North Dakota Building Trades Education

Content Standards

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Adapted from the NCCER Core Curriculum 6th Edition, 2021, and the NCCER Construction Technology Curriculum Course Planning Tools, http://www.nccer.org/.

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This set of standards was approved and edited
by current North Dakota teachers of Building Trades
over a period of two months, through a cooperative process.

Career and Technical Education Standards Introduction

Mission

The mission of the State Board for Career and Technical Education (CTE) is to work with others to provide all North Dakota citizens with the technical skills, knowledge, and attitudes necessary for successful performance in a globally competitive workplace.

Vision

The State Board for Career and Technical Education (CTE) is committed to providing career awareness, work readiness skills, occupational preparation, and retraining of workers throughout the state. Career and technical education will span all educational levels, providing youth with exploration opportunities and the foundation skills needed to enter the world of work while providing adults with skills needed to enter, re-enter, or advance in the workforce.

Goal

North Dakota Career and Technical Education's goal is to create a competitive and knowledgeable work force. This is accomplished through a variety of educational program areas that are organized to prepare students for careers in their chosen fields, to take leadership roles, and balance their multiple roles in life. CTE programs prepare students with the knowledge and skills to make informed career choices, to integrate and apply academic concepts, to prepare for successful participation in a global society, and to engage in lifelong learning.

Standards Development Process

Standards development is a multi-phase process. Existing and/or industry standards are the basis for the North Dakota Program Standards. A team of expert secondary and postsecondary teachers, business and industry representatives, and the state program supervisor draft the standards document. Once the document is finalized, the State Board for Career and Technical Education approves and adopts the standards.

Course Frameworks are also developed by the writing team. A framework includes a brief overview of the course content, topical units of study, and identifies the standards recommended for inclusion within the course. The frameworks are tailored to prepare young people for the opportunities in North Dakota. School Districts will use the frameworks as a guide for developing curriculum that reflects local needs.

Key Principles of Career and Technical Education

We believe that Career Technical Education:

1. **Draws its curricula, standards, and organizing principles from the workplace.**
   The workplace provides the context, objectives, and organizing constructs for instruction and assessment. The workplace also defines the standards of performance necessary, including those required for academic, technical, and employability skills.

2. **Is a critical and integral component of the total educational system, offering career-oriented benefits for all students.**
   CTE classes offer educational benefits to students pursuing careers requiring specific technical skills as well as providing a strong foundation for those pursuing a traditional four-year (or more) degree.

3. **Is a critical and integral component of the workforce development system, providing the essential foundation for a thriving economy.**
   Preparation of a well-prepared, qualified workforce requires solid academics, good work ethics, and specific technical skills as well as the ability to communicate, work with others, solve problems, and use information. CTE contributes directly to this preparation by providing a curriculum tied to specific workplace requirements.

4. **Maintains high levels of excellence supported through identification of academic and workplace standards, measurement of performance (accountability), and high expectations for participant success.**
   Career Technical Education is committed to continuous improvement, attention to industry certification, and the development of highly qualified teachers.

5. **Is robust and flexible enough to respond to the needs of the multiple educational environments, customers, and levels of specialization.**
   CTE involves a large and complex delivery system that (1) integrates career exploration, (2) provides effective tools for organizing all curricula, (3) facilitates the teaching and use of technology, (4) is integrated into the total learning experience, (5) enhances the learning of academic subjects, (6) teaches broad occupational skills, (7) includes all aspects of the industry, (8) teaches how to balance family and work responsibilities, (9) provides job-specific training, (10) is offered at multiple levels of the educational continuum, and (11) is delivered through a variety of educational environments.

