STRANDS AND STANDARDS

ARCHITECTURAL DESIGN 1

Learning that works for Utah
CTE®

Course Description

The first in a sequence of courses that prepare individuals for careers in the Architecture, Engineering, and Construction (AEC) industry. This course includes instruction in 2D or 3D Computer-Aided Design (CAD) software to draw a small residential home with an emphasis on blueprint reading.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.041
Concurrent Enrollment Core Code	38.01.00.13.041
Prerequisite	None
Skill Certification Test Number	631
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Architectural Design

ADA Compliant: December 2023

STRAND 1

Careers in Architecture, Engineering, and Construction (AEC)

Standard 1

Understand the responsibilities associated with different positions within the AEC industry.

- Architect
- Engineer
- Designer: Architectural, Interior, etc
- Drafter/CAD Operator.
- Contractor: General, Concrete, Framing, Plumbing, Roofing, etc.
- Building inspector/official
- Loan/mortgage officer

Standard 2

Understand the education, training, and certification needed for each of the occupations in Strand 1 Standard 1.

- Traditional college/university
- Apprenticeship
- Trade school

Standard 3

Identify skills needed for successful AEC careers.

Performance Skill

Student can create a personal plan to become an Architect, Engineering, or Contractor in the state of Utah.

STRAND 2

Mathematics, Measuring Conventions, and Scale

Standard 1

Perform basic arithmetic functions using fractions and decimals.

- Add
- Subtract
- Multiply
- Divide

Standard 2

Convert between fractions and decimals.

Standard 3

Convert between and within metric and imperial measurements.

Standard 4

Make and record basic measurements using the following tools

- Ruler
- Measuring Tape
- Architect Scale
- Engineering Scale

Standard 5

Commonly used Industry calculations:

- Area
  - Square footage of a house
- Material Estimation
  - Research cost per square foot in your local area.
- Acerage
  - Acre = 43,560 ft2
- Stairs
  - Rise (individual and total)
  - Run (individual and total)

Performance Skill

Student can accurately measure to 1/16” and to a millimeter.
Student can add, subtract, multiply, divide, and convert in fractions and decimal units.
Student can convert between and within metric and imperial units.
Student can calculate common industry measurements (Strand 2 Standard 5).

STRAND 3

Reading and Interpreting Residential Construction Documents

Standard 1

Understand the following aspects of residential construction drawings/plans:

- General Notes and Labels
- Title Block
  - Format
  - Necessary Info
- Alphabet of Lines
- Scale
- Dimensions
- Commonly used symbols/icons
  - Floor plans
    - Doors
    - Windows
    - Bathroom Fixtures
      - Toilet/Water Closet
      - Bathtub
      - Sink/Lavatory/Vanity
      - Shower
    - Appliances
      - Refrigerator
      - Stove/Oven/Range/Cooktop
      - Dishwasher
      - Washing Machine
      - Dryer
  - Electrical/ mechanical plans
    - Switch(s)
    - Duplex 110v receptacle outlet

- GFCI Outlet
- 220V Outlet
- Ceiling mounted light
- Smoke Detector
- CO2 Detector
- Water heater
- Furnace
- Others as needed

Standard 2

Read and interpret residential home drawings that include:

- General notes
- Site plan
- Foundation
- Floor plans
- Elevation drawings
- Electrical plans
- Building cross and wall sections
- Stair details

Performance Skill

Student can read and understand residential construction drawings used in the AEC industry.

STRAND 4

Architectural Sketching

Standard 1

Proper sketching techniques.
Create freehand sketches using paper, pencil, and an eraser (without the benefit of a straight edge, compass, or template) which is neat, clear, and smudge-free.
Demonstrate the use of lines as they are drawn according to the alphabet of lines. Understand and use accepted dimensioning practices for sketches.

Performance Skill

Student can sketch a proportional drawing to convey a general layout

STRAND 5

Architectural Planning using CAD/BIM software

Standard 1

CAD/BIM Software

- Navigating a CAD software interface.
- Proper use of wall, room, door, and window types, common floor materials, and construction terminology
- Proper placement of components including kitchen, bathroom, and laundry features.
  - Kitchen types
    - Corridor (Galley, Hallway)
    - One Wall

        - L-shape
        - U-shape
        - Island
        - Peninsula
    - Bathroom types
        - Half Bath (Powder Room)
        - ¾ Bath
        - Full Bath
- Use of lines as they are drawn according to the alphabet of lines.
- Fully dimension the plan.
- Use of leaders and notes using the correct text height and text style.
- Placement and use of title block information.
- Placement and use of general and specific notes.

Standard 2

Drawing a Foundation plan

- Understand the different types of foundations.
    - Slab on grade
    - Crawl space
    - Basement

Standard 3

Drawing Elevation plans

- Proper dimensioning
- Proper Annotations
- Material Symbols
    - Masonry
    - Log
    - Siding
    - Roofing

Standard 4

Drawing a Roof plan

- Identify roof types
    - Gable
    - Gambrel
    - Shed
    - Hip
    - Dutch hip
    - Flat
- Pitch
- Slope
- Common roofing materials
    - Asphalt shingles
    - Metal
    - Slate
    - Tile
- Construction terminology
    - Rafter

- Valley
- Ridge
- Truss
  - Chord
  - Web
- Eave
- Soffit
- Fascia
- Drip edge

Standard 5

Drawing a Site plan

- The Building
  - Dimensions
    - Size
    - Location
- Property boundaries
  - Property description
- North Arrow
- Utilities
- Easements and Setbacks
- Flat work
  - Sidewalk
  - Driveway
  - Curb
  - Gutter

Performance Skill

Student can reproduce a floor plan.
Student can reproduce a site plan.
Student can reproduce an elevation.
Student can reproduce a foundation plan.

STRAND 6

Identify the components of a typical wall section.

Standard 1

Identify the components of the following building systems:

- Foundation
  - Footings
  - Stem walls
  - Slab
  - Porch cap
  - J bar
  - Rebar
  - Anchor bolt
- Engineered Floor
  - Sill plate

    - Floor joists
    - Sub-floor
    - Rim Joist
- Exterior walls
    - Exterior & interior materials
    - Insulation
    - Doors
    - Windows
- Interior walls
    - Partition
    - Plumbing
    - Bearing
- Framing
    - Top plate
        - Single
        - Double
    - Sole plate
    - Treated Sill plate
    - Header
    - Stud
    - Sheathing
    - Fire Blocking

Performance Skill

Student can Identify the individual components of a wall section

Technology & Engineering Workplace Skills

- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use personal electronic devices.
- Maintain a high standard of industrial hygiene by:
    - adopting strong habits of professional dress and personal hygiene,
    - wearing the appropriate personal protective equipment,
    - adopting the habit to “clean as you go”, and
    - guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:
    - understanding and complying with established safety procedures,
    - watching for and speaking out when potential hazards and concerns are observed, and
    - actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with awareness and respect cultural differences.
- Exhibut initiative and leadership while demonstrating the ability to adapt to changing needs and situations.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
    - addition, subtraction, multiplication, division,
    - fraction to decimal as well as decimal to fraction conversions, and

    - using decimal places.
- Understand mathematical concepts such as:
    - ratios and proportions,
    - rounding and tolerance ranges,
    - engineering notation, and
    - metric equivalents.
- Demonstrate an ability to solve problems and develop improvements to products and processes using critical thinking and creativity.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Points by Strand								Total Points	Total Questions
		1	2	3	4	5	6	7	8		
CAD Architectural 1	631										