

## Colorado CTE Course – Scope and Sequence

| Course Name                                                                                                                                                                                                                                                                                                                        | Carpentry Technology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                  | Course Details                                                                                                                                                                                                  | Credit= 1.0<br>CTE Credential= Architecture and Construction<br>Prerequisite= Principles of Construction or Construction Technology                                                                                                                                      |                           |
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| Course Description                                                                                                                                                                                                                                                                                                                 | Carpentry Technology prepares students for careers in residential and commercial carpentry. Students will be able to frame floors, walls, ceilings, roofs, and stairs while safely employing tools and interpreting construction drawings to complete projects. Emphasis is placed on demonstrating proper measurement and application of mathematical concepts. Students to gain an understanding of wood grades and construction methods and to learn skills such as laying sills and joists; erecting sills and rafters; applying sheathing, siding, and shingles; setting door jambs; and hanging doors. Carpentry courses may teach skills for rough construction, finish work, or both. Students learn to read blueprints, draft, use tools and machines properly and safely, erect buildings from construction lumber, perform finish work inside of buildings, and do limited cabinet work. Carpentry courses may also include career exploration, good work habits, and employability skills. |                                                                                                                                                                                                                  |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                          |                           |
| Note:                                                                                                                                                                                                                                                                                                                              | This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                  |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                          |                           |
| SCED Identification #                                                                                                                                                                                                                                                                                                              | 17003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics. |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                          |                           |
| All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at <a href="https://www.cde.state.co.us/standardsandinstruction/essentialskills">https://www.cde.state.co.us/standardsandinstruction/essentialskills</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                  |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                          |                           |
| Instructional Unit Topic                                                                                                                                                                                                                                                                                                           | Suggested Length of Instruction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CTE or Academic Standard Alignment                                                                                                                                                                               | Competency / Performance Indicator                                                                                                                                                                              | Outcome / Measurement                                                                                                                                                                                                                                                    | CTSO Integration          |
| Safety                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Apply principles of protection, prevention and mitigation to create and maintain safe working conditions at construction sites.<br>Identify and rectify or mitigate construction hazards.                        | Identify safety hazards on a jobsite and demonstrate practices for safe working conditions. Student is expected to:<br><br>(A) Accurately read, interpret, and demonstrate adherence to safety rules, including | Given a common jobsite scenario, distinguish between safety rules and explain why certain rules apply. Perform a hazard assessment for a given task. Explain the steps necessary to safely perform the task, outlining procedures to follow in the case of an emergency. | SkillsUSA CPR competition |

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|                           |  |                                                                                                                                                                                              | <p>but not limited to rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA) guidelines, and state and national code requirements.</p> <p>(B) Maintain safety records and demonstrate adherence to industry-standard practices regarding general machine safety, tool safety, equipment safety, electrical safety, and fire safety to protect all personnel and equipment.</p> | <p>Demonstrate how to inspect equipment and tools; operate common hand tools; replace blades on various saw types; and state safety considerations for common tools and equipment. Demonstrate how safety records are maintained. Research and report on how safety incidents are documented and reported in industry. List safety considerations for various types of materials (lumbar, concrete, metal, etc.) and the appropriate PPE.</p> |                                                                                                       |
| <b>Career Exploration</b> |  | <p>Identify the knowledge, skills and abilities necessary to succeed in careers. Develop a career plan that reflects career interests, pathways and secondary and postsecondary options.</p> | <p>Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience. Student is expected to:</p> <p>(A) Articulate the knowledge, skills, and abilities for careers in carpentry;</p> <p>(B) explain the importance of work ethic, accountability and responsibility; and</p>                                                                       | <p>Investigate local job opportunities and compare and contrast the job requirements. Summarize the findings. Explore industry credentials and their requirements. Reflect on the skills involved in obtaining the credential and create a timeline one could use to accurately track towards credential attainment. Practice giving and receiving constructive feedback to improve work habits. Discuss</p>                                  | <p>Updates to ICAP</p> <p>SkillsUSA Carpentry Competition</p> <p>SkillsUSA Team Works Competition</p> |

