

## WTCS Repository

# Program Design

50-435-1 INDUSTRIAL PIPEFITTER APPRENTICE

Description

Industrial pipefitter's layout, assemble, install, maintain, and repair industrial piping systems, fittings, and related equipment. Common job tasks include:   
• Layout, fabricate, and install piping components including bends, saddles, reducers, flanges, elbows, hangers and supports   
• Fabricate pipe and tubing, fittings, templates, offsets with miters and other components   
• Bend pipe and tubing   
• Fabricate saddles, reducers, flanges, tees, laterals, "Y" fittings and elbows   
• Fabricate hangers, stands and assemblies from drawings   
• Install and maintain industrial piping systems such as: process piping, process steam, steam heating, hot water heating, refrigeration and air conditioning systems, fire protection systems, and boiler systems   
• Install, maintain, and troubleshoot hydraulic and pneumatic systems   
• Perform rigging operations   
• Transfer and handle hazardous materials   
• Apply safety and shop fundamentals to power and hand tools   
• Additional employer specific work processes may be involved, including welding certifications, specialized fitting familiarization, valve and actuator maintenance, natural gas, propane and fuel emitters and trains, heat treat furnaces, and other industrial equipment.

###### Related Outcomes

External Standards

|  |  |
| --- | --- |
| Title | Industrial Pipefitting DACUM |
| Sponsoring Organization | DWD-BAS and the WTCS |

###### Description

Industrial Pipefitter DACUM

Sponsoring Organizations: Wisconsin Department of Workforce Development Bureau of Apprenticeship Standards

Date of DACUM: 07/31/14

Organized by: Nicolet Area Technical College and Wisconsin Technical College System

Facilitated by: Hal Zenisek, DACUM Facilitator, Wisconsin Technical College System Foundation

Occupational Description

Pipefitters lay out, assemble, install, and maintain high- and low-pressure pipe systems, including: pipe supports, and related hydraulic and pneumatic equipment. The trade works on steam, hot water, heating, cooling, lubricating, and industrial production, and processing systems. They layout, fabricate, and install piping components. They layout with a square, templates, offset, miters, bends, saddles, reducers, flanges, elbows, bolt holes, penetration and hangers. Fitters fabricate pipe and tubing, and fittings. The trade installs and maintains industrial piping systems involved in process piping, process steam, steam heating, hot water heating, refrigeration and air conditioning systems. Industrial pipefitters also install, maintain, and troubleshoot hydraulic and pneumatic systems. They frequently perform rigging operations, and transfer and handle hazardous materials. Fitters obtain training in OSHA safety standards. Additional work processes may include welding/pipe certification, maintaining valves and actuators, maintaining natural gas, propane and fuel equipment, maintaining heat treat furnaces and auxiliary equipment.

|  |  |  |  |
| --- | --- | --- | --- |
| DACUM Panel of Experts | | | |
| Name | Job Title | Company | City |
| Robert Van Cleve | Mech Tech | Expera Specialty Paper | Rhinelander, WI |
| Brian Roberts | Industrial Pipefitter | PCA | Tomahawk, WI |
| Dean Everson | Maintenance Supervisor | PCA | Tomahawk, WI |
| Craig Sackett | Mech Tech | Expera Specialty Paper | Rhinelander, WI |
| Jeff Ison | Pipefitter | US Paper | Menasha, WI |
| John Lindner | Pipefitter Instr. | Nicolet College | Rhinelander, WI |
| Gary Petroff | Maintenance Supervisor | Expera Specialty Paper | Rhinelander, WI |

### Program Outcomes

|  |  |
| --- | --- |
| 1 | Adhere to safety requirements |
| 2 | Perform installation and maintenance of steam and condensate returns |
| 3 | Apply design concepts to service practices |
| 4 | Repair pipe and piping systems |
| 5 | Perform installation and maintenance of process piping |
| 6 | Maintain plant heating and cooling systems |
| 7 | Maintain plant fire protection systems |
| 8 | Perform welding on pipe, hangers and parts |
| 9 | Troubleshoot pipe and piping systems |
| 10 | Follow preventative maintenance programs |
| 11 | Communicate trade related information |

