKLER SYSTEM INSTALLER - INDUSTRY TITLE

13.0 DEMONSTRATE A BASIC KNOWLEDGE OF FIRE-SPRINKLER SYSTEMS--The student will be able to:

13.01 Explain the basic theory and principles of fire protection.
13.02 Identify fire-sprinkler components.

13.03 Read, interpret, and comply with the manufacturers' schematics and specifications of fire-sprinkler devices.

14.0 PERFORM PIPE-JOINING SKILLS--The student will be able to:

14.01 Cut plastic pipe.
14.02 Join plastic pipe, using the adapter-solvent cement method.
14.03 Bend steel pipe with a heavy-duty bending tool and with a chain vice and torch.
14.04 Cut steel pipe with a one-wheel and with a four-wheel steel-pipe cutter.
14.05 Join plastic pipe to steel pipe.
14.06 Thread steel pipe with an adjustable diestock, with a non-adjustable diestock, and with a power-driven vise stand.
14.07 Groove steel pipe with a pipe-driven grooving machine.
14.08 Join groove pipe with grooved couplings and fittings.
14.09 Cut copper tubing or pipe with a hacksaw and with a tubing cutter.
14.10 Bend copper tubing or pipe with a bender.
14.11 Join copper tubing to copper pipe, to brass pipe, to steel pipe, and to plastic pipe.
14.12 Cut ductile iron.
14.13 Join ductile and mechanical joints to fit.
14.14 Join steel pipe to ductile pipe.
14.15 Join plastic pipe to ductile pipe.
14.16 Braze pipe with a gas torch and filler metal.
14.17 Weld pipe with an oxyacetylene torch and filler metal.
14.18 Join pipe with an electric arc welder and filler metal.

15.0 READ AND INTERPRET FIRE-SPRINKLER BLUEPRINTS AND SPECIFICATIONS--The student will be able to:

15.01 Interpret measuring devices used for fire-sprinkler applications.
15.02 Identify and define basic fire-protection symbols.
15.03 Read and interpret a bill of lading for materials.
15.04 Read and interpret fire-sprinkler blueprints and specifications.
15.05 Read and interpret an architect's and an engineer's scale.

16.0 INSTALL UNDERGROUND--The student will be able to:

16.01 Lay out a job on site.
16.02 Install water-distribution systems.
16.03 Flush underground mains.
16.04 Conduct a hydrostatic test.
16.05 Complete test forms.

17.0 TRIM OUT A FIRE-SPRINKLER SYSTEM--The student will be able to:

17.01 Install and trim out the components of a fire-sprinkler system.
17.02 Test and inspect the final installation.

18.0 REPAIR, SERVICE, AND MAINTAIN FIRE-SPRINKLER SYSTEMS--The student will be able to:

18.01 Establish positive customer relations.
18.02 Troubleshoot and diagnose systems.
18.03 Determine alternative solutions.
18.04 Repair fire-sprinkler systems.
18.05 Repair leaks.
18.06 Repair or replace components.
18.07 Test and inspect repaired systems.
18.08 Prepare a job ticket.

18.09 Price a job, including the correct purchase price and sales tax, and write the invoice.
18.10 Collect payments for services rendered.

19.0 DEMONSTRATE KNOWLEDGE OF FIRE PROTECTION--The student will be able to:

19.01 Explain the purpose of fire protection.
19.02 Apply the basic theory and principles of fire-protection codes.
19.03 Read, locate, and interpret information in the fire code.
19.04 Define and explain the terms used in the fire code.
19.05 Explain why the code may supersede manufacturers' specifications on products.

20.0 APPLY THE KNOWLEDGE OF WATER-SUPPLY REQUIREMENTS FOR A FIRE-SPRINKLER SYSTEM--The student will be able to:

20.01 Conduct a flow test.
20.02 Identify and explain the source of the water supply.
20.03 Obtain the water department's approval for underground connections.
20.04 Identify the requirements of backflow prevention and testing.
20.05 Differentiate the various types of water-supply connections.
20.06 Analyze water-supply requirements for hydraulically designed systems.

