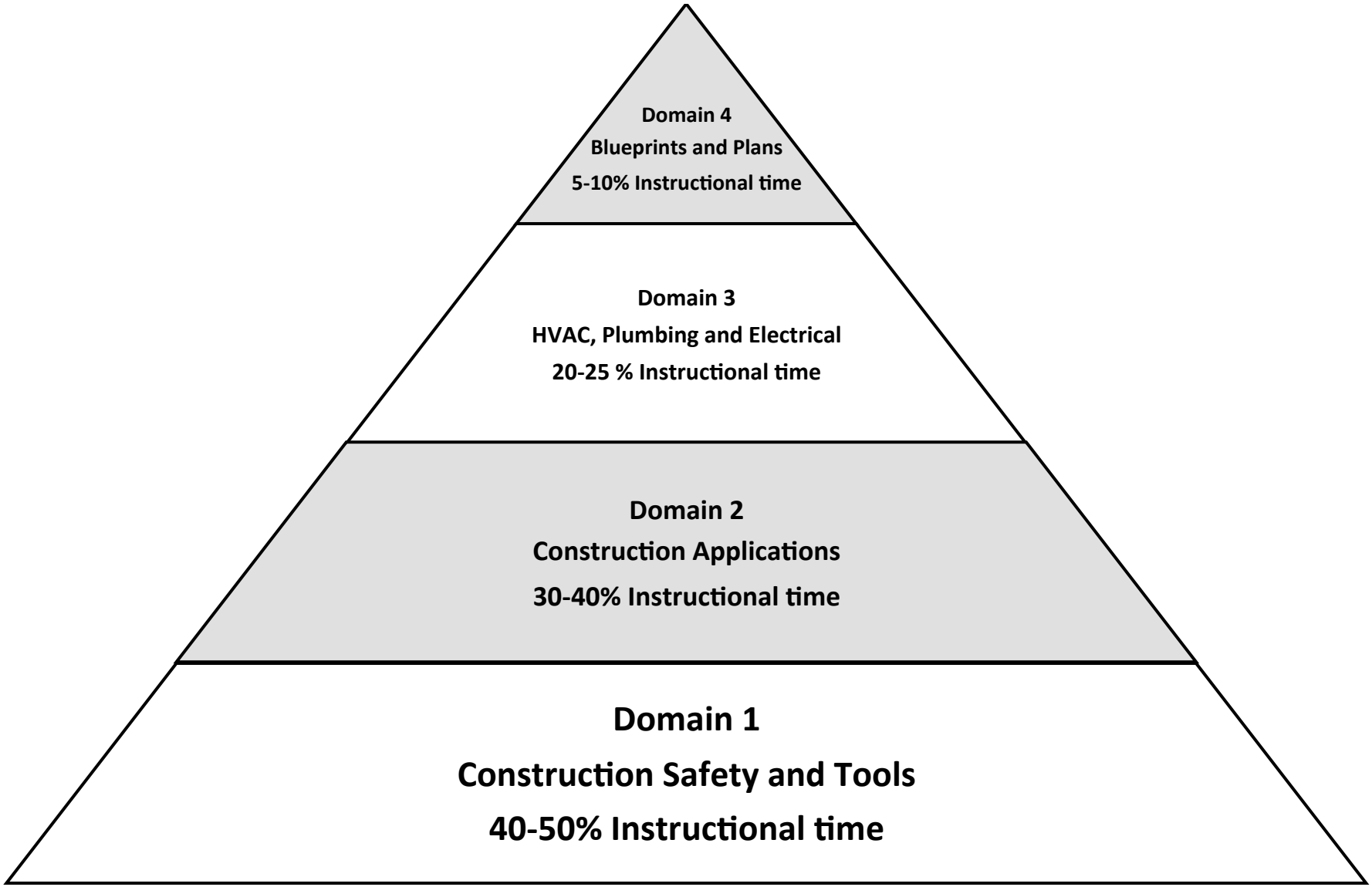
Content Domains

Construction Technologies 46.0400.20



The technical standards for the Construction Technologies Program are clustered in 4 domains. The greatest percentage of instructional time will be spent on domains 1 and 2 with less time on domains 3 and 4. Students who complete the program should demonstrate a thorough knowledge in each of these domains.

