

Wisconsin Technical College System Curriculum Standards Model & Program Design Summary

50-427-5 PLUMBING APPRENTICE (Related Instruction)

Program Information

Program Description

Plumbing apprentices plan, install, troubleshoot, and repair all aspects of water supply, waste, and vent systems, as well as gaseous fuel systems, following the Wisconsin Administrative Plumbing Code. They interpret blueprints, analyze technical specifications, and follow instructions on what and where work is to be done. They plan their work in a logical sequence; coordinate it with other trades, perform work in a quality manner and in a reasonable amount of time. They choose appropriate tools, equipment, and materials to perform their duties. They communicate effectively and are good team members.

External Requirements

1. State of Wisconsin Statutes Chapters 106, 145, 295 and 296
2. Wisconsin Administrative Codes SPS 305 and 381-387
3. NFPA 13D
4. 5 year on-the-job training program which includes 7,428 hours on-the-job training, 572 hours paid related instruction, and a minimum of 260 hours of unpaid related instruction
5. In the last year, apprentices must complete the Transition-To-Trainer Course and a Plumbing Code Review course (or equivalency)
6. Wisconsin Department of Workforce Development, Bureau of Apprenticeship Standards Exhibit A work processes

Program Outcomes

- 1 Apply state plumbing code requirements to the installation and repair of sanitary drain systems
- 2 Apply state plumbing code requirements to the installation and repair of venting systems
- 3 Apply state plumbing code requirements to the installation and repair of water supply systems
- 4 Apply state plumbing code requirements to the installation and repair of storm drain systems
- 5 Apply State plumbing code requirements to the installation and repair of POWTS systems
- 6 Refer to the Wisconsin Administrative Plumbing codes
- 7 Prepare for Journey level licensure examination

Program Configurations for Related Instruction for 2013-2014

WTCS Plumbing Core Apprenticeship Related Instruction Aligned Curriculum Model

Description

The paid related instruction portion of the plumbing apprenticeship consists of 8 semesters of coursework and a total of 572 hours of instruction. A plumbing code review course is required as an apprentice prepares for

taking the Wisconsin plumbing code exam. The following course configuration is recommended as a model for the sequence of courses taken by an apprentice at the Wisconsin technical colleges. Please note that registered apprentices may start at any point in this model and individual colleges may vary their course sequence in order to meet local needs. The Plumbing Independent Study course is used only in special circumstances and is not required for most apprentices; therefore it is listed as an Elective.

Credits

Total Credits 23.00

Total Hours 572 hours for PRI plus 260 hours for URI

Term 1

Course #	Course Title	Credits Hours	Course Description
50-427-751	Sanitary Drains 1	2.00 72 hours	Plumbing related instruction of sanitary drain systems. Course includes a review of codes and trade practices related to sanitary drains, drainage systems, components and applications.

Term 2

Course #	Course Title	Credits Hours	Course Description
50-427-752	Vents and Venting Systems	2.00 72 hours	This course is designed to provide the apprentice with the skills to identify and design sanitary vent piping in a plumbing system in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Term 3

Course #	Course Title	Credits Hours	Course Description
50-427-753	Water Distribution 1	2.00 72 hours	This course provides the apprentice with the skills to identify, design, install and service various applications for water supply systems that are listed in plumbing codes. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. Course topics will include commercial to single family and private well pump systems. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Term 4

Course #	Course Title	Credits Hours	Course Description
50-427-754	Water Distribution 2	2.00 72 hours	This course provides the apprentice with the skills to identify, design, install and service cross connection controls, water treatment equipment and multi-purpose piping systems in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Term 5

Course #	Course Title	Credits Hours	Course Description
50-427-755	Sanitary Drains 2	2.00 72 hours	This course provides the apprentice with the skills to identify, design, install and service various applications for storm water, clear water, and drainage systems. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Term 6

Course #	Course Title	Credits Hours	Course Description
50-427-756	Private Onsite Wastewater Treatment Systems (POWTS)	2.00 72 hours	This course provides the apprentice with the skills to identify, design, install and service various applications for private onsite wastewater treatment systems that are listed in plumbing codes or individual component manuals. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. Other topics will include pretreatment, soil evaluation, site planning and new technologies. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Term 7

Course #	Course Title	Credits Hours	Course Description
50-427-757	Green Plumbing Applications	2.00 72 hours	This course provides plumbing apprentices with an introduction to green applications. Apprentices will be instructed on how to identify, install and maintain a variety of green products and systems. They will apply the Wisconsin Plumbing Code to various installations. This introduction will give an apprentice the basic knowledge to study for a variety of green certifications.