21.0 DEMONSTRATE THE INSTALLATION OF A WET SYSTEM--The student will be able to:

21.01 Discuss the advantages and disadvantages of wet systems.
21.02 Identify and explain the types of check and control valves used in wet systems.
21.03 Place check and control valves at the correct location.
21.04 Determine the causes of unsatisfactory performance in a wet system.
21.05 Identify and explain the various hazards in which wet systems are installed.
21.06 Identify spacing, location, and position sprinklers.
21.07 Size a small wet pipe system (4,000 square feet), using the pipe schedule tables.
21.08 Discuss the advantages of a hydraulically designed wet system.
21.09 Demonstrate the installation of a wet system.
21.10 Test a wet system.

22.0 DEMONSTRATE THE INSTALLATION OF A DRY SYSTEM--The student will be able to:

22.01 Discuss the advantages and disadvantages of a dry system.
22.02 Identify and explain the types of check and control valves used in dry systems.
22.03 Place check and control valves at correct locations.
22.04 Determine the causes of unsatisfactory performance in a dry system.
22.05 Identify and describe the hazardous conditions in which dry systems are installed.
22.06 Identify the spacing, location, and position of sprinklers.
22.07 Identify the recommended capacity of a dry pipe system in U.S. gallons.
22.08 Discuss the advantages of a hydraulically designed dry system.
22.09 Identify the maximum time required for water to reach a remote inspector test.

22.10 Describe and demonstrate the methods of charging a dry system.
22.11 Describe the proper drainage of a dry pipe system.
22.12 Demonstrate the installation of a dry system.
22.13 Test a dry system.

23.0 DEMONSTRATE THE INSTALLATION OF PREACTION AND DELUGE SYSTEMS--The student will be able to:

23.01 Discuss the advantages and disadvantages of preaction and deluge systems.
23.02 Identify the types of check and control valves used in preaction and deluge systems.
23.03 Place check and control valves at the correct location.
23.04 Determine the causes of unsatisfactory performance.
23.05 Identify the various hazardous conditions in which preaction and deluge systems are installed.
23.06 Identify the spacing, location, and position of sprinklers.
23.07 Discuss the advantages of a hydraulically designed preaction and deluge system.
23.08 Describe the various types of preaction and deluge systems.
23.09 Identify and explain the various types of supplemental detection systems.
23.10 Install preaction and deluge systems.
23.11 Test preaction and deluge systems.

24.0 DEMONSTRATE THE INSTALLATION OF A COMBINED DRY PIPE AND PREACTION SYSTEM--The student will be able to:

24.01 Discuss the advantages and disadvantages of a combined system.
24.02 Identify and explain the types of check and control valves in a combined system.
24.03 Place check and control valves at the correct location.
24.04 Determine the cause of unsatisfactory performance in a combined system.
24.05 Identify and explain the hazardous conditions in which a combined system is installed.
24.06 Identify the spacing, location, and position of sprinklers.
24.07 Discuss the advantages of a hydraulically designed combined system.
24.08 Demonstrate the installation of a combined dry pipe and preaction system.
24.09 Test a combined system.
24.10 Define and explain a NFPA (National Fire Protection Association) combined system.

25.0 DEMONSTRATE THE INSTALLATION OF AN ANTIFREEZE SYSTEM--The student will be able to:

25.01 Discuss the advantages and disadvantages of the antifreeze system.
25.02 Differentiate various types of antifreeze solution.
25.03 Test an antifreeze solution.
25.04 Identify the purpose and procedures of installing an antifreeze loop.
25.05 Install an antifreeze system.
25.06 Test an antifreeze system.

