

STATE OF WYOMING
ARCHITECTURE AND CONSTRUCTION CLUSTER AND PATHWAY COMPETENCIES

ARCHITECTURE AND CONSTRUCTION CLUSTER

Cluster Level Core Competencies & Objectives

COMPETENCY

AC1 The student will understand and apply Occupational Safety and Health Standards (OSHA)

OBJECTIVES

- AC1-1 Demonstrate knowledge of and apply safety concepts related to the safe use of hand-tools, power/pneumatic tools, clothing and hair
 - Examples: carrying tools properly, use of safety guard, inspection of tools, changing blades and bits
- AC1-2 Demonstrate knowledge of and employ proper maintenance, set-up and inspection procedures for tools
 - Examples: lubrication, cords, hoses, connections, placing of switch, safety guards
- AC1-3 Demonstrate knowledge of the use and purpose of personal protective equipment (PPE)
 - Examples: respirators, safety glass, steel toed shoes, fall protection, hard-hats, hearing, etc.
- AC1-4 Demonstrate familiarity with emergency situations and procedures, including: use and location of first aid supplies, fire extinguishers, eye washers, understanding of blood pathogens, and evacuation procedures
- AC1-5 Follow safe procedures when handling materials
 - Examples: Proper lifting and carrying, material stacking and storage

COMPETENCY

AC2 The student will be able to demonstrate knowledge of applied mathematics

OBJECTIVES

- AC2-1 Perform basic arithmetic functions with real numbers
- AC2-2 Convert fractions/decimals
- AC2-3 Convert metric/inch measurement
- AC2-4 Perform basic trigonometric and geometric functions, solving for unknown angles and sides
- AC2-5 Demonstrate measurement skills
- AC2-6 Calculation: add, subtract, multiply and divide with fractions

COMPETENCY

AC3 The student will demonstrate knowledge of the different career paths and opportunities within a pathway

- Example: Layout and assemble a floor deck using dimensional lumber

Example: Technical Drafting – Student demonstrates an awareness of possible careers related to Technical Drafting and an awareness of the academic preparation needed to qualify for those possible careers

Architecture and Construction Cluster
CABINETMAKING AND WOODWORKING PATHWAY

Pathway Core Competencies & Objectives

COMPETENCY

ACCW1 The student will demonstrate knowledge of the safe use of stationary and portable power tools

OBJECTIVES

- ACCW1-1 Demonstrate safe use of stationary power tools for woodworking (set up, inspection, operation)
- Table Saw
 - Radial Arm Saw
 - Band Saw
 - Scroll Saw
 - Band of Scroll Saw
 - Surface Planer
 - Jointer
 - Drill Press
 - Sanding Machine
 - Power Miter Saw
 - Router Table
- ACCW1-2 Demonstrate the purposes and proper use of hand-held power tools (set up, inspection, operation):
- Routers,
 - Nail Guns
 - Power Drills & Drivers
 - Pneumatic Tools
 - Portable Sanders
 - Other Machines on a program-by-program basis

COMPETENCY

ACCW2 The student will demonstrate basic applied math and measuring concepts

OBJECTIVES

- ACCW2-1 Use tape measure to create an accurate measurement within a tolerance (using sixteenths)
- ACCW2-2 Use basic math skills to calculate materials needed and estimate project costs

COMPETENCY

ACCW3 The student will demonstrate a knowledge of design, planning and estimation process

OBJECTIVES

- ACCW3-1 Read and use a blue print to plan and create a project
- ACCW3-2 Use a material list
- ACCW3-3 Use a procedure list

COMPETENCY

ACCW4 The student will identify materials accurately

OBJECTIVES

- ACCW4-1 Identify wood types (hardwoods, softwoods, manufactured)
- ACCW4-2 Identify appropriate use of woods for a specific purpose (e.g., use of manufactured vs. hardwood/softwood)

COMPETENCY

ACCW5 The student will cut and shape components accurately

OBJECTIVES

- ACCW5-1 Choose tools for specific operations
- ACCW5-2 Employ order of operations to true and square a board
- ACCW5-3 Demonstrate truing and squaring a board
- ACCW5-4 Demonstrate basic joinery (dado, edge, miter, lap, rabbit, butt)

COMPETENCY

ACCW6 The student will demonstrate knowledge of the use of fasteners and adhesives

OBJECTIVES

- ACCW6-1 Describe the common types of adhesives and fasteners used in construction work and explain their uses
- ACCW6-2 Choose appropriate fastener for the task (glues, joinery, nails, screws)
- ACCW6-3 Demonstrate knowledge of clamping techniques (e.g., types of clamps and how long to apply clamps)
- ACCW6-4 Select and install hardware (hinges, drawer slides, handles)

COMPETENCY

ACCW7 The student will demonstrate finishing techniques

OBJECTIVES

ACCW7-1	Able to choose appropriate sanding technique for the task (tools, grit, abrasive type)
ACCW7-2	Demonstrate appropriate sanding techniques (visible flaws and machine marks removed, sanding with the grain)
ACCW7-3	Demonstrate knowledge of and use of safe handling and clean-up of lacquers, paints, stains, wood fillers
ACCW7-4	Demonstrate knowledge of and use of Material Safety Data Sheets

Note: We would like to acknowledge that some schools within the state currently or will in the future offer the following. However, these topics are NOT OFFERED STATEWIDE due to size or time limitations and as such, competencies have not been identified at this time.

