

# NCCER PLUMBING CURRICULUM

*The following is a brief description of subjects contained in all four levels of the plumbing program as well as the core curricula that all level one students are expected to pass.*

## CORE CURRICULUM

*The core curricula provides a basic introduction to construction work for all crafts. The core curriculum consists of 9 modules taught through in-person instruction and supplemented by online programming.*

### **Basic Safety**

Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common personal protective equipment (PPE), including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces, is also provided.

### **Introduction to Construction Math**

Reviews basic math skills related to the construction trades and demonstrates how they apply to the trades. Covers multiple systems of measurement, decimals, fractions, and basic geometry.

### **Introduction to Hand Tools**

Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Proper hand tool maintenance is also presented.

### **Introduction to Power Tools**

Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as on safe-handling guidelines and basic maintenance.

### **Introduction to Construction Drawings**

Introduces the basic elements of construction drawings. The common components of drawings are presented, as well as the most common drawing types. The use of drawing scales and how to measure drawings is also covered.

### **Basic Rigging**

Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

### **Basic Communication Skills**

Provides good techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and covers proper techniques to use in a variety of different written communication formats.

### **Basic Employability Skills**

Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills for the construction industry. Also identifies and discusses positive social skills and their value in the workplace.

### **Introduction to Material Handling**

Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Common material-handling equipment is also introduced.

## **PLUMBING – LEVEL ONE**

### **Introduction to the Plumbing Profession**

Introduces the trainee to many career options available in today's plumbing profession. Provides a history of plumbing and also discusses the current technology, industries, and associations that make up the modern plumbing profession. Also reviews human relations and safety skills.

### **Plumbing Safety**

Discusses the causes of accidents and their consequences and repercussions in terms of delays, increased expenses, injury, and loss of life. Reviews the types and proper use of personal protective equipment (PPE). Instructs trainees in the use of critical safety information conveyed in hazard communication (HazCom), safety signs, signals, lockout/tagout, and emergency response. Covers confined-space safety, and reviews safety issues related to hand and power tools.

### **Tools of the Plumbing Trade**

Instructs trainees in the care and use of the different types of hand and power tools they will use on the job. Gives trainees the information they need to select the appropriate tools for different tasks, and reviews tool maintenance and safety issues.

### **Introduction to Plumbing Math**

Review basic math concepts, such as whole numbers, fractions, decimals, and squares, and demonstrates how they apply to on-the-job situations. Teaches trainees how to measure pipe using fitting tables and framing squares and how to calculate 45-degree offsets.

### **Introduction to Plumbing Drawings**

Introduces trainees to the different types of plumbing drawings they will encounter on the job, and discusses how to interpret and apply them when laying out and installing plumbing systems. Discusses the symbols used in plumbing and mechanical drawings and reviews isometric, oblique, orthographic, as well as schematic drawings. Requires trainees to render plumbing drawings and to recognize how code requirements apply to plumbing drawings.

### **Plastic Pipe and Fittings**

Introduces trainees to the different types of plastic pipe and fittings used in plumbing applications, including ABS, PVC, CPVC, PE, PEX, and PB. Describes how to measure, cut, join, and support plastic pipe according to manufacturer's instructions and applicable codes. Also discusses pressure testing of plastic pipe once installed.

### **Copper Pipe and Fittings**

Discusses sizing, labeling, and applications of copper pipe and fittings, and reviews the types of valves that can be used on copper pipe systems. Explains proper methods for cutting, joining, and installing copper pipe. Also addresses insulation, pressure testing, seismic codes, and handling and storage requirements.

### **Cast-Iron Pipe and Fittings**

Introduces trainees to hub-and-spigot and no-hub cast-iron pipe and fittings and their applications in the DWV systems. Reviews material properties, storage and handling requirements, and fittings and valves. Covers joining methods, installation, and testing.

### **Carbon Steel Pipe and Fittings**

Discusses threading, labeling, and sizing of steel pipe, and reviews the differences between domestic and imported pipe. Covers the proper techniques for measuring, cutting, threading, joining, and hanging steel pipe. Also reviews corrugated stainless steel tubing.

### **Introduction to Plumbing Fixtures**

Discusses the proper applications of code-approved fixtures in plumbing installations. Reviews the different types of fixtures and faucets and the materials used in them. Also covers storage, handling, and code requirements.

