# Scope & Sequence

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| Course Name: Plumbing Technology I **TSDS PEIMS Code:**  13006000 | | | **Course Credit:** 1.0  **Course Requirements:** Grade Placement 10-12.  **Prerequisites:** None.  **Recommended Prerequisites:** Principles of Architecture, Principles of Construction, or Construction Technology I. |
| **Course Description:** In Plumbing Technology, I, students will gain knowledge and skills needed to enter the industry as a plumbing apprentice, building maintenance technician, or supervisor or prepare for a postsecondary degree in construction management, architecture, or engineering. Students will acquire knowledge and skills in industry workplace basics and employer/customer expectations, including how to use a plumbing code book; how to identify and use power and hand tools; how to be safe on the jobsite and when using hand and power tools; how to apply basic plumbing mathematics and plumbing drawing; and how to identify, fit, and use plastic, copper, cast iron, carbon steel, and corrugated stainless steel pipe. In addition, students will be introduced to gas, drainage, and water supply systems and continue their knowledge of workplace basics and green technologies. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 175 Periods  7,875 Minutes.  131.25 Hours.\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.61 (c) Knowledge and skills** | |
| **Unit 1: Professional Standards and Employability Skills**  Students will identify employment and entrepreneurship opportunities in the field of plumbing. Students will be encouraged to discover and use resources to further develop leadership and employability skills. Students will discuss and demonstrate appropriate and effective group participation, leadership, teamwork, and good citizenship in this and in all units as they develop personal and career goals and increase their interpersonal skills. Students will explore and discuss industry certification opportunities | 15 periods  675 minutes | (1) The student is expected to demonstrate professional standards/employability skills as required by business and industry. The student is expected to:  (A) demonstrate oral communication, written communication, leadership skills, teamwork skills, conflict management, customer service, professionalism, work ethic, integrity, multitasking, initiative, creativity, and how to follow directions;  (B) understand the importance of showing up to work on time, maintaining appropriate personal appearance, working as a team member, and being honest;  (C) demonstrate an understanding of the responsibilities of driving a company vehicle;  (D) demonstrate an understanding of why and how listening is a critical life skill; and  (E) demonstrate an understanding of the importance of being a self-starter and of increasing one's knowledge and skills in a chosen career field.  (3) The student understands and demonstrates what employer and customer expectations are and is familiar with industry workplace basics and their importance. The student is expected to:  (A) identify job opportunities and their accompanying job duties such as a plumber, building maintenance technician or supervisor, manager, and mechanical engineer;  (B) research careers along with the education, job skills, and experience required to achieve career goals;  (C) identify the industries and associations that make up the modern plumbing profession;  (D) demonstrate how to properly treat company and customer property;  (F) understand the importance of using industry standards and techniques for the job. | |
| **Unit 2: Health, Safety and Accidents**  Students will discuss, describe, and demonstrate employers’ expectations regarding safe and appropriate work habits, ethical conduct, and legal responsibilities in the workplace. Students will participate as a class and/or in small groups in activities to model, present, and demonstrate technical knowledge and health and safety scenarios, regulations, and safety equipment in the workplace, as well as an understanding of how human factors affect health, safety, and profitability. Multiple opportunities for students to learn and demonstrate their knowledge of personal responsibility, the function, application, and safe use of tools and equipment, and the proper handling and disposal of environmentally hazardous materials will be provided. | 12 periods  540 minutes | (2) The student understands the causes of accidents and their consequences and repercussions in terms of delays, increased expenses, injury, and loss of life. The student is expected to:  (A) describe the common unsafe acts and conditions that cause accidents;  (B) describe how to handle unsafe acts and conditions;  (C) explain the impact and cost of accidents and illnesses;  (D) demonstrate the use and care of appropriate personal protective equipment;  (E) identify job-site hazards specific to plumbers;  (F) demonstrate the proper use of ladders;  (G) explain how to work around a trench;  (H) describe and demonstrate the lockout/tagout process; and  (I) understand the purpose of material safety data sheets (MSDS) and their importance to job-site and personal safety.  (3) The student understands and demonstrates what employer and customer expectations are and is familiar with industry workplace basics and their importance. The student is expected to:  (E) understand the importance of keeping the work area clean and how that applies to job safety; | |