- Mass production processes, company organization, product pricing,
- Entrepreneurship/Custom furniture and fine custom cabinetry
- Cabinet installation
- Transportation issues: handling and damage reduction, proper placement and protection during transportation
- Wood bending and laminating processes
- Countertop types and methods (granite, solid surface, laminates, tile, veneer, metal)
- Advanced techniques: face frame, raised panel, casework (faceframe or European styles)
- Engraving and decoration (computer machining, CNC router, CNC lathe, CNC laser)

Architecture and Construction Cluster
RESIDENTIAL/COMMERCIAL CARPENTRY PATHWAY

Pathway Core Competencies & Objectives

COMPETENCY

ACRCP1 The student will demonstrate job-site safety

OBJECTIVES

ACRCP1-1 Properly place ladders

ACRCP1-2 Demonstrate knowledge of proper scaffolding placement

COMPETENCY

ACRCP2 The student will demonstrate a general knowledge of the similarities and differences between residential and commercial construction

OBJECTIVES

ACRCP2-1 Demonstrate knowledge of applicable codes and licenses (civil, commercial, residential, fire codes, metal vs. wood)

COMPETENCY

ACRCP3 The student will read and interpret blueprints or plans

ACRCP3-1 Apply measurements from a blueprint (plan) to a construction project or site

ACRCP3-2 Demonstrate knowledge of cross-sections, elevations, schedules

COMPETENCY

ACRCP4 The student will demonstrate knowledge of site layout, walls, foundation and slabs

OBJECTIVES

ACRCP4-1 Tool selection for specific tasks including; use of batter boards; measuring and locating building corners; and squaring using the 3-4-5 method, etc.

ACRCP4-2 Identify the three types of foundation construction (T-type, caissons, slab)

COMPETENCY

ACRCP5 The student will demonstrate knowledge of framing

OBJECTIVES

Floor Framing:

- ACRCP5-1 Identifying framing members (still plates, joists, beams, sheathing, hangers glues, fasteners)
- ACRCP5-2 Demonstrate layout and assembly techniques
 - Example: Layout and assemble a floor deck using dimensional lumber)

Wall Framing:

- ACRCP5-3 Identifying framing members (sole plate, studs, headers, trimmers, jack studs, corner techniques, wall intersections, top plates sheathing hangers, glues, fasteners)
- ACRCP5-4 Demonstrate layout and assembly techniques (layout of openings, windows, doors)
- ACRCP5-5 Describe and demonstrate the correct procedures for wall erection (bracing, order of construction)
- ACRCP5-6 Differentiate between bearing and non-bearing walls
- ACRCP5-7 Layout, assemble and erect a bearing and non-bearing walls

Roof Framing:

- ACRCP5-8 Identify conventional vs. trusses (stick-built vs. pre-fab)
- ACRCP5-9 Identify roof style/designs
- ACRCP5-10 Select and install appropriate hangers, fasteners
- ACRCP5-11 Application of roof sheathing
- ACRCP5-12 Layout, assemble and erect a roof frame

COMPETENCY

ACRCP6 The student will demonstrate knowledge of exterior finishes

OBJECTIVES

- ACRCP6-1 Demonstrate knowledge of the process/sequence for installation of doors (shim to be square and plumb)
- ACRCP6-2 Demonstrate knowledge of the process/sequence for installation of windows (shim to be square and plumb)
- ACRCP6-3 Identify fascia board and soffits
- ACRCP6-4 Identify types of siding by material (vinyl, wood, brick siding, stucco, etc.)
- ACRCP6-5 Identify siding by orientation (lap and vertical)
- ACRCP6-6 Demonstrate correct installation of siding and flashing (measurement and application)
- ACRCP6-7 Identify types of roofing materials (shingles, tiles, metal, etc.)
- ACRCP6-8 Correctly install underlayment, roofing material and appropriate flashing

COMPETENCY

ACRCP7 The student will demonstrate awareness of Building Codes and Permits

OBJECTIVES

- ACRCP7-1 Identify the process of obtaining permits

COMPETENCY

ACRCP8 The student will create materials cost estimate from a set of plans

COMPETENCY

ACRCP9 The student will demonstrate knowledge of decks and rails

COMPETENCY

ACRCP10 The student will demonstrate knowledge of interior finishes

OBJECTIVES

- ACRCP10-1 Demonstrate knowledge of application and installation of drywall
- ACRCP10-2 Identify tools and materials for drywall installation
- ACRCP10-3 Install of doors, casing, base and window trim
- ACRCP10-4 Order of installation for a door
- ACRCP10-5 Identify basic trim joints
- ACRCP10-6 Cut proper trim joints (coping joints, butt joints, miter joints)
- ACRCP10-7 Install casework (cabinets, countertops, vanities)
- ACRCP10-8 Identification of different paints and finishes
- ACRCP10-9 Identify different types of floor covering (hardwoods, tile, carpet, laminates, vinyl, concrete)