### **Introduction to Drain, Waste, and Vent (DWV) Systems**

Explains how DWV systems remove waste safely and effectively. Discusses how system components, such as pipe, drains, traps, and vents work. Reviews drain and vent sizing, grade, and waste treatment. Also discusses how building sewers and sewer drains connect the DWV system to the public sewer system.

### **Introduction to Water Distribution Systems**

Identifies the major components of water distribution systems and describes their functions. Reviews water sources and treatment methods, and covers supply and distribution for the different types of the systems that trainees will install on the job.

## **PLUMBING – LEVEL TWO**

### **Plumbing Math Two**

Explains the Pythagorean theorem and reviews methods for laying out square corners. Discusses the techniques used to calculate simple and rolling offsets, as well as offsets on parallel runs of pipe.

### **Reading Commercial Drawings**

Explains how to identify and interpret civil, architectural, structural, HVAC/mechanical, plumbing, and electrical drawings. Discusses how to ensure accurate dimensions, generate RFIs, and locate plumbing entry points, as well as how to establish piping routes and fixture locations. Isometric drawings, material takeoffs, approved submittal data, and Building Information Management (BIM).

### **Structural Penetrations, Insulation, and Fire-Stopping**

Introduces methods for adjusting structural members, insulating pipe, and installing fire-stopping. Covers reinforcement techniques for modified structural members; how to measure, cut and install fiberglass and flexible foam insulation; and how to identify walls, floors, and ceilings that require fire-stopping.

### **Installing and Testing DWV Piping**

Explains how to locate, install, connect, and test a complete drain, waste, and vent (DWV) system. Discusses how to develop material takeoffs, set up and use levels, locate building sewers and building drains, locate fixtures, and test a DWV system.

### **Installing Roof, Floor, and Area Drains**

Covers the proper techniques for locating, installing, and connecting roof, floor, and area drains and floor sinks according to code. Also discusses waterproof membranes and flashing, drain components, shower pans, trap primers, and proper drain applications.

### **Installing and Testing Water Supply Piping**

Explores the proper techniques for locating, installing, and testing complete water service and distribution systems, including meters, water heaters, water softeners, and hose bibbs. Introduces trainees to basic

backflow prevention and water hammer prevention, and discusses the installation of shower and tub valves, ice maker and washing machine boxes, and pipe stubouts and supports.

### **Types of Valves**

Reviews types of valves, their components, and applications. Also covers valve servicing.

### **Installing Fixtures and Valves**

Covers the installation of basic plumbing fixtures, including bathtubs, shower stalls, lavatories, sinks, water closets, and urinals. Reviews the installation of associated valves, faucets, and components. Also discusses how to connect appliances such as dishwashers, food-waste disposers, refrigerators and ice makers, and washing machines.

### **Installing Water Heaters**

Discusses gas-fired, electric, tankless, heat pump, and indirect water heaters, components, and applications. Reviews proper installation and testing techniques and covers the latest code requirements for water heaters.

### **Basic Electricity**

Introduces electrical safety and the principles of electricity, including voltage, current, resistance, and power. Includes important electrical formulas, circuitry, and common plumbing-related electrical applications.

### **Fuel Gas and Fuel Oil Systems**

Introduces techniques for safe handling of natural gas, liquefied petroleum gas, and fuel oil. Reviews fuel gas and fuel oil safety precautions and potential hazards, applications, systems installation, and testing.

## **PLUMBING – LEVEL THREE**

### **Applied Math**

Reviews math concepts, including weights and measures, area and volume, temperature, pressure, and force. Also describes the six simple machines: inclined planes, levers, pulleys, wedges, screws, and wheels and axles.

### **Sizing and Protecting the Water Supply System**

Teaches techniques for sizing water supply systems, including calculating system requirements and demand, developed lengths, and pressure drops. Reviews the factors that can reduce efficiency of water supply piping. Introduces different backflow prevention devices and explains how they work, where they are used, and how they are installed in water supply systems.

### **Potable Water Supply Treatment**

Explains how to disinfect, filter, and soften water supply systems. Discusses how to troubleshoot water supply problems, flush out visible contaminants from a plumbing system, and disinfect a potable water plumbing system.

### **Types of Venting**

Reviews the different types of vents that can be installed in a DWV system and how they work. Also teaches design and installation techniques.

### **Sizing DWV and Storm Systems**

Explains how to calculate drainage fixture units for waste systems. Reviews how to size drain, waste, and vent (DWV) systems; storm drainage systems; and roof storage and drainage systems.