Term 8

Course #	Course Title	Credits Hours	Course Description
50-427-758	Plumbing Advanced Topics / TSA	2.00 72 hours	This course provides the apprentice with the opportunity to select and complete an applied plumbing project in collaboration with the instructor. Projects will apply the skills required to identify, design, install and service various plumbing applications that are listed in plumbing codes. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course builds upon the theory, work experience, and the application of plumbing code principles addressed in previous coursework to support completing an applied hands-on project.

Unpaid Related Instruction (URI)

Course #	Course Title	Credits	Function
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		Hours	
50-427-760	Plumbing Applications	1.00 36 hours	Examines a variety of real-life applications used in the plumbing trades and typically covered in paid related instruction. The units address the how's and whys behind joints and connections, rigging and signaling, hydraulics and pneumatics, plumbing and the environment, gas pipe applications, and applied electricity for plumbers.
50-427-761	Plumbing Service and Repair	1.50 54 hours	This course is designed to provide apprentices with the academic and hands-on experience needed to perform plumbing service and repair tasks. Emphasis is placed on the safe and responsible use of tools and equipment. Topics include clogged drains, garbage disposers, water treatment equipment, water closets, urinals, flush valves, cold weather plumbing problems, water systems, pumps and faucets
50-427-762	Plumbing Blueprint Reading	1.00 36 hours	Provides instructional material for plumbing apprentices to develop the ability to interpret trade blueprints and to plan the installation of the required plumbing. Skills covered include identifying blueprint features, interpreting specifications, reading a blueprint for the purpose of layout work, listing material from print, and coordinating installation of piping with other trades. Blueprint reading practice will be offered while working with an actual print.
47-455-455	Transition to Trainer: Your Role as a Journey Worker	0.00 8 hours	<p>Apprenticeship training is a collaborative partnership: employer and employee associations, government, and educational institutions each play a part. In reality, most learning takes place through the daily interaction between an apprentice and his/her co-workers. Surveys have shown that the apprentices are least satisfied with the on-the-job portion of their training--particularly the ability of journey level workers and supervisors to pass on their knowledge of the trade.</p> <p>You have already learned to use the tools of your chosen trade. In this workshop you will be introduced to a new set of basic tools--the tools of a jobsite trainer. You will explore the skills that are necessary to be an effective trainer, discover how to deliver hands-on training, and examine the process for giving useful feedback. During the workshop you will build a Training Toolkit to take back to your work on the job.</p>
47-427-497	Prep Course for Wisconsin Plumbing License	1.50 54 hours	State plumbing codes will be reviewed in preparation for the licensure exam administered by DSPS. Use 47-427-499 for test out option.

Local Course Options

Course #	Course Title	Credits Hours	Function
50-427-763	Plumbing PRI Independent Study Option	2.00 72 hours	4 – Elective & Optional

Wisconsin Technical College System

47-427-497 Prep Course for Wisconsin Plumbing License

Course Outcome Summary

Course Information

Description State plumbing codes will be reviewed in preparation for the licensure exam administered by DSPS. Use 47-427-499 for test out option.

Total Credits 1.50

Program Outcomes

- 1 Apply state plumbing code requirements to the installation and repair of sanitary drain systems
- 2 Apply state plumbing code requirements to the installation and repair of venting systems
- 3 Apply state plumbing code requirements to the installation and repair of water supply systems
- 4 Apply state plumbing code requirements to the installation and repair of storm drain systems
- 5 Apply State plumbing code requirements to the installation and repair of POWTS systems
- 6 Refer to the Wisconsin Administrative Plumbing codes
- 7 Prepare for Journey level licensure examination

Course Competencies: Review of the program outcomes & applicable state codes.