Content Domains, Standards and Instruction

Construction Technologies
46.0400.20

Domain	Related Standards	Instructional Time
Domain 1 Construction Safety and Tools	**STANDARD 1.0 Maintain a safe work environment** **STANDARD 2.0 Operate hand and power tools/equipment**	40-50%
Domain 2 Construction Applications	**STANDARD 4.0 Lay out building lines** **STANDARD 5.0 Perform masonry work** **STANDARD 6.0 Lay out and install floor systems** **STANDARD 7.0 Demonstrate wall and ceiling framing** **STANDARD 8.0 Frame and finish a roof** **STANDARD 10.0 Apply exterior finishes** **STANDARD 11.0 Install doors and windows** **STANDARD 12.0 Install interior trim and stairs** **STANDARD 15.0 Install interior wall and ceiling finish** **STANDARD 16.0 Perform concrete work**	30-40%
Domain 3 HVAC, Plumbing and Electrical	**STANDARD 9.0 Identify conditioned living systems** **STANDARD 13.0 Assemble piping, waste, and vent distribution systems** **STANDARD 14.0 Install electrical component/system(s) to current industry code**	20-25%
Domain 4 Blueprints and Plans	**STANDARD 3.0 Use plans, specifications, and codes**	5-10%

Content domains are bodies of knowledge, skills or abilities to be taught or assessed. They are clustered as related to technical standards for instruction. The suggested percentage of instructional time is listed for each domain. Instructional time corresponds to the percentage of assessment items included on the Technical Skills Assessment 2017

Instructional Framework

Program: Construction Technologies
Cip code: 46.0400.20

Domain 1: Construction Safety and Tools Instructional Time 40 – 50%	
STANDARD 1.0 Maintain a safe work environment	
1.1 Follow job safety regulations and procedures for handling hazardous materials/chemicals according to OSHA guidelines and SDS (Safety Data Sheets)	• Safety Data Sheet (SDS) read and understand • Hazardous communication (HAZCOM) read and understand
1.2 Use appropriate personal protective equipment (PPE)	• Appropriate attire and equipment according to situation ex. safety glasses, all elements, etc.
1.3 Evaluate types of fires and use of appropriate fire extinguishers	• ABC type, ex. ordinary combustibles, electrical, liquids • Pull Aim Squeeze Sweep (PASS) • Location
1.4 Maintain worksite safety and housekeeping (lighting, safety, etc.), including a safety plan for emergency situations	• Construction site clean up • Disposal of waste • Trip hazards • Safety Plan • Awareness of surroundings
1.5 Identify first aid procedures	• First Aid /CPR Basic course by certified CPR instructor
1.6 Demonstrate appropriate procedure for lifting heavy objects	• Lift with knees not back • Proper lifting procedure • Appropriate equipment to lift
1.7 Follow safe procedures in setting up scaffolding and using ladders	• Awareness of and regulations of scaffolding • Proper use of ladders
1.8 Demonstrate safe work procedures around electrical hazards	• Water hazards • Exposed electrical • Use of GFCI • Symbols
1.9 Use correct procedures for lockout/tagout	• Lock out/tag out • Procedures of Lock out/tag out • Importance of
1.10 Identify procedures for reporting safety hazards	• Understand OSHA reporting procedure • Understand local reporting procedure
STANDARD 2.0 Operate hand and power tools/equipment	

2.1 Inspect, use, and maintain hand tools	• Identify Tools with proper name and common name • Proper working order for tools ex. sharpen chisels, etc.
2.2 Inspect, use, and maintain portable power tools, powder-actuated tools, pneumatic tools, and extension cords	• Identify Tools with proper name and common name • Proper working order for tools ex. check for sharpened saw blades, etc. • Hydraulic tool use

Domain 2: Construction Applications

Instructional Time: 30 -40%

STANDARD 4.0 Lay out building lines	
4.1 Demonstrate the use and care of precision measuring instruments	• Measure accurately to 16th of an inch • Proper use of transit/laser levels • Understand tape measure • Use of squares ex. Framing square, speed square, etc.
4.2 Establish building lines and recognize trade-specific layout	• Trade-Specific layout ex. Plumbing vs. electrical
4.3 Demonstrate a builder's level or transit and differential leveling procedures to determine site and building elevations	• Measure accurately to 16th of an inch • Proper use of transit/laser levels • Understand tape measure • Use of squares ex. Framing square, speed square, etc.
STANDARD 5.0 Perform masonry work	
5.1 Describe basic masonry units	• Types of blocks • Specific dimensions of block • Specific shapes of block ex. Headers bonding • Special condition ex. Arch way • Solid Load bearing • Hollow • Weight classification
5.2 Describe the components of a masonry wall and accessories	• Mortar • Cement • Aggregate • Sand

