



## Level One

### **MODULE 02101-05 – INTRODUCTION TO THE PLUMBING PROFESSION**

1. Describe the history of the plumbing profession.
2. Identify the responsibilities of a person working in the construction industry.
3. State the personal characteristics of a professional.
4. Identify the stages of progress within the plumbing profession and its positive impact on society.

### **MODULE 02102-05 – PLUMBING SAFETY**

1. Describe the common unsafe acts and unsafe conditions that cause accidents.
2. Describe how to handle unsafe acts and unsafe conditions.
3. Explain how the cost of accidents and illnesses affects everyone on site.
4. Demonstrate the use and care of appropriate personal protective equipment.
5. Identify job-site hazardous work specific to plumbers.
6. Demonstrate the proper use of ladders.
7. Demonstrate how to maintain power tools safely.
8. Explain how to work safely in and around a trench.
9. Describe and demonstrate the lockout/tagout process.

### **MODULE 02103-05 – PLUMBING TOOLS**

1. Identify the basic hand and power tools used in the plumbing trade.
2. Demonstrate the proper use of plumbing tools.
3. Demonstrate the ability to know when and how to select the proper tool(s) for tasks.
4. Demonstrate the proper maintenance for caring for hand and power tools.
5. Demonstrate how to prepare a surface for tool use.
6. Describe the safety requirements for using plumbing tools.

### **MODULE 02104-05 – INTRODUCTION TO PLUMBING MATH**

1. Add, subtract, multiply, and divide whole numbers.
2. Add, subtract, multiply, and divide fractions.
3. Add, subtract, multiply, and divide decimals.
4. Convert decimals to percentages and percentages to decimals.
5. Convert fractions to decimals and decimals to fractions.
6. Explain what the metric system is and how it is important in the plumbing trade.
7. Square various numbers and take square roots of numbers, with and without a calculator.
8. Identify the parts of a fitting and use common pipe-measuring techniques.
9. Use fitting dimension tables to determine fitting allowances and thread makeup.
10. Calculate end-to-end measurements using fitting allowances and thread makeup.

## **MODULE 02105-05 – INTRODUCTION TO PLUMBING DRAWINGS**

1. Identify pictorial (isometric and oblique), schematic, and orthographic drawings, and discuss how different views are used to depict information about objects.
2. Identify the basic symbols used in schematic drawings of pipe assemblies.
3. Explain the types of drawings that may be included in a set of plumbing drawings and the relationship among the different drawings.
4. Interpret plumbing-related information from a set of plumbing drawings.
5. Sketch orthographic and schematic drawings.
6. Use an architect's scale to draw lines to scale and to measure lines drawn to scale.
7. Discuss how code requirements apply to certain drawings.

## **MODULE 02106-05 – PLASTIC PIPE AND FITTINGS**

1. Identify types of materials and schedules of plastic piping.
2. Identify proper and improper applications of plastic piping.
3. Identify types of fittings and valves used with plastic piping.
4. Identify and determine the kinds of hangers and supports needed for plastic piping.
5. Identify the various techniques used in hanging and supporting plastic piping.
6. Properly measure, cut, and join plastic piping.
7. Explain proper procedures for the handling, storage, and protection of plastic pipes.

## **MODULE 02107-05 – COPPER PIPE AND FITTINGS**

1. Identify the types of materials and schedules used with copper piping.
2. Identify the material properties, storage, and handling requirements of copper piping.
3. Identify the types of fittings and valves used with copper piping.
4. Identify the techniques used in hanging and supporting copper piping.
5. Properly measure, ream, cut, and join copper piping.
6. Identify the hazards and safety precautions associated with copper piping.

## **MODULE 02108-05 – CAST-IRON PIPE AND FITTINGS**

1. Recognize proper and improper applications of cast-iron piping.
2. Identify the material properties, storage, and handling requirements of cast iron piping.
3. Identify the types of materials and schedules used in cast-iron piping.
4. Identify the types of fittings used with cast-iron piping.
5. Identify the various techniques used in handling and supporting cast-iron piping.
6. Properly measure, cut, and join cast-iron piping.
7. Identify the hazards and safety precautions associated with cast-iron piping.