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Standard 1	*INTRODUCTION TO BUILDING TRADES*	
Topic 1.1	**Describe the construction industry.**	
	Student Competencies	
	1.1.1	Define construction and summarize the current and future outlook for jobs.
	1.1.2	Identify some of construction's more prominent contributions in history.
Topic 1.2	**Explain the benefits of a construction career.**	
	Student Competencies	
	1.2.1	Recognize and describe how construction careers make a difference in the community.
	1.2.2	Describe the financial and professional benefits of pursuing a construction career.
Topic 1.3	**Describe the typical career path for craft professionals.**	
	Student Competencies	
	1.3.1	Describe industry sectors and the progression path for construction careers.
	1.3.2	Identify different construction careers and the types of skills they require.
Topic 1.4	**Identify ways to pursue a career in the construction industry.**	
	Student Competencies	
	1.4.1	Explain the benefits of career and technical education programs.
	1.4.2	Describe the advantages of craft training programs and their relationship with apprenticeships.
	1.4.3	Summarize the path to a construction career through community colleges and universities.

Standard 2	*BASIC SAFETY*	
Topic 2.1	**Explain the benefits of safety, the cost of workplace incidents, and ways to reduce related hazards.**	
	Student Competencies	
	2.1.1	Describe the types of workplace incidents along with physical and monetary impacts.
	2.1.2	Summarize the causes and consequences of common incidents.
	2.1.3	Explain how to recognize, evaluate, and control workplace hazards.
Topic 2.2	**Describe common fall hazards and methods to prevent them.**	
	Student Competencies	
	2.2.1	Summarize the most common types of construction fall hazards.
	2.2.2	Describe components of effective fall arrest systems and how they prevent or halt falls.
	2.2.3	Explain how to use ladders and stairs safely.
	2.2.4	Identify key steps to ensuring scaffolds are assembled and used safely.
Topic 2.3	**Recognize and avoid struck-by and caught-in-between hazards.**	
	Student Competencies	
	2.3.1	Describe struck-by hazards and how to avoid them.
	2.3.2	Describe common caught-in/caught-between hazards and steps that can prevent them.
Topic 2.4	**Identify common electrical hazards and how to avoid them.**	
	Student Competencies	
	2.4.1	Summarize basic job-site electrical safety guidelines.
	2.4.2	Explain the importance of disabling equipment as well as basic lockout/tagout procedures.
Topic 2.5	**Associate personal protective equipment (PPE) with the hazards they reduce or eliminate.**	
	Student Competencies	
	2.5.1	Explain how PPE is used to protect craftworkers from different types of injuries.
	2.5.2	Explain how respirators protect craft workers from respiratory dangers.
Topic 2.6	**Describe safety practices used with other common job-site hazards.**	
	Student Competencies	
	2.6.1	List other types of hazards craftworkers may encounter.
	2.6.2	Describe common environmental hazards and how craft workers should respond to them.
	2.6.3	Summarize hazards associated with hot work.
	2.6.4	Identify fire hazards and describe basic fire fighting procedures.
	2.6.5	Name different types of confined spaces and how to avoid related hazards.

Standard 3		***INTRODUCTION TO CONSTRUCTION MATH***
Topic 3.1	**Identify whole numbers and solve basic arithmetic problems with them.**	
	Student Competencies	
	3.1.1	List the key qualities of whole numbers and summarize their place values.
	3.1.2	Add and subtract whole numbers.
	3.1.3	Multiply and divide whole numbers.
Topic 3.2	**Name fraction types and calculate with fractions.**	
	Student Competencies	
	3.2.1	Define equivalent fractions and calculate their lowest common denominators.
	3.2.2	Define improper fractions and convert them into mixed numbers.
	3.2.3	Add and subtract fractions.
	3.2.4	Multiply and divide fractions.
Topic 3.3	**Identify decimal numbers and calculate with them.**	
	Student Competencies	
	3.3.1	List the key qualities of decimal numbers and summarize their place values.
	3.3.2	Add, subtract, multiply, and divide decimal numbers.
	3.3.3	Convert between decimals, fractions, and percentages.
Topic 3.4	**Name the common length-measuring tools and use them to measure lengths accurately.**	
	Student Competencies	
	3.4.1	Describe English and metric rulers, using them correctly to measure lengths.
	3.4.2	Describe English and metric measuring tapes, using them correctly to measure lengths.
Topic 3.5	**Name common length, weight, volume, and temperature units in both the inch-pound and metric systems and convert them into other comparable units.**	
	Student Competencies	
	3.5.1	List and convert between common inch-pound and metric length units.
	3.5.2	List and convert between common inch-pound and metric weight units.
	3.5.3	List and convert between common inch-pound and metric volume units.
	3.5.4	List and convert between common inch-pound and metric temperature units.
Topic 3.6	**Classify angles and geometric shapes, as well as calculating their areas or volumes.**	
	Student Competencies	
	3.6.1	List each angle type.
	3.6.2	Name common geometric shapes and summarize their qualities.
	3.6.3	Calculate the area of two-dimensional shapes.
	3.6.4	Calculate the volume of three-dimensional shapes.