	• Water • Block • Specialized additives • Rebar
5.3 Describe the components of mortar and how to properly mix mortar	• Mixing procedure • Sand, water, cement • Colorizing agents
5.4 Demonstrate proper use of tools for masonry	• Proper selection of tools ex. Trowels, jointers, mixers, Shovels, etc. • Proper use of tools ex. Trowels, jointers, mixers, Shovels, etc.
5.5 Demonstrate proper use of a level to evaluate masonry work	• Use of level ex. String, bubble level, etc.
5.6 Demonstrate how to lay brick/block to specification	• Follow specs ex. 90 degree corner, diagonal measurement, 6-8-10
STANDARD 6.0 Lay out and install floor systems	
6.1 Identify components of floor systems	• Floor system components ex. Fasteners, joists, seal, etc. • Subfloor
6.2 Describe the procedure for setting posts	• Footings • Anchors • Tie-ins/connectors bolted or screwed • Types of posts ex. Concrete, wood, etc.
6.2 Describe the correct fasteners used in construction of floor systems	• Footings • Anchors • Tie-ins/connectors bolted or screwed • Types of posts ex. Concrete, wood, etc.
6.3 Calculate the amount of material needed to frame a floor assembly	• Bill of materials • Determine area, volumes, perimeters, cost of materials • Determine amount of waste and overage
6.4 Lay out and construct floor systems	• Demonstrate use of fasteners ex. Nails, screws, glue, etc. • Demonstrate common methods of layout ex. 24 inch vs. 16 inch on center
STANDARD 7.0 Demonstrate wall and ceiling framing	
7.1 Lay out wall lines including plates, corner posts, door and window openings, partition Ts, bracing, and fire stops	• Chalk line method

	• Mark material
7.2 Assemble wood and metal stud walls	• Advantages and disadvantages of metal vs. wood
7.3 Assemble, erect, and brace exterior walls for a frame building	• Common methods of assemble, erect, and brace
7.4 Cut and install ceiling joists on a wood frame building	• Use of speed square and carpenters square • 16 inch or 24 inch on center
7.5 Calculate the materials required to frame walls and ceilings	• Bill of materials • Determine area, volumes, perimeters, cost of materials • Determine amount of waste and overage
STANDARD 8.0 Frame and finish a roof	
8.1 Construct conventional roof and/or set truss systems	• Rise and run and slope • Roof types • Lay out truss system ex. 16 inch vs. 24 inch on center
8.2 Install roof sheathing and coverings	• Types of sheathing and coverings • Describe common sheaths and coverings
8.3 Frame and/or illustrate a roof opening	• Common terms ex. Flashing, apron, etc.
8.4 Demonstrate the techniques for installing a variety of types of roofing materials	• Types of roofing materials ex. Felt, shingles, etc.
8.5 Estimate the materials used in framing and sheathing a roof	• Bill of materials • Determine area, volumes, perimeters, cost of materials • Determine amount of waste and overage
STANDARD 10.0 Apply exterior finishes	
10.1 Identify and/or install frieze boards or soffit	• Common types of frieze board or soffit • Advantages or disadvantages of frieze board or soffit
10.2 Identify and/or install exterior moldings and trim	• Common types of molding and trim
10.3 Identify and/or install various types of siding	• Common types of siding
10.4 Demonstrate correct installation methods to eliminate water intrusion	• Advantages and disadvantages of water intrusion methods ex. Caulking vs. flashing, etc.
10.5 Explain and/or demonstrate installation of exterior stucco finish	• Types of stucco finish ex. Smooth vs. course • Application of stucco finish ex. Spray, trowel, etc.

	• Prepping method ex. Chicken wire/wire mesh, etc.
11.0 Install Doors and Windows	
11.1 Install door systems	• Rough openings • Weather sealing • Headers • Molding and trim • Sill • Prefabricated
11.2 Install window systems	• Rough openings • Weather sealing • Headers • Molding and trim • Sill • Prefabricated
STANDARD 12.0 Install interior trim and stairs	
12.1 Lay out and cut stringers	• Speed square • framing square • Stringer layout method
12.2 Determine the number and sizes of risers and treads required for a stairway	• Rise and run method • Common height of rise
12.3 Build a small stair unit	• Rough openings • Weather sealing • Headers • Molding and trim • Sill • Prefabricated
12.4 Install baseboards and casings	• Lineal feet calculations • Linear perimeter
STANDARD 15.0 Install interior wall and ceiling finish	
15.1 Identify type and use of drywall	• Drywall thicknesses • Types of drywall ex. Fire rated, moisture rated, etc.
15.2 Demonstrate the proper techniques for cutting drywall	• Drywall squares