## **MODULE 02109-05 – CARBON STEEL PIPE AND FITTINGS**

1. Recognize proper applications of carbon steel piping.
2. Identify the material properties, storage, and handling requirements of carbon steel piping.
3. Identify the various techniques used in hanging and supporting carbon steel piping.
4. Properly measure, cut, groove, thread, and join carbon steel piping.

## **MODULE 02110-05 – CORRUGATED STAINLESS STEEL TUBING**

1. Identify the common manufacturers of corrugated stainless steel tubing.
2. Recognize proper and improper applications of corrugated stainless steel tubing.
3. Identify the various techniques used in hanging and supporting corrugated stainless steel tubing.
4. Explain how to properly measure, cut, join, and groove corrugated stainless steel tubing.
5. Identify the material properties, storage, and handling requirements of corrugated stainless steel tubing.

## **MODULE 02111-05 – FIXTURES AND FAUCETS**

1. Identify the basic types of materials used in the manufacture of plumbing fixtures.
2. Discuss common types of sinks, lavatories, and faucets.
3. Identify and discuss common types of bathtubs, bath-shower modules, shower stalls, and shower baths.
4. Discuss common types of toilets, urinals, and bidets.
5. Identify and describe common types of drinking fountains and water coolers.
6. Discuss common types of garbage disposals and domestic dishwashers.

## **MODULE 02112-05 – INTRODUCTION TO DRAIN, WASTE, AND VENT (DWV) SYSTEMS**

1. Explain how waste moves from a fixture through the drain system to the environment.
2. Identify the major components of a drainage system and describe their functions.
3. Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
4. Identify the various types of drain, waste, and vent (DWV) fittings and describe their applications.
5. Identify significant code and health issues, violations, and consequences related to DWV systems.

## **MODULE 02113-05 – INTRODUCTION TO WATER DISTRIBUTION SYSTEMS**

1. Describe the process in which water is distributed in municipal, residential, and private water systems.
2. Identify the major components of a water distribution system, and describe the function of each component.
3. Explain the relationships between components of a water distribution system.

## Level Two

### MODULE 02201-05 – PLUMBING MATH TWO

1. Calculate 11¼-, 22½-, 45-, 60-, and 72-degree offsets.
2. Check the squareness of a corner using the 3-4-5 ratio.
3. Lay out square corners using the 3-4-5 ratio.
4. Use a framing square to find the travel.
5. Use a folding rule to find given angles.
6. Calculate 11¼-, 22½-, 45-, 60-, and 72-degree parallel offsets.
7. Calculate rolling offsets using constants for the angled fittings.
8. Calculate rolling offsets using a framing square.
9. Calculate 45-degree offsets around obstructions.

### MODULE 02202-05 – READING COMMERCIAL DRAWINGS

1. Interpret information from given site plans.
2. Verify dimensions shown on drawings and generate a request for information (RFI) when you find discrepancies.
3. Locate plumbing entry points, walls, and chases.
4. Create an isometric drawing.
5. Do a material takeoff for drainage, waste, and vent (DWV) and water supply systems from information shown on drawings.
6. Use approved submittal data, floor plans, and architectural details to lay out fixture rough-ins, to develop estimates, and to establish general fixture locations.
7. Recognize the need for coordination and shop drawings.

### MODULE 02203-05 – HANGERS, SUPPORTS, STRUCTURAL PENETRATIONS, AND FIRE STOPPING

1. Identify the hangers and supports used to install DWV and water supply systems and explain their applications.
2. Install pipe hangers and supports correctly according to local applicable codes and manufacturer's specifications.
3. Modify structural members using the appropriate tools without weakening the structure.
4. Identify and install common types of fire-stopping materials used in penetrations through fire-rated structural members, walls, floors, and ceilings.

### MODULE 02204-05 – INSTALLING AND TESTING DWV PIPING

1. Develop a material takeoff from a given set of plans.
2. Use plans and fixture rough-in sheets to determine location of fixtures and route of the plumbing.
3. Install a building sewer and a building drain.
4. Locate the stack within the structure.
5. Install a DWV system using appropriate hangers and correct grade or slope.
6. Modify structural members using the appropriate tools without weakening the structure.
7. Test a DWV system.