# 50-435-1 WTCS Industrial Pipefitter Apprenticeship Related Instruction [2014-2015]

Description

The following program configuration and sequence of courses provides a curriculum standards model for related instruction in the industrial pipefitter apprenticeship. The configuration model includes 4 years and 8 semesters of related instruction for a total of 576 hours. The BAS required Transition to Trainer course is an additional 8 hours and may be taken at any time in the last year of one's apprenticeship. A maximum of 72 hours per term is shown below. Critical trade topics such as print reading, safety, math, and related science are introduced in the first two terms, and then reinforced and applied in multiple courses throughout related instruction. The model below requires the successful completion of the first semester as a pre-requisite to all remaining courses. The remaining courses may be scheduled in any sequence as needed to meet college, employer and trade schedules. The curriculum standards model recommendations presented here are based off of a validated DACUM occupational analysis done in 2014.

Credits

|  |  |
| --- | --- |
| Total Credits | 16.5 |

## Year 1 Term 1

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-709 | Orientation to the Trade and Safety for Industrial Pipefitters | .5 |
| 50-435-710 | Blueprint Reading 1 for Industrial Pipefitter Apprentices | .5 |
| 50-435-711 | Trade Math for Industrial Pipefitter Apprentices | 1 |

## Year 1 Term 2

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-712 | Related Science for Industrial Pipefitter Apprentices | 2 |

## Year 2 Term 3

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-713 | Blueprint Reading 2 for Industrial Pipefitter Apprentices | .5 |
| 50-435-714 | Process Piping 1 for Industrial Pipefitter Apprentices | 1.5 |

## Year 2 Term 4

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-715 | Steam Systems for Industrial Pipefitter Apprentices | 2 |

## Year 3 Term 5

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-716 | Blueprint Reading 3 for Industrial Pipefitter Apprentices | .5 |
| 50-435-717 | Chemical Handling & Hazardous Materials for Industrial Pipefitter Apprentices | .5 |
| 50-435-718 | Refrigeration and Air Conditioning for Industrial Pipefitter Apprentices | .5 |
| 50-435-719 | Hot Water Heating Systems for Industrial Pipefitter Apprentices | .75 |

## Year 3 Term 6

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-720 | Process Piping 2 for Industrial Pipefitter Apprentices | 1 |
| 50-435-721 | Rigging Safety for Industrial Pipefitter Apprentices | 1 |

## Year 4 Term 7

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-722 | Blueprint Reading 4 for Industrial Pipefitter Apprentices | .5 |
| 50-435-723 | Hydraulics for Industrial Pipefitter Apprentices | 1.5 |

## Year 4 Term 8

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 50-435-725 | Valves, Packings, and Gaskets for Industrial Pipefitter Apprentices | .25 |
| 50-435-724 | Welding and Brazing for Industrial Pipefitter Apprentices | 1 |
| 50-435-726 | Pneumatics for Industrial Pipefitter Apprentices | 1 |

## Other Related Instruction

|  |  |  |
| --- | --- | --- |
| Course # | Course Title | Credits |
| 47-455-455 | Transition to Trainer: Your Role as a Journey Worker |  |