| **Unit 3: Math Concepts and Applications**  Students will apply math concepts such as whole numbers, fractions, decimals. Metric system, and squared numbers to specific tasks. Students will be given multiple opportunities to describe, demonstrate and apply relevant problem-solving, reading, writing, and mathematical skills in-context as they read and interpret installation and repair information, technical bulletins, specifications, schematics, and parts catalogs. | 12 periods  540 minutes | (6) The student applies mathematical concepts to whole numbers, fractions, decimals, and squared numbers and examines how these concepts apply to specific situations. The student is expected to:  (A) add, subtract, multiply, and divide whole numbers, fractions, and decimals;  (B) convert fractions to decimals and decimals to fractions;  (C) demonstrate mathematical competency in the metric system and how the metric system is used in the plumbing industry;  (D) square various numbers and determine the square roots of numbers with and without a calculator;  (E) identify and demonstrate the parts of a plumbing fitting and use common pipe-measuring techniques;  (F) use fitting dimensions tables to determine fitting allowances and thread makeup; and  (G) demonstrate how to measure end-to-end, center-to-center, and end-to-center measurements using fitting allowances and thread makeup. | |
| **Unit 4: Proper Use and Care of Tools and Equipment**  Students will be able to identify and explain the safe use of tools and equipment used on plumbing projects. Students will be expected to select the appropriate tool for the job, properly care of the tools and equipment, and describe the safety requirements as related to each plumbing tasks.  . | 10 periods  450 minutes | (5) The student selects and safely uses different types of hand and power tools related to a specific task. The student is expected to:  (A) identify the hand and power tools used in the plumbing industry;  (B) demonstrate the proper use of hand and power plumbing tools;  (C) demonstrate the ability to know when and how to select the proper tools for tasks;  (D) demonstrate proper maintenance and care for hand and power tools;  (E) demonstrate how to prepare a surface for tool use;  (F) describe the safety requirements for using plumbing tools; and  (G) identify and demonstrate how to read and use various rulers and measuring tools. | |
| **Unit 5: Blueprint and Plumbing Drawings**  Students will expand their understanding of blueprint reading, building codes and standards, architectural terms and views, and symbols used in schematic drawings of pipe assemblies. Students will continue to learn and demonstrate their knowledge of plumbing drawings in-context with their unit activities included in lay out and install of plumbing systems. | 20 periods  900 minutes | (7) The student learns the various types of drawings used in the plumbing industry to lay out and install plumbing systems. The student is expected to:  (A) use current architectural technology to identify pictorial, isometric and oblique, schematic, and orthographic drawings and discuss how different views are used to depict information about objects;  (B) identify the basic symbols used in schematic drawings of pipe assemblies;  (C) explain the types of drawings that may be included in a set of plumbing drawings and the relationship among the different drawings;  (D) interpret plumbing-related information from a set of drawings;  (E) demonstrate how to sketch orthographic drawings;  (F) demonstrate the use of an architect's scale to draw lines to scale and to measure lines drawn to scale; and  (G) explain how code requirements apply to certain  14) The student identifies and draws hot and cold water lines on a floor plan using an isometric drawing. The student is expected to:  (A) identify hot and cold water lines and their symbols on a floor plan;  (B) demonstrate how to draw hot and cold water lines on a floor plan using an isometric drawing; and  (C) demonstrate how to properly size a residential drawings hot and cold water system. | |
| **Unit 6: Drain, Waste and Vent Systems**  Students will learn the purpose, major components, and functions of the drain waste and vent system. Students will have opportunities to discuss the diverse types of traps and their positive and negative aspects. Students will expand their knowledge of drain, waste and vent system through multiple opportunities for “hands-on” presentations, discussions, and demonstrations. | 20 periods  900 minutes | (12) The student understands the way drain, waste, and vent systems remove waste safely. The student understands how pipes, drains, traps, and vents work and the different types of materials used for drain waste and vent (DWV) piping. The student is expected to:  (A) explain how waste moves from a fixture through the drain system to the public or private sewer system;  (B) identify the major components of a drainage system and describe their functions;  (C) identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals;  (D) identify the various types of drain, waste, and vent fittings and describe their applications;  (E) identify significant code and health issues, violations, and consequences related to drain, waste, and vent systems;  (F) identify DWV symbols and lines on an isometric drawing and a floor plan;  (G) demonstrate how to draw an isometric DWV system to make a materials list;  (H) recognize and explain the use of different pipe and fitting materials used for DWV piping and how they are assembled; and  (I) understand how code requirements apply to DWV systems.  . | |