26.0 DEMONSTRATE THE INSTALLATION OF A STANDPIPE SYSTEM--The student will be able to:

26.01 Determine the need for a standpipe system.

26.02 Determine the standpipe sizing and number required according to the NFPA 14 standard book.
26.03 Identify the standpipe classification according to the building design.
26.04 Identify the locations and methods of sectionalizing standpipe.
26.05 Determine the GPM (gallons per minute) required for a standpipe system.
26.06 Differentiate various pressure-reducing devices and describe how to use them.
26.07 Install a standpipe system.
26.08 Test the standpipe system.
26.09 Conduct a standpipe flow test.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721610
Course Title: Plumbing Technology 1
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, safety precautions, basic-math applications, standards and codes, and human relations.

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 the pipe trades.
- 02.02 Identify pipes, fittings, materials, and equipment related pipe trades.
- 02.03 Identify fixtures and appliances for plumbing, fire-sprinkler fitting, pipe fitting and gas fitting jobs.
- 02.04 Define 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.
- 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.

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, fire-sprinkler fitting, gas fitting, and/or pipe fitting.
08.02 Read and interpret current standards and codes for plumbing, fire-sprinkler fitting, gas fitting, and/or pipe fitting.
08.03 Read and interpret basic building codes in the pipe-trade industry.

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.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721620
Course Title: Plumbing Technology 2
Course Credit: 1

COURSE DESCRIPTION:

The purpose of this course is to develop the competencies essential to pipe trades. These competencies relate to safety, pipe-trade-related math applications, basic science, standards and codes, employability skills, and communication.

06.0 DEMONSTRATE AN UNDERSTANDING OF BASIC SCIENCE--The student will be able to:

- 06.01 Describe 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 Explain 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.

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 "Florida's Right-to-Know" Law as recorded in the Florida Statutes, Chapter 442.
- 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.
- 09.13 Demonstrate competence in job-interview techniques.
- 09.14 Demonstrate knowledge of how to make job changes appropriately.

10.0 DEMONSTRATE COMMUNICATION SKILLS--The student will be able to:

10.01 Ask and answer questions coherently and concisely.
10.02 Read and follow written instructions and listen to and follow 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.

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.

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 Discuss the advantages and disadvantages of business ownership.
11.04 Discuss 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.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721830
Course Title: Fire Sprinkler Systems Technology 3
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with knowledge and skills in fire-sprinkler systems and pipe-joining.

13.0 DEMONSTRATE A BASIC KNOWLEDGE OF FIRE-SPRINKLER SYSTEMS--The student will be able to:

13.01 Explain the basic theory and principles of fire protection.
13.02 Identify fire-sprinkler components.
13.03 Read, interpret, and comply with the manufacturers' schematics and specifications of fire-sprinkler devices. (LA.A.2.4.4), (LA.A.2.4.6)

14.0 PERFORM PIPE-JOINING SKILLS--The student will be able to:

14.01 Cut plastic pipe.
14.02 Join plastic pipe, using the adapter-solvent cement method.
14.03 Bend steel pipe with a heavy-duty bending tool and with a chain vice and torch.
14.04 Cut steel pipe with a one-wheel and with a four-wheel steel-pipe cutter.
14.05 Join plastic pipe to steel pipe.
14.06 Thread steel pipe with an adjustable diestock, with a non-adjustable diestock, and with a power-driven vise stand.
14.07 Groove steel pipe with a pipe-driven grooving machine.
14.08 Join groove pipe with grooved couplings and fittings.
14.09 Cut copper tubing or pipe with a hacksaw and with a tubing cutter.
14.10 Bend copper tubing or pipe with a bender.
14.11 Join copper tubing to copper pipe, to brass pipe, to steel pipe, and to plastic pipe.
14.12 Cut ductile iron.
14.13 Join ductile and mechanical joints to fit.
14.14 Join steel pipe to ductile pipe.
14.15 Join plastic pipe to ductile pipe.
14.16 Braze pipe with a gas torch and filler metal.
14.17 Weld pipe with an oxyacetylene torch and filler metal.
14.18 Join pipe with an electric arc welder and filler metal.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721840
Course Title: Fire Sprinkler Systems Technology 4
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies related to blueprints and specifications, underground installation, fire-sprinkler-system installation, fire protection and provide students with competencies in the repair, servicing, and maintenance of fire-sprinkler systems.