### Program Course List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Title | Credits | Description | Pre/Corequisites |
| 50-435-709 | Orientation to the Trade and Safety for Industrial Pipefitters | .5 | Course competencies examine safe work practices involved in pipe fitting trades and various industrial settings.  Rigging safety, PPE, confined space entry, fall protection, heavy equipment operation, chemical safety and MSDS, boiler safety, and lockout tag-out will be examined.  Fall protection, and safe work practices for overhead work, and ladders are covered.  OSHA and other safety standards will be reviewed.  The course wraps up with an introduction to the trade where apprentices will examine job duties and tasks which have been identified for the industrial pipefitting apprenticeship. |  |
| 50-435-710 | Blueprint Reading 1 for Industrial Pipefitter Apprentices | .5 | Course competencies include an introduction to industrial blueprints; building freehand sketching skills; drawing symbols, lines, and pipe fittings; and interpreting technical information found on blueprints.  Apprentices will learn how prints support work processes performed by the pipefitting trade. |  |
| 50-435-711 | Trade Math for Industrial Pipefitter Apprentices | 1 | Course competencies include building apprentice skills working with fractions, decimals, measurement and ratios commonly used by the trade. Measurement, tolerances and interpreting trade related information will help apply math concepts to industrial work processes. Basic algebra, geometry and trigonometry will be applied to industrial pipefitting tasks. |  |
| 50-435-712 | Related Science for Industrial Pipefitter Apprentices | 2 | Course competencies include the science of matter; properties of solids, liquids and gases; work, energy and power; temperature and heat effects; change of state; heat engines; and force balance and gravity.   A field trip to observe related science applications in a plant is included.  Related science concepts included in this course will be reinforced and applied later in related instruction. | 50-435-711 is suggested |
| 50-435-713 | Blueprint Reading 2 for Industrial Pipefitter Apprentices | .5 | Course competencies include pipe and pipe fitting blueprint symbols and other technical information found on pipe prints.  Apprentices will examine isometric and multi-view drawings; dimensions; and process pipe drawings symbols.  Drawing and sketching skills will be further developed. | 50-435-710 is suggested |
| 50-435-714 | Process Piping 1 for Industrial Pipefitter Apprentices | 1.5 | Course competencies include examining the metallurgical properties of various piping materials, applying piping materials to process pipe installations, fabricating piping offsets, calculating values needed to solve pipe layout and fabrication problems associated with pipe welding layouts, comparing clamps and aligning devices employed by the trade, and fabricating miters, tees, saddles, laterals, and elbows. | 50-435-709 is suggested |
| 50-435-715 | Steam Systems for Industrial Pipefitter Apprentices | 2 | Course competencies include steam trapping, boiler accessories, boiler valves, steam heating, steam systems, and high pressure steam.  Course includes a field trip to examine steam systems applied to an industrial setting. | 50-435-709 is suggested |
| 50-435-716 | Blueprint Reading 3 for Industrial Pipefitter Apprentices | .5 | Course competencies include identifying piping isometrics and dimensions found on flow diagrams, elevation drawings, section views, and process piping plans.  Apprentices will further develop skills in sketching and drawing as well as interpreting information from flow diagrams, pipe drawings, and related industrial prints.  Apprentices will learn to use prints and diagrams to interpret information about given runs of pipe. | 50-435-710 is suggested |
| 50-435-717 | Chemical Handling & Hazardous Materials for Industrial Pipefitter Apprentices | .5 | Course competencies include safety in handling chemicals, chlorine, caustic soda and other hazardous materials.  MSDS information and related procedures will be applied to industrial situations. | 50-435-709 is suggested |
| 50-435-718 | Refrigeration and Air Conditioning for Industrial Pipefitter Apprentices | .5 | Course competencies include refrigeration systems, applications of mechanical refrigeration, refrigeration components, and troubleshooting systems. | 50-435-709 is suggested |
| 50-435-719 | Hot Water Heating Systems for Industrial Pipefitter Apprentices | .75 | Course examines hot water heating systems and boilers found in industrial plants.  Course competencies include hot water heating equipment and components, boiler operations and safety, insulation, heat loss, and maintenance. | 50-435-709 is suggested |
| 50-435-720 | Process Piping 2 for Industrial Pipefitter Apprentices | 1 | Course competencies include rolling offsets, parallel offsets, layout of pipe intersections, and fabricating and cutting uneven rolling offsets.  Course includes a field trip to observe the application of related concepts. | 50-435-709 is suggested |
| 50-435-721 | Rigging Safety for Industrial Pipefitter Apprentices | 1 | Apprentices will compare types of rigging equipment and their uses; determine safe loads, rig and crib loads, and move a load with cranes and hoists. This course is intended for related instruction in the industrial pipefitter apprenticeship. Course competencies examine safe rigging equipment, hardware, equipment, tools, procedures, and safe work practices applicable to industrial settings. Rigging for cranes, forklifts and other industrial power equipment, and hand devices are included. | 50-435-709 is suggested |
| 50-435-722 | Blueprint Reading 4 for Industrial Pipefitter Apprentices | .5 | Course competencies include interpreting information from isometric drawings and spool drawings.  Apprentices will learn how to develop material lists from both types of drawings and build skills working with industrial blueprints. | 50-435-710 is suggested |
| 50-435-723 | Hydraulics for Industrial Pipefitter Apprentices | 1.5 | Gain knowledge of the uses and applications of hydraulics required in the trade. Hydraulic systems, devices and components will be examined. Job duties and tasks related to safety, inspection, testing, maintenance and repair will be included. Course competencies examine hydraulic fluids, safety, hydraulic equipment and components, controls, troubleshooting, repair, and preventative maintenance. | 50-435-709 is suggested |
| 50-435-724 | Welding and Brazing for Industrial Pipefitter Apprentices | 1 | Course compares common welding processes and develops apprentice skills related to welding, cutting, heating and using oxy-gas. Welding with arc, MIG and TIG will be explored.  Common cutting and joining techniques will be compared. Industrial brazing techniques will be demonstrated.  Joint preparation, using hand and power tools, and working with low-temp and high-temp solders are examined. Welding safety and PPE requirements will be reinforced. | 50-435-709 is suggested |
| 50-435-725 | Valves, Packings, and Gaskets for Industrial Pipefitter Apprentices | .25 | Course includes an examination of the various types of valves and their applications in industrial plant processes.  Apprentices will also compare gasket types, materials and their applications.  Valve packings will be compared and procedures for repacking valves examined.  Apprentices will build skills installing and repairing valves. | 50-435-709 is suggested |
| 50-435-726 | Pneumatics for Industrial Pipefitter Apprentices | 1 | Gain knowledge of the uses and applications of pneumatics required in the trade. Pneumatic systems, devices and components will be examined. Job duties and tasks related to safety, inspection, testing, maintenance and repair will be included. | 50-435-709 is suggested |
| 47-455-455 | Transition to Trainer: Your Role as a Journey Worker |  | 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. |  |