Standard 4		***INTRODUCTION TO HAND TOOLS***
Topic 4.1	**Name common hand tools and state how to use them.**	
	Student Competencies	
	4.1.1	Identify various hammers and demolition tools and explain how to use them.
	4.1.2	Describe chisels and punches and how they are used.
	4.1.3	Match screwdrivers to the appropriate hardware.
	4.1.4	Differentiate between non-adjustable, adjustable, and socket wrenches.
	4.1.5	Describe various types of pliers and explain how they are used.
Topic 4.2	**Identify common measurement and layout tools and describe how to use them.**	
	Student Competencies	
	4.2.1	Explain how to use a variety of measuring tools.
	4.2.2	Define various types of levels and layout tools and indicate how they are used.
Topic 4.3	**Identify and describe other hand tools common to shops and jobsites.**	
	Student Competencies	
	4.3.1	Differentiate between various handsaws and their designated applications.
	4.3.2	Identify common clamp designs.
	4.3.3	Explain how different files and utility knives are used with various materials.
	4.3.4	Describe shovels and picks and the tasks for which each one is best suited.

Standard 5	*INTRODUCTION TO POWER TOOLS*	
Topic 5.1	**Identify and explain how to use various types of power drills and impact wrenches.**	
	Student Competencies	
	5.1.1	Summarize basic power tool safety guidelines.
	5.1.2	Identify common power drills and bits and explain how to use them.
	5.1.3	Describe the difference between hammer drills and impact drivers.
	5.1.4	Identify pneumatic drills and impact wrenches and explain how to use them.
Topic 5.2	**Identify and explain how to use various types of power saws.**	
	Student Competencies	
	5.2.1	Explain how to use a circular saw and identify different types of blades.
	5.2.2	Differentiate between jigsaws and reciprocating saws and explain how to use them.
	5.2.3	Explain how to use a portable band saw.
	5.2.4	Describe the difference between miter saws and cutoff saws.
	5.2.5	Explain how to use table saws and describe the types of jobs for which they are best suited.
Topic 5.3	**Describe the types of jobs best suited to grinders and oscillating multi-tools.**	
	Student Competencies	
	5.3.1	Explain how to use various types of grinders.
	5.3.2	Identify grinder accessories and the jobs for which they are used.
	5.3.3	List the type of jobs that can be performed using an oscillating multi-tool.
Topic 5.4	**Identify and explain how to use miscellaneous power tools.**	
	Student Competencies	
	5.4.1	Discuss the hazards of using power nailers.
	5.4.2	Describe jobs that can be performed with hydraulic jacks.

Standard 6	***INTRODUCTION TO CONSTRUCTION DRAWINGS***	
Topic 6.1	**Describe components and features used in construction drawings and identify how the drawings are different.**	
	Student Competencies	
	6.1.1	Summarize the purpose of the six basic construction drawing components.
	6.1.2	List and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
	6.1.3	Explain how dimensions relate to various drawing scales.
	6.1.4	Demonstrate how to use engineer's and architect's scales.
	6.1.5	Identify the six types of construction drawings.