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|                                          |  |                                                                                                                                                                                                                                                    | (C) demonstrate professional behaviors in the classroom and workplace.                                                                                                                                                                                                                                                                                 | why feedback is an important part of communication skills on the jobsite. Develop strategies for self-promotion in the hiring process (e.g., filling out job applications, résumé writing, interviewing skills, portfolio development).                                |  |
| <b>Building Materials</b>                |  | Identify various types of building materials and describe their uses.                                                                                                                                                                              | Identify and describe the uses of common building materials and tools, including, but not limited to: <ul style="list-style-type: none"> <li>• lumber grades and types</li> <li>• Panels</li> <li>• Fasteners, anchors, and adhesives</li> <li>• Metal framing</li> <li>• Concrete and masonry</li> <li>• Hand tools</li> <li>• Power tools</li> </ul> | Demonstrate the use and application of tools and equipment.<br><br>State the use and function of common construction industry materials.                                                                                                                               |  |
| <b>Construction Industry Regulations</b> |  | Analyze how professional, ethical and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance. Identify how federal and state laws affect products and services in the construction industry. | Understand the purpose and process for building permits. Student is expected to:<br>(A) describe the process for how local building permits are obtained, including filing and inspection requirements.                                                                                                                                                | Given a building scenario, determine if a building permit is required and the process for determining the zoning regulations. Describe how zone designation and regulations such as setbacks, ground coverage, and maximum height impact the design and placement of a |  |

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|                                   |  |                                                                                                                                                                              | (B) explain how local zoning requirements are used in industry;<br>(C) explain the inspection procedures used to enforce building code.                                                                                                                                                                                                                                                                                                                       | building on a given site, citing findings from the investigation.                                                                                                                                                                                                                           |  |
| <b>Site Layout and Blueprints</b> |  | Understand how engineering and field measurement processes are used to survey for site development.                                                                          | Apply conventional engineering and field measurement processes to survey for site development. Student is expected to:<br>(A) describe the basic procedures by which surveyors create site drawings;<br>(B) read and interpret a site drawing to determine the steps, personnel, equipment, and materials needed to prepare a site for construction; and<br>(C) relate the site features labeled on the plan to the layout and topography on the actual site. | Develop a timeline and action steps needed to complete a site layout.<br>Annotate site layout data using proper field note techniques. Identify topographical and existing features of areas (i.e., property lines, utilities, streets, setbacks) on survey maps (parcel map, survey plat). |  |
| <b>Foundation Systems</b>         |  | Apply principles of architectural engineering to erect residential, commercial and industrial buildings, with specific application to constructing footings and foundations. | Understand and apply knowledge of foundation systems and properties of concrete. Student is expected to:<br>(A) describe the composition of concrete;                                                                                                                                                                                                                                                                                                         | Use construction texts and other technical documents to compare and contrast types of foundation systems and footings. Create a written report or visual description                                                                                                                        |  |

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|                        |  |                                                                 | <p>(B) calculate volumes of concrete and specific materials for a given project;</p> <p>(C) understand the factors that affect concrete curing and application; and</p> <p>(D) apply appropriate tools, equipment, and procedures according to industry standards for concrete projects.</p> | <p>outlining the structure and properties of each type. Describe the conditions, costs, and other factors that influence the decision to use each various types of system. Describe the composition of concrete by listing the materials used to make concrete.</p> <p>Analyze the factors that impact the compression strength of concrete, such as the water-cement ratio. Identify additional materials used in concrete construction, such as reinforcement materials and forms. For example, create a comparison chart outlining the materials, forms, and reinforcement used in concrete for a sidewalk versus a bridge. Describe the sequencing procedures for placing large and small slabs.</p> |  |
| <b>Framing Systems</b> |  | Understand and apply knowledge of construction framing systems. | <p>Understand and apply knowledge of basic framing systems in residential and commercial construction. Student is expected to:</p> <p>(A) distinguish among the basic types of wood framing systems; and</p>                                                                                 | <p>Create a chart to define and compare the pros and cons of various types of framing systems (such as platform frames, balloon frames, and post-and-beam frames), citing examples of when each is used.</p> <p>Read and interpret specifications and drawings</p>                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |

