Texas CTE: Architecture and Construction

Construction Technology I

General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Construction or Principles of Architecture. Students shall be awarded two credits for successful completion of this course. CT1.A

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Introduction CT1.B

1 Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. CT1.B.1

2 The Architecture and Construction Career Cluster focuses on designing, planning, managing, building, and maintaining the built environment. CT1.B.2

3 In Construction Technology I, students will gain knowledge and skills needed to enter the workforce as carpenters or building maintenance supervisors or to prepare for a postsecondary degree in construction management, architecture, or engineering. Students will acquire knowledge and skills in safety, tool usage, building materials, codes, and framing. For safety and liability considerations, limiting course enrollment to 15 students is recommended. CT1.B.3

4 Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations. CT1.B.4

5 Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples. CT1.B.5

Knowledge and skills. CT1.C

1 **The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:** CT1.C.1

- A explain the role of an employee in the construction industry; CT1.C.1.A
- B apply critical-thinking skills; CT1.C.1.B
- C demonstrate the ability to solve problems using critical-thinking skills; CT1.C.1.C
- D demonstrate knowledge of basic computer systems; CT1.C.1.D
- E explain common uses for computers in the construction industry; CT1.C.1.E
- F define effective relationship skills; and CT1.C.1.F
- G recognize workplace issues such as sexual harassment, stress, and substance abuse. CT1.C.1.G

2 **The student understands that safe working standards are imperative in the classroom and in the field. The student is expected to:** CT1.C.2

- A explain the idea of a safety culture; CT1.C.2.A
- B explain the importance of a safety culture in the construction crafts; CT1.C.2.B
- C explain the role of Occupational Safety and Health Administration (OSHA) in job-site safety; CT1.C.2.C
- D explain fall protection, ladder safety, stair safety, and scaffold safety procedures; CT1.C.2.D
- E explain the importance of hazard communication (HazCom); CT1.C.2.E
- F explain the importance of Safety Data Sheets (SDS); CT1.C.2.F
- G explain OSHA's General Duty Clause; CT1.C.2.G
- H explain OSHA 1926 CFR Subpart C; CT1.C.2.H
- I identify causes of accidents; CT1.C.2.I
- J identify impacts of accident costs; CT1.C.2.J
- K identify struck-by hazards; CT1.C.2.K
- L identify caught-in-between hazards; CT1.C.2.L
- M identify other construction hazards on the job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires; CT1.C.2.M
- N define safe work procedures around electrical hazards; CT1.C.2.N
- O define hazard recognition; CT1.C.2.O
- P define risk assessment techniques; and CT1.C.2.P
- Q demonstrate the use and care of appropriate personal protective equipment, including safety goggles and glasses, hard hat, gloves, safety harness, and safety shoes. CT1.C.2Q

3 **The student identifies various opportunities in the field of carpentry and the characteristics a carpenter should possess. The student is expected to:** CT1.C.3

A identify job opportunities and their accompanying job duties such as carpentry, building maintenance supervisor, architect, and engineer; and CT1.C.3.A

B research careers along with the education, job skills, and experience required to achieve them. CT1.C.3.B

4 **The student gains knowledge about building materials used in the construction industry. The student is expected to:** CT1.C.4

A identify various types of building materials and their uses; CT1.C.4.A

B state the uses of various types of hardwoods and softwoods; CT1.C.4.B

C identify the different grades and markings of wood building materials; CT1.C.4.C

D describe the proper method of storing and handling building materials; CT1.C.4D

E state the uses of various types of engineered lumber; CT1.C.4.E

F calculate the quantities of lumber and wood products using industry-standard methods; and CT1.C.4.F

G describe the fasteners, anchors, and adhesives used in construction work and explain their uses. CT1.C.4.G

5 **The student applies the proper and safe use of hand and power tools associated with carpentry. The student is expected to:** CT1.C.5

A identify the hand tools commonly used by carpenters and describe their uses; CT1.C.5.A

B use hand tools in a safe and appropriate manner; CT1.C.5.B

C state the general safety rules for operating all power tools, regardless of type; CT1.C.5.C

D identify the portable power tools commonly used by carpenters and describe their uses; and CT1.C.5.D

E use portable power tools in a safe and appropriate manner CT1.C.5.E

6 **The student interprets architectural and engineering working drawings and specifications. The student is expected to:** CT1.C.6

A describe the types of drawings usually included in a set of plans and list the information found on each type; CT1.C.6.A

B identify the different types of lines used on construction drawings; CT1.C.6.B

C identify selected architectural symbols commonly used to represent materials on plans; CT1.C.6.C

D identify selected electrical, mechanical, and plumbing symbols commonly used on plans; CT1.C.6.D

E identify selected abbreviations commonly used on plans; CT1.C.6.E

F read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings; CT1.C.6.F

G state the purpose of written specifications; CT1.C.6.G

H identify and describe the parts of a specification; and CT1.C.6.H

I demonstrate or describe how to perform a quantity takeoff for materials. CT1.C.6.I

7 **The student gains knowledge of wood framing and the layout and construction of wood-framed floor systems using common and engineered lumber. The student is expected to:** CT1.C.7