50-435-709 Orientation to the Trade and Safety for Industrial Pipefitters

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies examine safe work practices involved in pipe fitting trades and various industrial settings.  Rigging safety, PPE, confined space entry, fall protection, heavy equipment operation, chemical safety and MSDS, boiler safety, and lockout tag-out will be examined.  Fall protection, and safe work practices for overhead work, and ladders are covered.  OSHA and other safety standards will be reviewed.  The course wraps up with an introduction to the trade where apprentices will examine job duties and tasks which have been identified for the industrial pipefitting apprenticeship. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | .5 |
|  | Total Hours | 18 |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Examine OSHA and other industrial safety standards |
| 2. | Determine personal protective safety equipment and devices commonly used by the trade |
| 3. | Explore material handling safety |
| 4. | Explore safe work practices when working at heights |
| 5. | Compare PPE equipment and safety practices involved in chemical handling |
| 6. | Examine electrical safety work practices |
| 7. | Apply confined space entry requirements to trade work practices |
| 8. | Classify industrial equipment according to safety practices for pipefitters |
| 9. | Apply safe work practices that protect workers, equipment and facilities |
| 10. | Complete an orientation to the industrial pipefitting trade |

50-435-710 Blueprint Reading 1 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include an introduction to industrial blueprints; building freehand sketching skills; drawing symbols, lines, and pipe fittings; and interpreting technical information found on blueprints.  Apprentices will learn how prints support work processes performed by the pipefitting trade. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | .5 |
|  | Total Hours | 18 |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Examine industrial blueprints used by the trade |
| 2. | Illustrate industrial equipment symbols using freehand sketching and drawing techniques |
| 3. | Sketch process pipe drawings |
| 4. | Interpret basic symbols found on industrial prints. |
| 5. | Interpret other pipe and process related information contained in industrial prints and diagrams |
| 6. | Produce isometric drawing according to standards used by industry |