| **Unit 7: Pipes and Fittings**  Students will be introduced to the various types of pipe and fittings used in plumbing installations. Students will expand their knowledge of the pros and cons and proper usage of each type of pipe—plastic, copper, and carbon steel and the appropriate fittings for each. Students will participate in class discussions, “hands on” activities and class projects to help them understand importance in plumbing technology. | 32 periods  1,440 minutes | (8) The student learns the types and schedules of plastic pipe and fittings used in plumbing applications, including acrylonitrile butadiene styrene or ABS, polyvinyl chloride or PVC, chlorinated polyvinyl chloride or CPVC, polyethylene or Poly pipe, crosslinked polyethylene or PEX, and polybutylene. The student is expected to:  (A) identify types of materials and schedules of plastic piping;  (B) identify proper and improper applications of plastic piping;  (C) identify types of fittings and valves used with plastic fittings;  (D) identify and determine the kinds of hangers and supports needed for plastic piping;  (E) identify the various techniques used in hanging and supporting plastic piping;  (F) demonstrate how to measure, cut, and join the different types of plastic piping;  (G) explain proper procedures for the handling, storage, and protection of plastic pipes; and  (H) explain how code requirements apply to different types of plastic pipe.  (9) The student understands the applications of copper pipe and fittings, the types of valves that can be used on copper pipe systems, and the methods for cutting, reaming, joining, and installing copper tubing. The student is expected to:  (A) identify the different types of copper tubing;  (B) identify the material properties and storage and handling requirements of copper tubing;  (C) identify the types of fittings and valves used with copper tubing;  (D) identify the various techniques used in hanging and supporting copper tubing;  (E) demonstrate, using industry standards, how to safely solder copper tubing using different heat sources;  (F) demonstrate how to measure, ream, and cut copper piping;  (G) identify the hazards and safety precautions associated with copper piping; and  (H) explain how code requirements apply to copper tubing.  (10) The student measures, cuts, threads, reams, joins, and hangs carbon steel pipe and becomes familiar with labeling and sizing carbon steel pipe. The student is expected to:  (A) recognize proper applications of carbon steel piping;  (B) identify the material properties, storage, and handling requirements of carbon steel piping;  (C) identify the various techniques used in hanging and supporting carbon steel piping;  (D) demonstrate how to measure, cut, ream, thread, and join carbon steel piping; and  (E) explain how code requirements apply to carbon steel pipe. | |
| **Unit 8: Installing Stainless Steel Tubing**  Students will develop an understanding of stainless steel tubing and its applications in plumbing projects. Students will learn how to measure, cut and join stainless steel tubing. Students will expand their knowledge of the materials, storage, handling and code requirements. Students will be given multiple opportunities to describe, demonstrate and apply relevant problem-solving skills regarding tubing through “hands on” plumbing projects. | 12 periods  540 minutes | (11) The student gains knowledge and skills to connect and install corrugated stainless steel tubing in various installation conditions. The student is expected to:  (A) identify the common manufacturers of corrugated stainless steel tubing;  (B) recognize proper and improper applications of corrugated stainless steel tubing;  (C) identify the various techniques used in hanging and supporting corrugated stainless steel tubing;  (D) demonstrate how to measure, cut, and join corrugated stainless steel tubing;  (E) identify the material properties, storage, and handling requirements of corrugated stainless steel tubing; and  (F) explain how code requirements apply to corrugated stainless steel tubing. | |
| **Unit 9: Water Distribution Systems**  Students will explore the purpose and major components of a municipal water system and how water is distributed. Students will expand their understanding to include importance and relationship of green technology to a water system. Students will enhance their understanding through research, class discussions and “hands on” activities. | 30 periods  1350 minutes | (4) The student understands and demonstrates what green technology is and how it relates to the plumbing profession and environment. The student is expected to:  (A) identify different green plumbing fixtures;  (B) identify several types of reuse plumbing systems; and  (C) design and demonstrate a particular reuse water plumbing system.  (13) The student identifies major components of a municipal water system and how water is distributed to residential or commercial houses or buildings. The student is expected to:  (A) describe and explain the earth's water cycle;  (B) describes different water sources;  (C) describe and show how water gets from the water well or water meter to the house or building; and  (D) discuss and explain different types of valves and devices found in a residential or commercial water system. | |
| **Unit 10: Valves**  Students will be given multiple opportunities through classroom discussions and “hands on” activities to expand their knowledge of the various types of valves and their uses. Students will be able to select the appropriate valve for specific plumbing activities. | 12 periods  540 minutes | (13) The student identifies major components of a municipal water system and how water is distributed to residential or commercial houses or buildings. The student is expected to:  (D) discuss and explain different types of valves and devices found in a residential or commercial water system.  (15) The student describes and demonstrates the different types of valves and their uses. The student is expected to:  (A) explain why and where open-close valves are used;  (B) explain why and where flow regulation valves are used;  (C) explain why and where pressure reducing valves are used; and  (D) explain why and where pressure and vacuum relief valves are used. | |