A identify the different types of framing systems; CT1.C.7.A

B read and interpret drawings and specifications to determine floor system requirements; CT1.C.7.B

C identify floor and sill framing and support members; CT1.C.7.C

D name the methods used to fasten sills to the foundation; CT1.C.7.D

E select the proper girder or beam size from a list of available girders or beams given specific floor load and span data; CT1.C.7.E

F list and recognize different types of bridging; CT1.C.7.F

G list and recognize different types of flooring materials; CT1.C.7.G

H explain the purposes of subflooring and underlayment; CT1.C.7.H

I select the appropriate fasteners to be used in various floor framing systems; CT1.C.7.I

J estimate the amount of material needed to frame a floor assembly; CT1.C.7.J

K lay out and construct a floor assembly; CT1.C.7.K

L install bridging; CT1.C.7.L

M install joists for a cantilever-floor; CT1.C.7.M

N install a subfloor using butt-joint plywood or oriented strand board panels; and CT1.C.7.N

O install a single floor system using tongue-and-groove (T&G) plywood or oriented strand board (OSB) panels. CT1.C.7.O

8 **The student knows how to lay out and frame walls and ceilings, rough-in door and window openings, construct corners and partition Ts, brace walls and ceilings, and apply sheathing. The student is expected to:** CT1.C.8

- A identify the components of a wall and ceiling layout; CT1.C.8.A
- B describe the procedure for laying out a wood frame wall, including the installation of plates, corner posts, door and window openings, partition Ts, bracings, and firestops; CT1.C.8.B
- C describe the correct procedure for assembling and erecting an exterior wall; CT1.C.8.C
- D identify the common materials and methods used for installing sheathing on walls; CT1.C.8.D
- E lay out, assemble, erect, and brace exterior walls for a frame building; CT1.C.8.E
- F describe wall framing techniques used in masonry construction; CT1.C.8.F
- G explain the use of metal studs in wall framing; CT1.C.8.G
- H cut and install ceiling joists on a wood frame building; and CT1.C.8.H
- I estimate the materials required for frame walls and ceilings. CT1.C.8.I

9 **The student gains knowledge of various types of framed roofs and how to frame these roofs using both stick-build and truss-build systems. The student is expected to:** CT1.C.9

- A demonstrate an understanding of the terms associated with roof framing; CT1.C.9.A
- B identify the roof framing members used in gable and hip roofs; CT1.C.9.B
- C identify the methods used to calculate the length of a rafter; CT1.C.9.C
- D identify the various types of trusses used in roof framing; CT1.C.9.D
- E use a framing square, speed square, and calculator in laying out a roof; CT1.C.9.E
- F identify various types of sheathing used in roof construction; CT1.C.9.F
- G frame a gable roof with vent openings; CT1.C.9.G
- H erect a gable roof using trusses; CT1.C.9.H
- I frame a roof opening; and CT1.C.9.I
- J estimate the materials used for framing and sheathing a roof. CT1.C.9.J

10 **The student knows the ingredients of concrete, various types of concrete, and methods to mix concrete. The student is expected to:** CT1.C.10

- A identify the properties of cement; CT1.C.10.A
- B describe the composition of concrete; CT1.C.10.B
- C perform volume estimates for concrete; CT1.C.10.C
- D identify types of concrete reinforcement materials and describe their uses; CT1.C.10.D
- E identify various types of footings and explain their uses; CT1.C.10.E
- F identify the parts of various types of concrete forms; CT1.C.10.F
- G explain the safety procedures associated with the construction and use of concrete forms; and CT1.C.10.G
- H erect, plumb, and brace a simple concrete form with reinforcement. CT1.C.10.H

11 **The student gains knowledge of various types of windows, skylights, and exterior doors. The student is expected to:** CT1.C.11

- A identify various types of fixed, sliding, and swinging windows; CT1.C.11.A
- B identify the parts of a window installation; CT1.C.11.B
- C state the requirements for proper window installation; CT1.C.11.C
- D install a pre-hung window; CT1.C.11.D
- E identify the common types of exterior doors and explain how they are constructed; CT1.C.11.E
- F identify the parts of a door installation; CT1.C.11.F
- G identify types of thresholds used with exterior doors; CT1.C.11.G
- H install a pre-hung exterior door; CT1.C.11H
- I identify the various types of locksets used on exterior doors and explain how the locksets are installed; CT1.C.11.I
- J install a lockset; and CT1.C.11.J
- K identify and explain the use and installation of various door and window hardware, including security hinges, keepers, deadbolts, and peep holes. CT1.C.11.K

12 The student is introduced to various types of stairs and the common building code requirements related to stairs. The student is expected to: CT1.C.12

- A identify the various types of stairs; CT1.C.12.A
- B identify the various parts of stairs; CT1.C.12.B
- C identify the materials used in the construction of stairs; CT1.C.12.C
- D interpret construction drawings of stairs; CT1.C.12.D
- E calculate the total rise, number and size of risers, and the number and size of treads required for a given stairway; CT1.C.12.E
- F lay out and cut stringers, risers, and treads; and CT1.C.12.F
- G build a small stair unit with a temporary handrail. CT1.C.12.G