50-435-711 Trade Math for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include building apprentice skills working with fractions, decimals, measurement and ratios commonly used by the trade. Measurement, tolerances and interpreting trade related information will help apply math concepts to industrial work processes. Basic algebra, geometry and trigonometry will be applied to industrial pipefitting tasks. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1 |
|  | Total Hours | 36 |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Solve problems using fractions |
| 2. | Perform math using decimals |
| 3. | Apply measurement information to trade math |
| 4. | Apply basic geometry to the trade |
| 5. | Solve problems using basic algebra |
| 6. | Apply trigonometry to trade math problems |

50-435-712 Related Science for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include the science of matter; properties of solids, liquids and gases; work, energy and power; temperature and heat effects; change of state; heat engines; and force balance and gravity.   A field trip to observe related science applications in a plant is included.  Related science concepts included in this course will be reinforced and applied later in related instruction. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 2 |
|  | Total Hours | 72 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-711 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Interpret basic electrical theory as it relates to trade work processes |
| 2. | Relate energy to work, power and efficiency |
| 3. | Compare the properties of solids, liquids and gases as they related to the trade |
| 4. | Summarize the relationships among heat, temperature and expansion |
| 5. | Investigate changes of state as it relates to trade work processes |
| 6. | Examine chemistry and chemical principles involved in industrial settings |
| 7. | Apply mechanics and mechanical principles to trade work processes |
| 8. | Examine physics and physical science as it relates to the trade |
| 9. | Participate in a field trip to observe related science concepts in action |

50-435-713 Blueprint Reading 2 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include pipe and pipe fitting blueprint symbols and other technical information found on pipe prints.  Apprentices will examine isometric and multi-view drawings; dimensions; and process pipe drawings symbols.  Drawing and sketching skills will be further developed. |
|  | Total Credits | .5 |
|  | Total Hours | 18 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-710 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Interpret pipe and pipe fittings as shown on industrial prints |
| 2. | Compare how valves and measuring instruments are shown on industrial prints |
| 3. | Illustrate how pumps, tanks, and piping equipment are represented in prints and drawings |
| 4. | Interpret drawings and plans for pipe and fitting assemblies |

50-435-714 Process Piping 1 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include examining the metallurgical properties of various piping materials, applying piping materials to process pipe installations, fabricating piping offsets, calculating values needed to solve pipe layout and fabrication problems associated with pipe welding layouts, comparing clamps and aligning devices employed by the trade, and fabricating miters, tees, saddles, laterals, and elbows. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1.5 |
|  | Total Hours | 54 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Compare the metallurgical properties of various metals and piping materials |
| 2. | Analyze piping materials to process pipe installations and applications |
| 3. | Examine hand and power tools used in pipe fabrication |
| 4. | Fabricate piping offsets |
| 5. | Calculate values needed to solve pipe layout and fabrication problems associated with pipe welding layouts |
| 6. | Compare clamps and aligning devices employed by the trade |
| 7. | Analyze the purpose of hangers and supports used in piping systems |

50-435-715 Steam Systems for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include steam trapping, boiler accessories, boiler valves, steam heating, steam systems, and high pressure steam.  Course includes a field trip to examine steam systems applied to an industrial setting. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 2 |
|  | Total Hours | 72 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Apply related science to steam and steam systems |
| 2. | Analyze steam boiler systems used in industrial plants |
| 3. | Examine boiler operations, fittings, and accessories |
| 4. | Compare boiler make-up and feedwater systems and equipment |
| 5. | Maintain steam heating systems |
| 6. | Service steamtraps |
| 7. | Explore high pressure steam systems |
| 8. | Apply safety requirements and safe work practices to boiler and steam related job duties and tasks performed by the trade, |
| 9. | Examine steam systems applied to an industrial setting |