## **MODULE 02205-05 – INSTALLING ROOF, FLOOR, AND AREA DRAINS**

1. Use a surveyor's level or transit level to set the elevation of a floor or area drain.
2. Install a roof drain, a floor drain, and an area drain.
3. Install waterproof membranes and flashing.

## **MODULE 02206-05 – TYPES OF VALVES**

1. Identify the basic types of valves.
2. Describe the differences in pressure ratings for valves.
3. Demonstrate the ability to service various types of valves.

## **MODULE 02207-05 – INSTALLING AND TESTING WATER SUPPLY PIPING**

1. Develop a material takeoff from a given set of plans.
2. Use plans and fixture rough-in sheets to determine the location of fixtures and the route of the water supply piping.
3. Locate and size a water meter.
4. Locate a water heater, water softener, and hose bibbs.
5. Install a water distribution system using appropriate hangers.
6. Modify structural members, using the appropriate tools, without weakening the structure.
7. Correctly size and install a water service line, including backflow prevention.
8. Test a water supply system.

## **MODULE 02208-05 – INSTALLING FIXTURES, VALVES, AND FAUCETS**

1. Describe the general procedures you should follow before installing any fixture.
2. Install bathtubs, shower stalls, valves, and faucets.
3. Install water closets and urinals.
4. Install lavatories, sinks, and pop-up drains.
5. Protect fixtures.

## **MODULE 02209-05 – INTRODUCTION TO ELECTRICITY**

1. State and demonstrate the safety precautions that must be followed when working on electrical equipment.
2. State how electrical power is generated and distributed.
3. Describe how voltage, current, resistance, and power are related.
4. Use Ohm's law to calculate the current, voltage, and resistance in a circuit.
5. Use the power formula to calculate how much power is consumed by a circuit.
6. Describe the differences between series and parallel circuits.
7. Recognize and describe the purpose and operation of the various electrical components used in plumbing equipment.
8. Make voltage, current, and resistance measurements using electrical test equipment. Determine the positioning of leads. Test a fuse for continuity.
9. Explain and understand electrical symbols.

## **MODULE 02210-05 – INSTALLING WATER HEATERS**

1. Describe the basic operation of water heaters.
2. Identify and explain the functions of the basic components of water heaters.
3. Install an electric water heater.
4. Install a gas water heater.
5. Describe the safety hazards associated with water heaters.

## **MODULE 02211-05 – FUEL GAS SYSTEMS**

1. Identify the major components of the following fuel systems and describe the function of each component:
  - Natural gas
  - LP gas (liquefied petroleum gas)
  - Fuel oil
2. Identify the physical properties of each type of fuel.
3. Identify the safety precautions and potential hazards associated with each type of fuel and system.
4. Connect appliances to the fuel gas system properly.
5. Apply local codes to various fuel gas systems.
6. Design, size, purge, and test fuel gas systems.
7. Demonstrate familiarity with applicable fuel gas codes.

## **MODULE 02212-05 – SERVICING OF FIXTURES, VALVES, AND FAUCETS**

1. Identify common repair and maintenance requirements for fixtures, valves, and faucets.
2. Identify the proper procedures for repairing and maintaining fixtures, valves, and faucets.

# Level Three

## MODULE 02301-06 – APPLIED MATH

1. Identify the weights and measures used in the English and metric systems.
2. Describe how to calculate area and volume.
3. Describe the practical applications of area and volume calculations in plumbing.
4. Explain the concepts of temperature and pressure and how they apply to plumbing installations.
5. Explain the functions and applications of six simple machines: inclined plane, lever, pulley, wedge, screw, and wheel and axle.

## MODULE 02302-06 – SIZING WATER SUPPLY PIPING

1. Calculate pressure drops in a water supply system.
2. Size pipe for different acceptable flow rates.
3. Explain the difference between and advantages of a continuous-flow system and an intermittent-flow system.
4. Identify fixtures with high flow rates.
5. Explain how friction and flow impact a water supply system.
6. Lay out a water supply system.
7. Calculate developed lengths of branches for a given water supply system.
8. Calculate flow rates for high flow rate fixtures.