Wisconsin Technical College System

50-427-751 Sanitary Drains 1

Course Outcome Summary

Course Information

Description Plumbing related instruction of sanitary drain systems. Course includes a review of codes and trade practices related to sanitary drains, drainage systems, components and applications.

Total Credits 2.00

Course Competencies

- 1 Size gravity flow drain piping: horizontal pipe, vertical drain pipe, and vertical drain stacks of 3 branch intervals or less
- 2 Size vertical drain stacks of more than 3 branch intervals
- 3 Size gravity flow building drain, building sewer and private interceptor main sewer
- 4 Design and develop installation requirements
- 5 Design sanitary sump systems

Wisconsin Technical College System
50-427-752 Vents and Venting Systems
Course Outcome Summary

Course Information

Description This course is designed to provide the apprentice with the skills to identify and design sanitary vent piping in a plumbing system in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Total Credits 2.00

Course Competencies

- 1 Locate vent connections to fixture drains
- 2 Determine minimum size and maximum length of fixture vents
- 3 Determine pitch and position of fixture vent connections
- 4 Design the installation of vent terminals
- 5 Design the installation of an individual vent
- 6 Design the installation of a common vent
- 7 Design the installation of circuit vented fixtures
- 8 Design the installation of a vent for an island plumbing fixture(s)
- 9 Design the installation of a wet vent
- 10 Design the installation of a relief vent for circuit vents, building drain offset, and horizontal wet vents
- 11 Design the installation of a combination drain and vent system
- 12 Design the installation of a sanitary sump vent
- 13 Design the installation of a vent stack, stack vent and vent header
- 14 Design the installation of a yoke vent and a relief vent for a drain stack offsets
- 15 Design the installation of a yoke vent for drain stacks of more than ten branch intervals
- 16 Analyze air admittance valves (AAV's) as "product approved alternate systems"

Wisconsin Technical College System

50-427-753 Water Distribution 1

Course Outcome Summary

Course Information

Description This course provides the apprentice with the skills to identify, design, install and service various applications for water supply systems that are listed in plumbing codes. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. Course topics will include commercial to single family and private well pump systems. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Total Credits 2.00

Course Competencies

- 1 Determine building demand
- 2 Calculate uniform pressure loss
- 3 Assign Water Supply Fixture Units (WSFU) to the piping system
- 4 Determine minimum pipe size
- 5 Determine installation requirements for water supply systems

Wisconsin Technical College System

50-427-754 Water Distribution 2

Course Outcome Summary

Course Information

Description This course provides the apprentice with the skills to identify, design, install and service cross connection controls, water treatment equipment and multi-purpose piping systems in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Total Credits 2.00

Course Competencies

- 1 Analyze the potential for cross-connection
- 2 Select the most appropriate device and or method for backflow prevention
- 3 Determine installation requirements in Comm 82.41

Wisconsin Technical College System

50-427-755 Sanitary Drains 2

Course Outcome Summary

Course Information

Description This course provides the apprentice with the skills to identify, design, install and service various applications for storm water, clear water, and drainage systems. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Total Credits 2.00

Course Competencies

- 1 Identify the types of water discharge from a building site
- 2 Size the stormwater/clearwater piping system
- 3 Apply installation requirements for stormwater/clearwater piping
- 4 Determine the requirements for a site that is equal to or greater than one acre

Wisconsin Technical College System

50-427-756 Private Onsite Wastewater Treatment Systems (POWTS)

Course Outcome Summary

Course Information

Description This course provides the apprentice with the skills to identify, design, install and service various applications for private onsite wastewater treatment systems that are listed in plumbing codes or individual component manuals. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. Other topics will include pretreatment, soil evaluation, site planning and new technologies. The course focuses on theory, work experience, and the application of plumbing code principles through discussions, drawing exercises, work sheets, and evaluations.