	• Utility knives • Snapping the boards • Scoring
15.3 Fasten drywall to ceiling and walls	• lifting methods ex. Hangman, drywall lift • Nailing procedure • Type of fasteners
15.4 Apply mud, use tape appropriately, and install corner bead	• Weights of joint compound (Mud) • Types of mud ex. Premixed, dried, etc. • Types of tape ex. Paper vs. fiberglass
15.5 Demonstrate proper material use and methods of paint application	• Application types ex. Spray, roll, brush, etc. • Types of paint ex. Latex, clear, enamels, primer, etc.
STANDARD 16.0 Perform concrete work	
16.1 Describe the components of concrete	• Cement • Aggregate • Sand • Water • Specialized additives • Rebar
16.2 Prepare, pour, and finish concrete	• Mixers • Forms • Concrete tools ex. Trowels, bull floats, etc.
16.3 Demonstrate proper use of concrete tools	• Tampering • Brushing • Brooming • Expansion joints • Jointing

Domain 3: HVAC, Plumbing and Electrical **Instructional Time: 20 -25%**	
STANDARD 9.0 Identify conditioned living systems	
9.1 Identify types and use of thermal insulation, vapor barriers, R-values, and U-values	• Advantages and disadvantages of different types of thermal insulation

	ex. glass fiber vs. plastic foam, etc. ● Purpose of vapor barrier ● R-values vs. U-value
9.2 Describe the function of an HVAC system	● Heat /cool ● Ventilate ● Air condition ● Filtration ● Regulate humidity
9.3 Describe various types of energy efficient systems (e.g., solar electricity, solar water heating, cocoon insulation systems, gray water systems, turbines, etc.)	● Advantages and disadvantages of different types of energy efficient systems ex. solar electricity, solar water heating, cocoon insulation systems, gray water systems, turbines, etc
9.4 Identify conditioned living systems and explain how they relate to overall building performance	● Central heating/cooling system vs. individual room heating/cooling system ● Window systems ● Outside door vs. inside door
STANDARD 13.0 Assemble piping, waste, and vent distribution systems	
13.1 Identify the major components of a drainage and water distribution system	● Potable water ● Sewage line ● Grey water ● Black water
13.2 Assemble a soil, waste, and vent system	● Plumbing fixtures ex. pee trap, j corners, etc. ● Rise, run, and slope ● Sewage gas
13.3 Assemble a water distribution system	● Types of piping ● Tools ● Glues, solders, flux
13.4 Install plumbing fixtures or equipment	● Plumbing fixtures ex. pee trap, j corners, etc. ● Rise, run, and slope ● Types of piping ● Tools ● Glues, solders, flux
13.5 Measure, cut, and join plastic and copper piping	● Assemble pipes

13.6 Describe the functions of a drainage and water distribution system and how they malfunction	● Correct/incorrect Rise, run, slope, and Pressure ● Size of pipe ● Correct/incorrect installation
13.7 Identify how an efficient system affects water usage	● Control ● Leaks ● Reclaimed water usage
STANDARD 14.0 Install electrical component/system(s) to current industry code	
14.1 Identify electrical service entrance requirements	● Volts, watts, amps ● Service drop ex. underground vs. overhead ● Residential vs. commercial, vs. industrial requirements
14.2 Rough in electrical enclosures (switch boxes and outlet boxes, etc.) and cable	● Breaker box ● Circuit breaker box ● Gang boxes ● Sheeted cable size ex. 12 gauge vs. 14 gauge, wire count (2 or 3) ● Colored wires
14.3 Determine the correct wire size for a circuit	● End use determines wire size ex. 12 gauge vs. 14 gauge ● Voltage requirement ex. 120 or 220
14.4 Trim out electrical devices, appliances, light fixtures (luminaires), and ceiling fans	● Demonstrate installation of electrical appliances
14.5 Identify components of solar P.V. systems	● Battery ● Solar panel ● Inverters

Domain 4: Blueprints and Plans **Instructional Time: 5-10%**	
STANDARD 3.0 Use plans, specifications, and codes	
3.1 Identify blueprint terms, components, and symbols	● Blueprint terms/components/symbols ex. legends, assembly drawing , auxiliary view, dimensioning, etc.
3.2 Identify a set of drawings/symbols/scales and legends	● Blueprint terms/components/symbols ex. legends, assembly drawing , auxiliary view, dimensioning, etc.

3.3 Read material schedules on blueprints	● Differentiate material types, sizes, and quantities
3.4 Relate information on blueprints to actual locations	● Surveying ● Scheduling/placing ex. location of door openings, etc.
3.5 Identify and use drawing dimensions	● Scaling ● Type of scale ex. ¼ inch = 1 foot ● Converting between scales
3.6 Explain build codes and their importance	● Understand local, state, and national building codes
3.7 Identify resources for current building codes	● Types of resources ex. OSHA, National Electrical Code (NEC), International Residential Commercial Code (IRCC) etc.
3.8 Identify types of technology used in construction management	● CAD - computer aided drawing ● GPS ● Lasers ● Drones ● Software ex. scheduling, budgeting, electrical loads, etc.