Standard 7	***INTRODUCTION TO BASIC RIGGING***	
Topic 7.1	**Identify and describe various types of rigging slings, hardware, and equipment.**	
	Student Competencies	
	7.1.1	Identify and describe various types of slings.
	7.1.2	Describe how to inspect various types of slings.
	7.1.3	Identify and describe how to inspect common rigging hardware.
	7.1.4	Identify and describe various types of hoists.
	7.1.5	Identify and describe basic rigging hitches and the related Emergency Stop hand signal.

Standard 8	*BASIC COMMUNICATION SKILLS*	
Topic 8.1	**Describe the communication, listening, and speaking processes and their relationship to job performance.**	
	Student Competencies	
	8.1.1	Describe the communication process and the importance of listening and speaking skills.
	8.1.2	Describe the listening process and identify good listening skills.
	8.1.3	Describe the speaking process and identify good speaking skills.
Topic 8.2	**Describe good reading and writing skills and their relationship to job performance.**	
	Student Competencies	
	8.2.1	Describe the importance of good reading and writing skills.
	8.2.2	Describe job-related reading requirements and identify good reading skills.
	8.2.3	Describe job-related writing requirements and identify good writing skills.

Standard 9	*BASIC EMPLOYABILITY SKILLS*	
Topic 9.1	**Describe the opportunities in the construction businesses and how to enter the construction workforce.**	
	Student Competencies	
	9.1.1	Describe the construction business and the opportunities offered by the trades.
	9.1.2	Explain how workers can enter the construction workforce.
Topic 9.2	**Explain the importance of critical thinking and how to solve problems.**	
	Student Competencies	
	9.2.1	Describe critical thinking and barriers to solving problems.
	9.2.2	Describe how to solve problems using critical thinking.
	9.2.3	Describe problems related to planning and scheduling.
Topic 9.3	**Explain the importance of social skills and identify ways good social skills are applied in the construction trade.**	
	Student Competencies	
	9.3.1	Identify good personal and social skills.
	9.3.2	Explain how to resolve conflicts with co-workers and supervisors.
	9.3.3	Explain how to give and receive constructive criticism.
	9.3.4	Identify and describe various social issues of concern in the workplace.
	9.3.5	Describe how to work in a team environment and how to be an effective leader.

Standard 10	*INTRODUCTION TO MATERIAL HANDLING*	
Topic 10.1	**Identify the basic concepts of material handling and common safety precautions.**	
	Student Competencies	
	10.1.1	Describe the basic concepts of material handling and manual lifting.
	10.1.2	Identify common material handling safety precautions.
	10.1.3	Identify and describe how to tie knots commonly used in material handling.
Topic 10.2	**Identify various types of material handling equipment and describe how they are used.**	
	Student Competencies	
	10.2.1	Identify non-motorized material handling equipment and describe how they are used.
	10.2.2	Identify motorized material handling equipment and describe how they are used.

Standard 11	*INTRODUCTION TO MASONRY*	
Topic 11.1	**Describe and explain the historic and current methods and procedures used in the masonry trade.**	
	Student Competencies	
	11.1.1	Discuss the history of masonry.
	11.1.2	Describe modern masonry materials and methods.
	11.1.3	Explain career ladders and advancement possibilities in masonry work.
	11.1.4	Describe the skills, attitudes, and abilities needed to work as a mason.
	11.1.5	State the safety precautions that must be practiced at a work site, including the following: Safety practices, Fall-protection procedures, Forklift-safety operations.
	11.1.6	Perform the following basic bricklaying procedures: Mixing of mortar, Laying a mortar bed, Laying bricks.
	11.1.7	Put on eye protection, respiratory protection, and a safety harness.
	11.1.8	Use the correct procedures for fueling and starting a gasoline-powered tool.