## MODULE 02303-06 – POTABLE WATER TREATMENT

1. Flush out visible contaminants from plumbing systems.
2. Disinfect a potable water plumbing system.
3. Identify common water problems and identify the basic equipment to solve them.
4. Practice methods used to soften water.
5. Analyze and measure water-conditioning problems.
6. Install water-conditioning equipment.

## MODULE 02304-06 – BACKFLOW PREVENTERS

1. Explain the principle of backflow due to back siphonage or back pressure.
2. Explain the hazards of backflow and demonstrate the importance of backflow preventers.
3. Identify and explain the applications of the six basic backflow prevention devices.
4. Install common types of backflow preventers.

## MODULE 02305-06 – TYPES OF VENTING

1. Describe the scientific principles of venting.
2. Design vent systems according to local code requirements.
3. Sketch the different types of vents.
4. Construct given vent configurations.
5. Install the different types of vents correctly.
6. Select correct fittings for vents.

## **MODULE 02306-06 – SIZING DWV AND STORM SYSTEMS**

1. Calculate drainage fixture units for waste systems.
2. Size building drains and sewers.
3. Size a vent system.
4. Identify and size special kinds of waste and vent systems.
5. Size roof drainage systems.

## **MODULE 02307-06 – SEWAGE PUMPS AND SUMP PUMPS**

1. Explain the functions, components, and operation of sewage and sump pumps.
2. Size a storm water sump by calculating the runoff from paved and unpaved land surfaces.
3. Size a sewage sump by calculating the sewage flow from a structure.
4. Install and adjust sensors, switches, and alarms in sewage and sump pumps.
5. Troubleshoot and repair sewage and sump pumps.
6. Using a detailed drawing, identify system components.
7. Install a sump pump.
8. Find local applicable code requirements for installation and use.

## **MODULE 02308-06 – CORROSIVE-RESISTANT WASTE PIPING**

1. Discuss corrosive wastes and explain where they are found.
2. Discuss common types of materials used for corrosive-resistant waste piping.
3. Explain the methods of joining corrosive-resistant waste piping.
4. Discuss safety issues and hazard communications.

## **MODULE 02309-06 – COMPRESSED AIR**

1. Identify components of compressed air systems.
2. Discuss the installation of compressed air systems and their components and accessories.
3. Describe the applications of compressed air systems.
4. Identify the different methods of conditioning compressed air.
5. Identify the types, functions, and capacities of different air compressor systems.
6. Identify the safety issues related to compressed air systems.
7. Install a basic compressed air system.



# Level Four

## MODULE 02401-06 – BUSINESS PRINCIPLES FOR PLUMBERS

1. Identify and interpret a balance sheet and a profit and loss statement.
2. Prepare a material takeoff as part of an estimate.
3. Identify the business activities that affect profit and loss.

## MODULE 02402-06 – INTRODUCTORY SKILLS FOR THE CREW LEADER

### CHAPTER ONE – ORIENTATION TO THE JOB

1. Discuss the history, trends, and economic conditions of the construction industry.
2. Describe how workers' values have changed over the years.
3. Explain the importance of training for construction industry personnel.
4. List the new technologies available, and discuss how they are helpful to the construction industry.
5. Identify the gender and minority issues associated with a changing workforce.
6. Describe what employers can do to prevent workplace discrimination.
7. Describe the four major categories of construction projects.
8. Differentiate between formal and informal organizations.
9. Describe the difference between authority and responsibility.
10. Explain the purpose of job descriptions and what they should include.
11. Distinguish between company policies and procedures.

### CHAPTER TWO – LEADERSHIP SKILLS

1. Explain the role of a crew leader.
2. List the characteristics of effective leaders.
3. Be able to discuss the importance of ethics in a supervisor's role.
4. Identify the three styles of leadership.
5. Describe the forms of communication.
6. Explain the four parts of verbal communication.
7. Demonstrate the importance of active listening.
8. Illustrate how to overcome the barriers to communication.
9. List some ways that supervisors can motivate their employees.
10. Explain the importance of delegating and implementing policies and procedures.
11. Differentiate between problem solving and decision making.