Total Credits 2.00

Course Competencies

- 1 Characterize the components of a private on-site wastewater treatment system (POWTS)
- 2 Make mathematical calculations needed to design a POWTS
- 3 Evaluate the site
- 4 Relate soil science to the treatment of wastewater
- 5 Locate applicable requirements for each portion of the POWTS
- 6 Identify anaerobic treatment tanks (ATT), formerly known as septic tank, for the requirements of POWTS
- 7 Explore an inground gravity POWTS
- 8 Explore an inground dose POWTS
- 9 Explore an in-ground pressure distribution POWTS
- 10 Explore an at-grade POWTS
- 11 Explore a mound POWTS
- 12 Explore a system using alternative components
- 13 Determine holding tank requirements for a POWTS
- 14 Examine field service skills for a POWTS
- 15 Create a POWTS journal

Wisconsin Technical College System

50-427-757 Green Plumbing Applications

Course Outcome Summary

Course Information

Description This course provides plumbing apprentices with an introduction to green applications. Apprentices will be instructed on how to identify, install and maintain a variety of green products and systems. They will apply the Wisconsin Plumbing Code to various installations. This introduction will give an apprentice the basic knowledge to study for a variety of green certifications.

Total Credits 2.00

Course Competencies

- 1 Assess the economic and environmental impact of green plumbing
- 2 Select water conservation measures
- 3 Perform a water audit
- 4 Analyze the impact of the Wisconsin Plumbing Code on green technology
- 5 Recommend water reuse technologies, products and systems for a given situation
- 6 Assess the viability of water heating systems
- 7 Analyze the components of solar thermal water heating systems
- 8 Conduct a site assessment for a solar thermal system
- 9 Design a solar thermal water heating system to meet site requirements
- 10 Plan for installation of solar thermal water heating systems
- 11 Identify ways to improve the delivery of hot water by utilizing structured plumbing principles
- 12 Determine the role of LEED certification in green plumbing

Wisconsin Technical College System

50-427-758 Plumbing Advanced Topics / TSA

Course Outcome Summary

Course Information

Description This course provides the apprentice with the opportunity to select and complete an applied plumbing project in collaboration with the instructor. Projects will apply the skills required to identify, design, install and service various plumbing applications that are listed in plumbing codes. Apprentices will use the code language and tables to in various plumbing systems in accordance with the Wisconsin Plumbing Code. The course builds upon the theory, work experience, and the application of plumbing code principles addressed in previous coursework to support completing an applied hands-on project.

Total Credits 2.00

Program Outcomes

- 1 Apply state plumbing code requirements to the installation and repair of sanitary drain systems
- 2 Apply state plumbing code requirements to the installation and repair of venting systems
- 3 Apply state plumbing code requirements to the installation and repair of water supply systems
- 4 Apply state plumbing code requirements to the installation and repair of storm drain systems
- 5 Apply State plumbing code requirements to the installation and repair of POWTS systems
- 6 Refer to the Wisconsin Administrative Plumbing codes
- 7 Prepare for Journey level licensure examination

Wisconsin Technical College System

50-427-760 Plumbing Applications

Course Outcome Summary

Course Information

Description Examines a variety of real-life applications used in the plumbing trades and typically covered in paid related instruction. The units address the how's and whys behind joints and connections, rigging and signaling, hydraulics and pneumatics, plumbing and the environment, gas pipe applications, and applied electricity for plumbers.

Total Credits 1.00

Course Competencies

- 1 Explore pipes and fittings
- 2 Select method for joining pipe
- 3 Select hangers, supports and anchors
- 4 Use rigging techniques
- 5 Apply hydraulic and pneumatic principles to pumps
- 6 Assess wells
- 7 Determine treatment of drinking water based on assessment
- 8 Assess private onsite wastewater treatment systems
- 9 Explore devices or methods used to eliminate cross-connection hazards
- 10 Select size/type of piping for various applications
- 11 Pipe typical gas-fired equipment and regulator venting
- 12 Determine electrical equipment connection requirements
- 13 Use testing equipment

Wisconsin Technical College System
50-427-761 Plumbing Service and Repair
Course Outcome Summary

Course Information

Description This course is designed to provide apprentices with the academic and hands-on experience needed to perform plumbing service and repair tasks. Emphasis is placed on the safe and responsible use of tools and equipment. Topics include clogged drains, garbage disposers, water treatment equipment, water closets, urinals, flush valves, cold weather plumbing problems, water systems, pumps and faucets.