Standard 12	*FLOOR SYSTEMS*	
Topic 12.1	**Identify, lay out, and construct residential flooring systems to include materials and general platform framing methods.**	
	Student Competencies	
	12.1.1	Identify the different types of framing systems.
	12.1.2	Read and interpret drawings and specifications to determine floor system requirements.
	12.1.3	Identify floor and sill framing and support members.
	12.1.4	Name the methods used to fasten sills to the foundation.
	12.1.5	Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams.
	12.1.6	List and recognize different types of floor joists.
	12.1.7	Given specific floor load and span data, select the proper joist size from a list of available joists.
	12.1.8	List and recognize different types of bridging.
	12.1.9	List and recognize different types of flooring materials.
	12.1.10	Explain the purposes of subflooring and underlayment.
	12.1.11	Match selected fasteners used in floor framing to their correct uses.
	12.1.12	Estimate the amount of material needed to frame a floor assembly.
	12.1.13	Demonstrate the ability to: Lay out and construct a floor assembly, Install bridging, Install joists for a cantilever floor, Install a subfloor using butt-joint plywood/OSB panels, Install a single floor system using tongue-and-groove plywood/OSB panels.

Standard 13	*WALL & CEILING FRAMING*	
Topic 13.1	**Identify, describe, and assemble correct wall and ceiling framing systems.**	
	Student Competencies	
	13.1.1	Identify the components of a wall and ceiling layout.
	13.1.2	Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.
	13.1.3	Describe the correct procedure for assembling and erecting an exterior wall.
	13.1.4	Identify the common materials and methods used for installing sheathing on walls.
	13.1.5	Lay out, assemble, erect, and brace exterior walls for a frame building.
	13.1.6	Describe wall framing techniques used in masonry construction.
	13.1.7	Explain the use of metal studs in wall framing.
	13.1.8	Describe the correct procedure for laying out ceiling joists.
	13.1.9	Cut and install ceiling joists on a wood frame building.
	13.1.10	Estimate the materials required to frame walls and ceilings.
Topic 13.2	**Describe and identify thermal and moisture installation and protection.**	
	Student Competencies	
	13.2.1	Describe the safety and health hazards when working with insulation.
	13.2.2	Describe the various types of insulation and their characteristics.
	13.2.3	Describe the various installation methods for insulation.
	13.2.4	Identify the requirements for moisture control, waterproofing, and ventilation, and describe the related installation methods.
	13.2.5	Describe the estimating procedure for thermal and moisture projects.

Standard 14	*INTRODUCTION TO ROOFING*	
Topic 14.1	**Describe, identify, and complete basic roofing installation.**	
	Student Competencies	
	14.1.1	Understand the terms associated with roof framing.
	14.1.2	Identify the roof framing members used in gable and hip roofs.
	14.1.3	Identify the methods used to calculate the length of a rafter.
	14.1.4	Identify the various types of trusses used in roof framing.
	14.1.5	Use a rafter framing square, speed square, and calculator in laying out a roof.
	14.1.6	Identify various types of sheathing used in roof construction.
	14.1.7	Frame a gable roof with vent openings.
	14.1.8	Frame a roof opening.
	14.1.9	Erect a gable roof using trusses.
	14.1.10	Estimate the materials used in framing and sheathing a roof.
Topic 14.2	**Explain and install basic roofing applications.**	
	Student Competencies	
	14.2.1	Identify the materials and methods used in roofing.
	14.2.2	Explain the safety requirements for roof jobs.
	14.2.3	Install fiberglass shingles on gable and hip roofs.
	14.2.4	Close up a valley using fiberglass shingles.
	14.2.5	Explain how to make various roof projections watertight when using fiberglass shingles.
	14.2.6	Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
	14.2.7	Lay out, cut, and install a cricket or saddle.
	14.2.8	Demonstrate the techniques for installing other selected types of roofing materials.