50-435-716 Blueprint Reading 3 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include identifying piping isometrics and dimensions found on flow diagrams, elevation drawings, section views, and process piping plans.  Apprentices will further develop skills in sketching and drawing as well as interpreting information from flow diagrams, pipe drawings, and related industrial prints.  Apprentices will learn to use prints and diagrams to interpret information about given runs of pipe. |
|  | Total Credits | .5 |
|  | Total Hours | 16 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-710 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Interpret the information found on flow diagrams |
| 2. | Interpret the information found on elevation drawings |
| 3. | Interpret the information found on section drawings |
| 4. | Interpret the information found on piping plans |

50-435-717 Chemical Handling & Hazardous Materials for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include safety in handling chemicals, chlorine, caustic soda and other hazardous materials.  MSDS information and related procedures will be applied to industrial situations. |
|  | Total Credits | .5 |
|  | Total Hours | 16 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Examine safe work practices involved in handling industrial chemicals |
| 2. | Describe procedures for handling chlorine, |
| 3. | Outline the steps involved when working with caustic soda |
| 4. | Explore other hazardous industrial materials commonly used by the trade |
| 5. | Classify chemicals according to their SDS information and safety requirements |
| 6. | Identify hazards associated with chemical process piping systems |

50-435-718 Refrigeration and Air Conditioning for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include refrigeration systems, applications of mechanical refrigeration, refrigeration components, and troubleshooting systems. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | .5 |
|  | Total Hours | 16 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Apply related science to refrigeration and air conditioning systems |
| 2. | Compare refrigeration and air conditioning systems |
| 3. | Apply mechanical refrigeration concepts to equipment used in an industrial setting |
| 4. | Relate mechanical refrigeration and air conditioning components to their functions |
| 5. | Troubleshoot refrigeration and air conditioning equipment and problems |

50-435-719 Hot Water Heating Systems for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course examines hot water heating systems and boilers found in industrial plants.  Course competencies include hot water heating equipment and components, boiler operations and safety, insulation, heat loss, and maintenance. |
|  | Total Credits | .75 |
|  | Total Hours | 24 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Apply related science to hot water and heating systems |
| 2. | Evaluate insulation options and alternatives used in the trade. |
| 3. | Analyze the various types of hot water heating systems. |
| 4. | Classify the types of boilers used for industrial heating applications |
| 5. | Apply maintenance techniques to hot water heating systems. |
| 6. | Install selected devices on a hot water heating system |

50-435-720 Process Piping 2 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course competencies include rolling offsets, parallel offsets, layout of pipe intersections, and fabricating and cutting uneven rolling offsets.  Course includes a field trip to observe the application of related concepts. |
|  | Total Credits | 1 |
|  | Total Hours | 36 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Fabricate miters, tees, saddles, laterals, and elbows |
| 2. | Demonstrate the ability to install and fabricate hangers and support setups. |
| 3. | Compare fabrication requirements for rolling offsets, parallel offsets, and uneven rolling offsets |
| 4. | Layout piping system intersections |
| 5. | Participate in a field trip to observe pipe fabrication techniques in practice |

50-435-721 Rigging Safety for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Apprentices will compare types of rigging equipment and their uses; determine safe loads, rig and crib loads, and move a load with cranes and hoists. This course is intended for related instruction in the industrial pipefitter apprenticeship. Course competencies examine safe rigging equipment, hardware, equipment, tools, procedures, and safe work practices applicable to industrial settings. Rigging for cranes, forklifts and other industrial power equipment, and hand devices are included. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1 |
|  | Total Hours | 36 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Review safety rules, regulations, and requirements |
| 2. | Identify the types of rigging equipment and their uses |
| 3. | Determine the safe working load of rigging equipment |
| 4. | Rig a load |
| 5. | Crib a load |
| 6. | Move a load with an overhead crane |
| 7. | Move a load with a mobile crane |
| 8. | Move a load with portable hand hoisting/chain equipment |

50-435-722 Blueprint Reading 4 for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