15.0 READ AND INTERPRET FIRE-SPRINKLER BLUEPRINTS AND SPECIFICATIONS--The student will be able to:

15.01 Interpret measuring devices used for fire-sprinkler applications.
15.02 Identify and define basic fire-protection symbols. (LA.A.1.4.3), (LA.A.2.4.4), (LA.A.2.4.6)
15.03 Read and interpret a bill of lading for materials. (LA.A.2.4.4)
15.04 Read and interpret fire-sprinkler blueprints and specifications. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7)
15.05 Read and interpret an architect's and an engineer's scale.

16.0 INSTALL UNDERGROUND--The student will be able to:

16.01 Lay out a job on site.
16.02 Install water-distribution systems.
16.03 Flush underground mains.
16.04 Conduct a hydrostatic test.
16.05 Complete test forms. (LA.B.1.4.3)

17.0 TRIM OUT A FIRE-SPRINKLER SYSTEM--The student will be able to:

17.01 Install and trim out the components of a fire-sprinkler system.
17.02 Test and inspect the final installation.

18.0 REPAIR, SERVICE, AND MAINTAIN FIRE-SPRINKLER SYSTEMS--The student will be able to:

18.01 Establish positive customer relations.
18.02 Troubleshoot and diagnose systems.
18.03 Determine alternative solutions.
18.04 Repair fire-sprinkler systems.
18.05 Repair leaks.
18.06 Repair or replace components.
18.07 Test and inspect repaired systems.
18.08 Prepare a job ticket. (LA.B.1.4.3)
18.09 Price a job, including the correct purchase price and sales tax, and write the invoice.
18.10 Collect payments for services rendered.

19.0 DEMONSTRATE KNOWLEDGE OF FIRE PROTECTION--The student will be able to:

19.01 Explain the purpose of fire protection.
19.02 Apply the basic theory and principles of fire-protection codes.

19.03 Read, locate, and interpret information in the fire code. (LA.A.2.4.4), (LA.A.2.4.6), (LA.A.2.4.7)
19.04 Define and explain the terms used in the fire code. (LA.B.1.4.3)
19.05 Explain why the code may supersede manufacturers' specifications on products.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721850
Course Title: Fire Sprinkler Systems Technology 5
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies relating to water-supply requirements for fire-sprinkler systems and to the installation of wet systems.

20.0 APPLY THE KNOWLEDGE OF WATER-SUPPLY REQUIREMENTS FOR A FIRE-SPRINKLER SYSTEM--The student will be able to:

20.01 Conduct a flow test.
20.02 Identify and explain the source of the water supply. (LA.B.1.4.3)
20.03 Obtain the water department's approval for underground connections.
20.04 Identify the requirements of backflow prevention and testing.
20.05 Differentiate the various types of water-supply connections.
20.06 Analyze water-supply requirements for hydraulically designed systems.

21.0 DEMONSTRATE THE INSTALLATION OF A WET SYSTEM--The student will be able to:

21.01 Discuss the advantages and disadvantages of wet systems.
21.02 Identify and explain the types of check and control valves used in wet systems. (LA.B.1.4.3), (LA.B.2.4.4)
21.03 Place check and control valves at the correct location.
21.04 Determine the causes of unsatisfactory performance in a wet system.
21.05 Identify and explain the various hazards in which wet systems are installed. (LA.B.1.4.3)
21.06 Identify spacing, location, and position sprinklers. (LA.B.1.4.3)
21.07 Size a small wet pipe system (4,000 square feet), using the pipe schedule tables.
21.08 Discuss the advantages of a hydraulically designed wet system. (LA.C.3.4.2)
21.09 Demonstrate the installation of a wet system.
21.10 Test a wet system.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721860
Course Title: Fire Sprinkler Systems Technology 6
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies in fire protection and the installation of deluge and dry systems.