Standard 15	*EXTERIOR & INTERIOR FINISHING*	
Topic 15.1	**Describe and install various types and applications of exterior finishing.**	
	Student Competencies	
	15.1.1	Describe the purpose of wall insulation and flashing.
	15.1.2	Install selected common cornices.
	15.1.3	Demonstrate lap and panel siding estimating methods.
	15.1.4	Describe the types and applications of common wood siding.
	15.1.5	Describe fiber-cement siding and its uses.
	15.1.6	Describe the types and styles of vinyl and metal siding.
	15.1.7	Describe the types and applications of stucco and masonry veneer finishes.
	15.1.8	Describe the types and applications of special exterior finish systems.
	15.1.9	Install three types of siding commonly used in your area.
Topic 15.2	**Describe and install various types and applications of interior finishing.**	
	Student Competencies	
	15.2.1	Identify components of a drywall assembly.
	15.2.2	Describe the installation of drywall.
	15.2.3	Contrast rated assemblies to nonrated assemblies.
	15.2.4	Identify how to calculate a quantity takeoff for proper drywall installation.
	15.2.5	Identify differences between the six levels of finish established by industry standards.
	15.2.6	Identify the different materials for proper drywall finishing.
	15.2.7	Identify the proper tools used in drywall finishing.
	15.2.8	Describe proper drywall finishing procedures.
	15.2.9	Explain how to estimate the proper amount of drywall finishing materials.
	15.2.10	Describe the safety hazards related to working with window, door, floor, and ceiling trim.
	15.2.11	Identify the different types of standard moldings and materials.
	15.2.12	Explain how to install different types of molding.
	15.2.13	Explain how to estimate window, door, floor, and ceiling trim.
Topic 15.3	**Identify, interpret plans for, and build basic stair units.**	
	Student Competencies	
	15.3.1	Identify the various types of stairs.
	15.3.2	Identify the various parts of stairs.
	15.3.3	Identify the materials used in the construction of stairs.
	15.3.4	Interpret construction drawings of stairs.
	15.3.5	Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.
	15.3.6	Lay out and cut stringers, risers, and treads.

	15.3.7	Build a small stair unit with a temporary handrail.
Topic 15.4	**Explain and identify basic cabinet installation.**	
	Student Competencies	
	15.4.1	Describe the safety hazards when installing cabinets.
	15.4.2	Identify the different types of cabinets.
	15.4.3	Identify cabinet components and hardware and describe their purpose.
	15.4.4	Explain how to lay out and install a basic set of cabinets.

Standard 16	***INTRODUCTION TO RESIDENTIAL ELECTRICAL SYSTEMS***	
Topic 16.1	**Develop and recognize correct electrical safety procedures and techniques.**	
	Student Competencies	
	16.1.1	Recognize safe working practices in the construction environment.
	16.1.2	Explain the purpose of OSHA and how it promotes safety on the job.
	16.1.3	Identify electrical hazards and how to avoid or minimize them in the workplace.
	16.1.4	Explain electrical safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.
	16.1.5	Develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.
Topic 16.2	**Calculate and explain residential electrical services.**	
	Student Competencies	
	16.2.1	Explain the role of the *National Electrical Code*® in residential wiring and describe how to determine electric service requirements for dwellings.
	16.2.2	Explain the grounding requirements of a residential electric service.
	16.2.3	Calculate and select service-entrance equipment.
	16.2.4	Select the proper wiring methods for various types of residences.
	16.2.5	Compute branch circuit loads and explain their installation requirements.
	16.2.6	Explain the types and purposes of equipment grounding conductors.
	16.2.7	Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
	16.2.8	Size outlet boxes and select the proper type for different wiring methods.
	16.2.9	Describe rules for installing electric space heating and HVAC equipment.
	16.2.10	Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
	16.2.11	Explain how wiring devices are selected and installed.
	16.2.12	Describe the installation and control of lighting fixtures.