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|                 |  |                                                                                                                                                                                                      | (B) explain how systems are related within the building blueprint.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | to determine framing system requirements. Describe the information on typical architectural drawings and explain how mechanical, electrical and plumbing plan are incorporated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <b>Flooring</b> |  | Understand and apply appropriate knowledge and technical skills appropriate to construction flooring systems.<br>Demonstrate carpentry techniques for the construction of a single-family residence. | Understand and apply knowledge of basic flooring systems in residential and commercial construction. Student is expected to:<br>(A) identify the components and use of various flooring systems;<br>(B) list the basic steps for constructing a flooring system;<br>(C) cite general flooring system requirements as required by application or code;<br>(D) identify, describe, and assemble materials for floor framing;<br>(E) lay out, cut and install floor joists;<br><br>(F) frame floor openings;<br>(G) install bridging (e.g., wood, metal); and | Identify the components which make up a floor frame, analyzing the purpose of and interrelationships among each component and explaining the sequence in which each is constructed.<br>Read and interpret construction drawings to determine floor system requirements such as the proper girder and joist size for a given span and floor load, and estimate the amount of material needed to frame a floor assembly.<br>Describe the procedures necessary to fasten sills to the foundation and construct a floor assembly. Apply the appropriate tools, equipment, and procedures to build a floor assembly. Demonstrate ability to work in teams to install girders, layout and install floor joists, install bridging and blocking, and apply subflooring. |  |

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|                                         |  |                                                                                                                                          | (H) install subflooring using adhesives and fasteners.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Estimate the amount of material needed for a floor assembly and prepare a materials list from a set of plans.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| <b>Wall and Ceiling Framing Systems</b> |  | Demonstrate common wall and ceiling framing knowledge and technical skills used in residential and commercial construction applications. | <p>Understand and apply knowledge of wall and ceiling framing systems used in residential and commercial construction. Student is expected to:</p> <p>(A) read and interpret drawings to determine wall and ceiling frame requirements for a given residential or commercial structure.</p> <p>(B) identify wall and ceiling framing components, materials, tools, and equipment.</p> <p>(C) construct wall and ceiling framing according to industry standards for residential and commercial application.</p> | <p>Explain the procedure to lay out a wood frame wall, defining and describing the components such as plates, studs, partitions, door and window openings, bracing, and other components.</p> <p>Given a set of blueprints, calculate the length of a stud and estimate the amount of material needed to frame a wall and ceiling assembly.</p> <p>Cut and assemble wood and metal wall framing components (e.g., corner posts, T-posts, door openings, window openings, headers, cripples, king studs, trimmers, common studs).</p> <p>Erect and plumb partitions and walls with top and bottom plates.</p> <p>Brace exterior walls and install wind bracing.</p> |  |

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|                           |  |                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Lay out, cut, and install ceiling joists and bracing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                           |
| <b>Electrical Systems</b> |  | Demonstrate knowledge and skills necessary to complete common electrical system tasks in a single-family residence in accordance with accepted industry standards. | Use and apply scientific principles and technical knowledge to electrical systems applications for residential and commercial construction. Student is expected to:<br>(A) understand the hazards associated with electrical systems and how they effect the human body;<br>(B) understand and appropriately use technical terminology associated with electrical systems;<br>(C) identify electrical circuits and apply knowledge of scientific principles to solve electrical-related problems;<br>(D) explain the using ground fault circuit interrupters (GFCIs); and<br>(E) apply safety practices when working with electrical systems and components. | Describe how different levels of electrical shock affect the human body. Research current OSHA standards and other regulations specific to electrical systems to identify methods and equipment to reduce the risk of injury due to electrical shock.<br>Drawing on evidence from textbooks and OSHA standards, apply lockout/tagout procedures to ensure safe working conditions. For example, perform a lockout/tagout to prepare to work on an electrical device.<br>Citing technical data, explain the interrelationships among sources of current, voltage, resistance, and power in electric circuits and the units to quantify each (amperes, volts, ohms and watts).<br>Demonstrate understanding of the operation of electrical circuits (series, parallel, and series-parallel circuits)and relate it to the physical laws, such as Ohm's law and Kirchhoff's law, that govern the behavior of electrical | SkillsUSA<br>Electrical<br>Construction<br>Wiring Contest |