22.0 DEMONSTRATE THE INSTALLATION OF A DRY SYSTEM--The student will be able to:

22.01 Discuss the advantages and disadvantages of a dry system (LA.C.3.4.2)
22.02 Identify and explain the types of check and control valves used in dry systems.
22.03 Place check and control valves at correct locations.
22.04 Determine the causes of unsatisfactory performance in a dry system.
22.05 Identify and describe the hazardous conditions in which dry systems are installed. (LA.B.1.4.3)
22.06 Identify the spacing, location, and position of sprinklers. (LA.B.1.4.3)
22.07 Identify the recommended capacity of a dry pipe system in U.S. gallons. (LA.B.1.4.3)
22.08 Discuss the advantages of a hydraulically designed dry system. (LA.C.3.4.2)
22.09 Identify the maximum time required for water to reach a remote inspector test.
22.10 Describe and demonstrate the methods of charging a dry system.
22.11 Describe the proper drainage of a dry pipe system.
22.12 Demonstrate the installation of a dry system.
22.13 Test a dry system.

23.0 DEMONSTRATE THE INSTALLATION OF PREACTION AND DELUGE SYSTEMS--The student will be able to:

23.01 Discuss the advantages and disadvantages of preaction and deluge systems. (LA.C.3.4.2)
23.02 Identify the types of check and control valves used in preaction and deluge systems.
23.03 Place check and control valves at the correct location.
23.04 Determine the causes of unsatisfactory performance.
23.05 Identify the various hazardous conditions in which preaction and deluge systems are installed. (LA.B.1.4.3)
23.06 Identify the spacing, location, and position of sprinklers. (LA.B.1.4.3)
23.07 Discuss the advantages of a hydraulically designed preaction and deluge system.
23.08 Describe the various types of preaction and deluge systems.
23.09 Identify and explain the various types of supplemental detection systems. (LA.B.1.4.3)
23.10 Install preaction and deluge systems.
23.11 Test preaction and deluge systems.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8721870
Course Title: Fire Sprinkler Systems Technology 7
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to provide students with competencies in the installation of a combined dry pipe and preaction, antifreeze and of a standpipe system.

24.0 DEMONSTRATE THE INSTALLATION OF A COMBINED DRY PIPE AND PREACTION SYSTEM--The student will be able to:

24.01 Discuss the advantages and disadvantages of a combined system. (LA.C.3.4.2)
24.02 Identify and explain the types of check and control valves in a combined system. (LA.B.1.4.3)
24.03 Place check and control valves at the correct location.
24.04 Determine the cause of unsatisfactory performance in a combined system.
24.05 Identify and explain the hazardous conditions in which a combined system is installed. (LA.B.1.4.3)
24.06 Identify the spacing, location, and position of sprinklers. (LA.B.1.4.3)
24.07 Discuss the advantages of a hydraulically designed combined system. (LA.C.3.4.2)
24.08 Demonstrate the installation of a combined dry pipe and preaction system.
24.09 Test a combined system.
24.10 Define and explain a NFPA (National Fire Protection Association) combined system.

25.0 DEMONSTRATE THE INSTALLATION OF AN ANTIFREEZE SYSTEM--The student will be able to:

25.01 Discuss the advantages and disadvantages of the antifreeze system. (LA.C.3.4.2)
25.02 Differentiate various types of antifreeze solution.
25.03 Test an antifreeze solution.
25.04 Identify the purpose and procedures of installing an antifreeze loop.
25.05 Install an antifreeze system.
25.06 Test an antifreeze system.

26.0 DEMONSTRATE THE INSTALLATION OF A STANDPIPE SYSTEM--The student will be able to:

26.01 Determine the need for a standpipe system.
26.02 Determine the standpipe sizing and number required according to the NFPA 14 standard book.
26.03 Identify the standpipe classification according to the building design.
26.04 Identify the locations and methods of sectionalizing standpipe.
26.05 Determine the GPM (gallons per minute) required for a standpipe system.

26.06 Differentiate various pressure-reducing devices and describe how to use them.
26.07 Install a standpipe system.
26.08 Test the standpipe system.
26.09 Conduct a standpipe flow test.