## **CHAPTER THREE – SAFETY**

1. Demonstrate an understanding of the importance of safety.
2. Give examples of direct and indirect costs of workplace accidents.
3. Identify safety hazards of the construction industry.
4. Explain the purpose of the Occupational Safety and Health Act (OSHA).
5. Discuss OSHA inspection programs.
6. Identify the key points of a safety program.
7. List the steps to train employees on how to perform new tasks safely.
8. identify a supervisor’s safety responsibilities.
9. Explain the importance of having employees trained in first aid and Cardio-Pulmonary Resuscitation (CPR) on the job site.
10. Describe the signals of substance abuse.
11. List the essential parts of an accident investigation.
12. Describe the ways to maintain employee interest in safety.

## **CHAPTER FOUR – PROJECT CONTROL**

1. Describe the three phases of a construction project.
2. Define the three types of project delivery systems.
3. Define planning and describe what it involves.
4. Explain why it is important to plan.
5. Describe the two major stages of planning.
6. Explain the importance of documenting one’s work.
7. Describe the estimating process.
8. Explain how schedules are developed and used.
9. Identify the two most common schedules.
10. Explain short-interval production scheduling (SIPS).
11. Describe the different costs associated with building a job.
12. Explain the supervisor’s role in controlling costs.
13. Illustrate how to control the main resources of a job: materials, tools, equipment, and labor.
14. Define the terms production and productivity and explain why they are important.

## **MODULE 02403-06 – WATER PRESSURE BOOSTER AND RECIRCULATION SYSTEMS**

1. Explain the complete water pressure booster system and its components.
2. Explain the maintenance and basic troubleshooting processes for water pressure booster systems.
3. Describe the characteristics of the different recirculation systems.
4. Identify the basic components of a recirculation system.
5. Identify the location of various components within a recirculation system.
6. Install the basic components of a recirculation system.
7. Use the local plumbing code to find and cite requirements for recirculation systems.

## **MODULE 02404-06 – INDIRECT AND SPECIAL WASTE**

1. Identify and install an indirect waste system.
2. Identify and install an interceptor.

## **MODULE 02405-06 – HYDRONIC AND SOLAR HEATING SYSTEMS**

1. Describe the basic types of hydronic and solar heating systems and their components.
2. Describe the procedures for rough-in, installation, and testing of the piping in hydronic or solar heating systems.
3. Lay out and build a hydronic or a solar heating system.

## **MODULE 02406-06 – CODES**

1. Describe the model and local plumbing codes and their purposes.
2. Explain the procedure for modifying plumbing codes.
3. Use the local plumbing code to find and cite references.

## **MODULE 02407-06 – SERVICING PIPING SYSTEMS, FIXTURES, AND APPLIANCES**

1. Diagnose and address problems with water supply and quality.
2. Explain different types of corrosion and their effects on pipes.
3. Diagnose and solve fixture and appliance problems.
4. Troubleshoot and repair water heater problems.
5. Troubleshoot and repair DWV problems.

## **MODULE 02408-06 – PRIVATE WATER SUPPLY WELL SYSTEMS**

1. Identify the qualities of a good well.
2. Explain the operation of various types of pumps and well components.
3. Explain the installation of private water supply well system components.
4. Assemble and disassemble given components of private water supply well systems.

## **MODULE 02409-06 – PRIVATE WASTE DISPOSAL SYSTEMS**

1. Describe the types of private waste disposal systems.
2. Discuss the installation and maintenance of private waste disposal systems.
3. Discuss the local code requirements for private waste disposal systems.

## **MODULE 02410-06 – SWIMMING POOLS AND HOT TUBS**

1. Identify swimming pool and hot tub systems and their components.
2. Calculate the volume and turnover rate of a pool using your local code.
3. Explain water quality issues related to swimming pools and hot tubs.
4. Identify and explain backflow prevention requirements for swimming pools and hot tubs according to local procedures and codes.

## **MODULE 02411-06 – PLUMBING FOR MOBILE HOME AND TRAVEL TRAILER PARKS**

1. Describe the proper location, layout, and procedures for connecting sewer and supply lines for a mobile home park.
2. Explain code issues that are specific to mobile homes.
3. Describe a travel trailer park and its plumbing needs.
4. Describe a sanitary dump system.