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| --- | --- | --- |
|  | Description | Course competencies include interpreting information from isometric drawings and spool drawings.  Apprentices will learn how to develop material lists from both types of drawings and build skills working with industrial blueprints. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | .5 |
|  | Total Hours | 18 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-710 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Interpret information found on isometric drawings |
| 2. | Interpret information found on spool drawings |
| 3. | Produce a materials list for a specific job |
| 4. | Produce an isometric drawing for a given industrial application |

50-435-723 Hydraulics for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Gain knowledge of the uses and applications of hydraulics required in the trade. Hydraulic systems, devices and components will be examined. Job duties and tasks related to safety, inspection, testing, maintenance and repair will be included. Course competencies examine hydraulic fluids, safety, hydraulic equipment and components, controls, troubleshooting, repair, and preventative maintenance. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1.5 |
|  | Total Hours | 54 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Relate principles of hydraulics to industrial equipment and processes |
| 2. | Interpret hydraulic schematic prints and diagrams |
| 3. | Select hydraulic fluids for various industrial applications |
| 4. | Analyze the function of hydraulic system components |
| 5. | Apply principles of hydraulic control to work practices performed by the trade |
| 6. | Apply troubleshooting principles to hydraulic systems |
| 7. | Remove, construct and install hydraulic conductors and connectors |
| 8. | Repair hydraulic components |
| 9. | Perform preventive maintenance on hydraulic systems |

50-435-724 Welding and Brazing for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course compares common welding processes and develops apprentice skills related to welding, cutting, heating and using oxy-gas. Welding with arc, MIG and TIG will be explored.  Common cutting and joining techniques will be compared. Industrial brazing techniques will be demonstrated.  Joint preparation, using hand and power tools, and working with low-temp and high-temp solders are examined. Welding safety and PPE requirements will be reinforced. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1 |
|  | Total Hours | 28 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Examine safe work practices to welding and brazing |
| 2. | Compare joint preparations for welding and brazing in an industrial setting |
| 3. | Apply heat related metallurgical concepts to welding and brazing |
| 4. | Compare different welding processes used in industrial plants |
| 5. | Use oxy-gas processes for heating, cutting and welding |
| 6. | Arc weld metal parts and pipe |
| 7. | Discover MIG welding techniques for metal parts and pipe |
| 8. | Discover TIG welding techniques for metal parts and pipe |
| 9. | Braze metals following industry accepted practices |

50-435-725 Valves, Packings, and Gaskets for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Course includes an examination of the various types of valves and their applications in industrial plant processes.  Apprentices will also compare gasket types, materials and their applications.  Valve packings will be compared and procedures for repacking valves examined.  Apprentices will build skills installing and repairing valves. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | .25 |
|  | Total Hours | 8 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Examine piping system valve types and their applications in an industrial setting. |
| 2. | Compare types of packings and gasket materials, and their applications. |
| 3. | Demonstrate the ability to repair and install valves. |

50-435-726 Pneumatics for Industrial Pipefitter Apprentices

# Course Outcome Summary

### Course Information

|  |  |  |
| --- | --- | --- |
|  | Description | Gain knowledge of the uses and applications of pneumatics required in the trade. Pneumatic systems, devices and components will be examined. Job duties and tasks related to safety, inspection, testing, maintenance and repair will be included. |
|  | Instructional Level | Technical Diploma |
|  | Total Credits | 1 |
|  | Total Hours | 36 |

Pre/Corequisites

|  |  |
| --- | --- |
| Prerequisite | 50-435-709 is suggested |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Relate principles of pneumatics to industrial equipment and processes |
| 2. | Interpret pneumatic schematic prints and diagrams |
| 3. | Compare the function of pneumatic system components |
| 4. | Service an Filter-Regulator-Lubricator (FRL) unit |
| 5. | Apply troubleshooting principles to pneumatic systems |
| 6. | Service pneumatic conductors and connectors |
| 7. | Repair pneumatic components |
| 8. | Perform preventive maintenance on pneumatic systems |

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. |
|  | Total Hours | 8 |

### 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 |