### **Sewage Pumps and Sump Pumps**

Discusses the installation, diagnosis, and repair of pumps, controls, and sumps in sewage and storm water removal systems.

### **Corrosive-Resistant Waste Piping**

Discusses corrosive wastes and reviews related safety issues and hazard communications. Discusses how to determine when corrosive-resistant waste piping needs to be installed, as well as how to correctly select and properly connect different types of piping.

### **Compressed Air**

Explains the principles of compressed air systems and describes their components and accessories. Reviews installation and periodic servicing of air compressor systems.

### **Service Plumbing**

Covers the troubleshooting and repair of fixtures, valves, and faucets in accordance with code and safety guidelines. Explains how to diagnose and repair water supply and drainage piping, water heaters, and other appliances and fixtures. Describes the effects of corrosion, freezing, and hard water on plumbing systems.

## **PLUMBING – LEVEL FOUR**

### **Business Principles for Plumbers**

Introduces concepts and practices that are essential for competitive, successful plumbing businesses. Covers basic business accounting and project estimating, as well as techniques for cost control and task organization.

### **Introductory Skills for the Crew Leader**

Introduces trainees to the knowledge and skills required for team leadership. Covers practical information about today's construction industry; basic leadership skills; safety responsibilities of a supervisor; and a detailed survey of project control techniques.

### **Water Pressure Booster and Recirculation**

Builds on trainees' previous experience with the pumps, storage tanks, controls, and pipes and fittings by explaining how to assemble those components into systems that boost water pressure and provide hot water.

### **Indirect and Special Waste**

Explains the code requirements and installation procedures for systems that protect against contamination from indirect and special wastes.

### **Hydronic and Solar Heating Systems**

Introduces basic hydronic and solar heating systems and their components. Reviews hydronic and solar heating system layout and installation. Also discusses methods inhibiting corrosion in solar heating systems.

### **Codes**

Discusses the different codes used by plumbers across the country and explains how those codes are written, adopted, modified, and implemented.

### **Servicing Piping Systems, Fixtures, and Appliances**

Explains how to diagnose and repair water supply and drainage piping, water heaters, and other appliances and fixtures. Describe the effects of corrosion, freezing, and hard water on plumbing systems.

### **Private Water Supply Well Systems**

Explains the operation of pumps and well components. Review the qualities of good wells and how to assemble and disassemble pumps and components.

### **Private Waste Disposal Systems**

Describes the types of private sewage systems, discusses the maintenance and replacement of these systems, and explains how to determine the local code requirements for these systems. Covers percolation tests and sewage system planning and layout.

### **Swimming Pools and Hot Tubs**

Introduces plumbing systems in swimming pools, hot tubs, and spas. Trainees will learn how to install and troubleshoot water supply systems and drains.

### **Plumbing for Mobile Homes and Travel Trailers**

Describes the location and layout of plumbing systems for mobile home and travel trailer parks. Explains how to design and lay out a system, how to connect water and sewer lines to a mobile home, and how to estimate materials and costs for the park.



## **THE NCCER PROGRAM**

NCCER (National Center for Construction Education & Research) maintains a portable and widely recognized credentialing and certification system through its Registry. This Registry assures portability of skills by providing transcripts, certificates and wallet cards to students who successfully complete the NCCER Curriculum through an accredited sponsor. These valuable industry credentials benefit students as they seek employment and build their careers. To be entered in NCCER's Automated National Registry, you must complete and sign a Registration and Release Form. This form will be completed on the first night of class in each semester and requires your Social Security Number and your signature.

NCCER has developed a consistent program of accreditation, instructor certification, standardized curriculum, registry, assessment and certification, which are key elements in developing a skilled workforce of craft professionals.

NCCER is the accrediting body for the industry and establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process ensures that students receive quality training based on uniform standards and criteria.

The NCCER Curriculum, in cooperation with publishing partner Pearson, has developed and publishes a world-class curriculum created by "Subject Matter Experts" representing contractors and schools from around the country. "Subject Matter Experts" ensure exceptional training programs that meet or exceed national industry standards. The NCCER Curriculum, which includes more than 60 craft areas, is taught worldwide by contractors, associations, construction users, and secondary and post-secondary schools. In addition, multiple

State Departments of Education recognize the curriculum along with the U.S. Department of Labor - Office of Apprenticeship.