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|                |  |                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                    | <p>circuits and devices such as the function of resistors in electrical circuits. Accurately apply these physical laws to solve problems. For example, use Ohm's law to calculate the current flow of a circuit for an electric dryer with a given voltage and resistance. Prepare rough framing for the installation of electrical cables and conduit.</p> <p>Lay out components to the tolerances indicated on the construction drawings, specifications, and government codes. Install typical devices, junction boxes, and panels.</p> |  |
| <b>Roofing</b> |  | Demonstrate knowledge and technical skills related to roofing systems in residential and commercial construction applications. | <p>Understand and apply construction knowledge related to roofing systems. Student is expected to:</p> <p>(A) identify Common types of roofs and roofing materials in residential and commercial construction;</p> <p>(B) identify terminology associated with roofing systems;</p> <p>(C) describe methods to layout roof rafters and gables;</p> | <p>Compare and contrast roof types and materials. Identify common material types and their applications. Describe various materials used for sheathing and underlayment. Research applicable code for residential and commercial applications and report on the findings. Lay out and install shingles and other roof finishes (e.g., fiberglass, asphalt, wood, valley material, felt paper, starter strip, hip and ridge caps).</p>                                                                                                      |  |

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|                          |  |                                                                                                                                                                                                              | (D) describe basics of roof sheathing installation; and<br>(E) describe how to complete a roofing materials takeoff and estimate.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Building Envelope</b> |  | Define the building envelope and how it relates to the weatherization process in construction.<br>Demonstrate the application of exterior finish materials and protective finishes in building construction. | Understand the concept of building envelope and apply proper weatherization techniques to common building components. Students are expected to:<br>(A) identify the components of the building envelope;<br>(B) demonstrate the process for proper window installation;<br>(C) demonstrate proper door installation;<br>(D) demonstrate proper skylight installation; and<br>(E) demonstrate understanding of weatherization processes. | Research a weatherization product on the market and report on its application and effectiveness.<br>List all potential air or moisture entry points in a home/building and ways that those can be minimized or prevented.<br>Describe various types and uses of doors and windows used in building construction.<br>Install pre-hung windows, skylights, and doors using appropriate flashing and trim. |  |

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| <b>Applied Mathematics</b> |  | Apply the appropriate mathematical calculations used in the construction trades. | Use mathematical construction for the application of construction related tasks. Student will:<br>(A) Apply formulas to determine area, volume, lineal, board, and square feet.<br>(B) apply the Pythagorean Theorem to calculate pipe offsets, roof slope, and check for square.<br>(C) estimate the materials needed to complete a specific task. | Demonstrate ability to select and use appropriate mathematical constructs as applied to construction tasks or for problem-solving. These competencies may be demonstrated and evaluated throughout the course. |  |
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## Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc) [CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

## Reading, Writing, & Communicating

### Standard 1: Oral Expression and Listening

- **Prepared Graduate 1:** Collaborate effectively as group members or leaders who listen actively and respectfully; pose thoughtful questions, acknowledge the ideas of others; and contribute ideas to further the group's attainment of an objective.
- **Prepared Graduate 2:** Deliver effective oral presentations for varied audiences and varied purposes.

### Standard 2: Reading for All Purposes

- **Prepared Graduate 3:** Read a wide range of literary texts to build knowledge and to better understand the human experience.
- **Prepared Graduate 4:** Read a wide range of informational texts to build knowledge and to better understand the human experience.
- **Prepared Graduate 5:** Understand how language functions in different contexts, command a variety of word-learning strategies to assist comprehension, and make effective choices for meaning or style when writing and speaking.

### **Standard 3: Writing and Composition**

- **Prepared Graduate 6:** Craft arguments using techniques specific to the genre.
- **Prepared Graduate 7:** Craft informational/explanatory texts using techniques specific to the genre.

### **Standard 4: Research Inquiry and Design**

- **Prepared Graduate 10:** Gather information from a variety of sources; analyze and evaluate its quality and relevance; and use it ethically to answer complex questions.

*Note: Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.*