Total Credits 1.50

Course Competencies

- 1 Examine and demonstrate the responsibilities of a repair plumber.
- 2 Characterize types of construction
- 3 Practice service safety
- 4 Follow electrical safety procedures
- 5 Use electrical test meters
- 6 Service gas and electric water heaters
- 7 Service clogged drains
- 8 Service food waste grinders
- 9 Service water supply treatment equipment
- 10 Service water closets, bidets, and urinals
- 11 Service flush valves
- 12 Solve cold weather plumbing problems
- 13 Service water supply systems
- 14 Service pumps
- 15 Perform single- handle faucet repair
- 16 Perform two-handle faucet repair
- 17 Perform mixing valve faucet repair (thermostatic and pressure balance)
- 18 Troubleshoot thermostatic valves
- 19 Examine specialized repair techniques
- 20 Service private onsite wastewater treatment systems (POWTS)

Wisconsin Technical College System
50-427-762 Plumbing Blueprint Reading
Course Outcome Summary

Course Information

Description Provides instructional material for plumbing apprentices to develop the ability to interpret trade blueprints and to plan the installation of the required plumbing. Skills covered include identifying blueprint features, interpreting specifications, reading blueprint for the purpose of layout work, listing material from print, and coordinating installation of piping with other trades. Blueprint reading practice will be offered while working with an actual print.

Total Credits 1.00

Course Competencies

- 1 Identify blueprint features/components
- 2 Access information from specification book
- 3 Read blueprint for purpose of layout work
- 4 Coordinate installation of piping with other trades
- 5 List material from print

Wisconsin Technical College System

50-427-763 Plumbing PRI Independent Study Option

Course Outcome Summary

Course Information

Description	Provides additional hours for plumbing apprentices who require time to complete their 572 hours of paid related requirement. Up to 72 hours can be scheduled as need in an independent study format. Course hours can be used to make up for time lost due to injury or illness, or to catch-up apprentices who start mid-term for example.
Total Credits	2.00

Wisconsin Technical College System

47-421-420 Drafting, Isometric - Plumber Apprentices

Course Outcome Summary

Course Information

Description Is a basic course in isometric drawing covering the theory of isometric construction from basic orthographic drawings. Isometric piping is introduced.

Total Credits 0.50

Course Competencies

- 1 Draw basic shapes.
- 2 Draw complete isometrics of plumbing systems.

Wisconsin Technical College System

50-427-771 OSHA Safety for Plumbing Apprenticeship

Course Outcome Summary

Course Information

Description A Plumbing Apprenticeship night school course that provides the Apprentice with necessary job skills related to safety procedures and typical plumbing job sites. The course focuses on common work site safety issues and application of proper procedures.

Course Competencies

- 1 Use personal protective equipment (PPE)
- 2 Follow hold card procedures
- 3 Protect yourself from hazardous materials and waste
- 4 Use respiratory protection equipment
- 5 Work ergonomically
- 6 Maintain job site
- 7 Respond to fire hazards
- 8 Apply confined space procedures
- 9 Use fall protection equipment
- 10 Handle compressed gas cylinders
- 11 Apply asbestos procedures
- 12 Apply arsenic procedure
- 13 Work with natural gas systems

Wisconsin Technical College System

47-455-455 Transition to Trainer: Your Role as a Journey Worker

Course Outcome Summary

Course Information

Description Apprenticeship training is a collaborative partnership: employer and employee associations, government, and educational institutions each play a part. In reality, most learning takes place through the daily interaction between an apprentice and his/her co-workers. Surveys have shown that the apprentices are least satisfied with the on-the-job portion of their training--particularly the ability of journey level workers and supervisors to pass on their knowledge of the trade.

You have already learned to use the tools of your chosen trade. In this workshop you will be introduced to a new set of basic tools--the tools of a jobsite trainer. You will explore the skills that are necessary to be an effective trainer, discover how to deliver hands-on training, and examine the process for giving useful feedback. During the workshop you will build a Training Toolkit to take back to your work on the job.

Course Competencies

- 1 Value your role as a journey worker trainer
- 2 Serve as a mentor and job coach
- 3 Foster a positive work environment by acting as an ally/advocate
- 4 Provide hands-on skills training
- 5 Provide feedback on apprentice performance