Standard 17	***INTRODUCTION TO RESIDENTIAL HVAC SYSTEMS***	
Topic 17.1	**Explain and Identify types of residential heating, ventilation, and air conditioning systems.**	
	Student Competencies	
	17.1.1	Explain the basic principles of heating, ventilation, and air conditioning.
	17.1.2	Identify career opportunities available for people in the HVAC trade.
	17.1.3	Explain the purpose and objectives of an apprenticeship training program.
	17.1.4	Describe how certified apprentice training can start in high school.
	17.1.5	Describe what the *Clean Air Act* means to the HVAC trade.
	17.1.6	Describe types of regulatory codes encountered in the HVAC trade.
	17.1.7	Identify the types of schedules/drawings used in the HVAC trade.

Standard 18	***INTRODUCTION TO RESIDENTIAL PLUMBING SYSTEMS***	
Topic 18.1	**Identify and explain drain, waste, and vent (DWV) systems.**	
	Student Competencies	
	18.1.1	Explain how waste moves from a fixture through the drain system to the environment.
	18.1.2	Identify the major components of a drainage system and describe their functions.
	18.1.3	Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
	18.1.4	Identify the various types of drain, waste, and vent (DWV) fittings and describe their applications.
	18.1.5	Identify significant code and health issues, violations, and consequences related to DWV systems.
Topic 18.2	**Explain and identify plastic pipe and fittings.**	
	Student Competencies	
	18.2.1	Identify types of materials and schedules of plastic piping.
	18.2.2	Identify proper and improper applications of plastic piping.
	18.2.3	Identify types of fittings and valves used with plastic piping.

	18.2.4	Identify and determine the kinds of hangers and supports needed for plastic piping.
	18.2.5	Identify the various techniques used in hanging and supporting plastic piping.
	18.2.6	Properly measure, cut, and join plastic piping.
	18.2.7	Explain proper procedures for the handling, storage, and protection of plastic pipes.
Topic 18.3	**Identify and install copper pipe and fittings.**	
	Student Competencies	
	18.3.1	Identify the types of materials and schedules used with copper piping.
	18.3.2	Identify the material properties, storage, and handling requirements of copper piping.
	18.3.3	Identify the types of fittings and valves used with copper piping.
	18.3.4	Identify the techniques used in hanging and supporting copper piping.
	18.3.5	Properly measure, ream, cut, and join copper piping.
	18.3.6	Identify the hazards and safety precautions associated with copper piping.

Career Ready Practices

1. Act as a Responsible and Contributing Citizen and Employee

Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them, think about the near-term and long-term consequences of their actions, and seek to act in ways that contribute to the betterment of their teams, families, community, and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

2. Apply Appropriate Academic and Technical Skills

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications and make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

3. Attend to Personal Health and Financial Well-Being

Career-ready individuals understand the relationship between personal health, workplace performance, and personal well-being; they act on that understanding to regularly practice health diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

4. Communicate Clearly, Effectively, and with Reason

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice and organization and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

5. Consider the environmental, social, and economic impacts of decisions

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment. They are aware of and utilize new technologies, understandings, procedures, materials and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and profitability of the organization.

6. Demonstrate creativity and innovation

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

7. Employ valid and reliable research strategies

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices, or inform strategies. They use a reliable research process to search for new information and evaluate the validity of sources when considering the use and adoption of external information or practices. They use an informed process to test new ideas, information, and practices in their workplace situation.

8. Utilize critical thinking to make sense of problems and persevere in solving them

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur, quickly take action to address the problem, thoughtfully investigate the root cause of the problem prior to introducing solutions, and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

9. Model integrity, ethical leadership, and effective management

Career-ready individuals consistently act in ways that align to personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they apply insights into human behavior to change others' actions, attitudes, and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.

10. Plan education and career path aligned to personal goals

Career-ready individuals take personal ownership of their own educational and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience, and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the educational and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

11. Use technology to enhance productivity

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology, being proficient with ubiquitous technology applications. They understand the inherent risks, personal and organizational, of technology applications, and they take actions to prevent or mitigate these risks.

12. Work productively in teams while using cultural/global competence

Career-ready individuals positively contribute to every team whether formal or informal. They apply an awareness of cultural differences to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.