COMPETENCY

ACRCP11 The student will demonstrate knowledge of concrete placement

OBJECTIVES

- ACRCP11-1 Building forms for concrete placement
- ACRCP11-2 Placement of reinforcement for concrete
- ACRCP11-3 Calculate quantity per job
- ACRCP11-4 Flatwork finish and installation

COMPETENCY

ACRCP12 The student will demonstrate knowledge of energy efficient construction

OBJECTIVES

- ACRCP12-1 Demonstrate awareness and understanding of green building materials and techniques
- ACRCP12-2 Identify r-values
- ACRCP12-3 Know the difference between Passive solar and active solar energy construction
- ACRCP12-4 Demonstrate knowledge of different insulation types and the appropriate uses of each

Other competencies NOT OFFERED STATEWIDE (and for which competencies have not been identified by this group):

- DRYWALL FINISHING AND PAINTING
- HVACR/SHEET METAL
- MASONRY
- PLUMBING
- RESIDENTIAL WIRING
- HOME IMPROVEMENT REPAIR AND SERVICES

Architecture and Construction Cluster
ARCHITECTURAL DRAFTING PATHWAY

Pathway Core Competencies & Objectives

COMPETENCY

ACAD1 The student will demonstrate knowledge of architectural drawing standards

OBJECTIVES

- ACAD1-1 Demonstrate knowledge of appropriate Uniform Drawing Standards (UDS)
- Example 1: Use appropriate line types (center, hidden, phantom, object)
 - Example 2: Dimension using appropriate styles and standards (correct placement of measurement/dimensions)

COMPETENCY

ACAD2 The student will apply architectural room planning (sleeping, living and service areas)

OBJECTIVES

- ACAD2-1 List of family needs that should be considered when planning a dwelling
- ACAD2-2 Demonstrate knowledge of factors to be considered (family budget, family activities, family size, and design)
- ACAD2-3 Demonstrate knowledge of the appropriate size for a component of a dwelling based on building code and family size: bedroom, bathroom, living room, garage, closet space
- ACAD2-4 Demonstrate knowledge of good traffic flow

COMPETENCY

ACAD3 The student will design a residential floor plan

OBJECTIVES

- ACAD3-1 Design and draw (to scale) a residential floor plan using the accepted symbols and techniques
- ACAD3-2 Dimension the floor plan in a clear and precise manner, complying with arch standards. (put measurements in the right places and the right form, appropriate to foundation plan vs. floor plan)
- ACAD3-3 List the information to be included on a typical floor plan
- ACAD3-4 Develop or complete a door and window schedule (list of sizes, opening, door types, window specs, mfg numbers, quantity)
- ACAD3-5 Draw and label roof/floor framing for a floor plan
- ACAD3-6 The student will demonstrate knowledge of nominal size of materials

COMPETENCY

ACAD4 The student will analyze, calculate and design footings and foundations

OBJECTIVES

- ACAD4-1 Analyze the typical floor plan to determine the appropriate foundation, given footing size and foundation thickness
- ACAD4-2 Develop foundation plan showing placement of columns and floor framing

COMPETENCY

ACAD5 The student will lay out interior and exterior elevations

OBJECTIVES

- ACAD5-1 List the features that should be included on an exterior elevation
- ACAD5-2 Identify the dimensions commonly shown on elevations
- ACAD5-3 Illustrate symbols that are often found on elevations
- ACAD5-4 Draw a typical exterior elevation
- ACAD5-5 Calculate appropriate roof pitch/slope for a residence

COMPETENCY

ACAD6 The student will demonstrate knowledge of wall construction

OBJECTIVES

- ACAD6-1 Label/name components of a typical frame wall
- ACAD6-2 Identify methods of frame wall construction (balloon framing, platform framing)
- ACAD6-3 Draw typical wall section and full cross-sections
- ACAD6-4 Demonstrate awareness of alternative wall construction (masonry, rammed earth, etc.)

COMPETENCY

ACAD7 The student will lay out stair details

OBJECTIVES

- ACAD7-1 Calculate appropriate rise and run (risers and tread), given set parameters
- ACAD7-2 Draw and dimension interior stairs

The following are competencies that are NOT OFFERED STATEWIDE. Accordingly, these core competencies apply only to those programs that cover these topics.

COMPETENCY

ACAD8 The student will lay out electrical plans

OBJECTIVES

- ACAD8-1 Draw electrical plans for all floors to comply with national electrical code
- ACAD8-2 Identify appropriate uses of GFCI (ground fault circuit interrupter)
- ACAD8-3 Identify appropriate spacing for wall outlets
- ACAD8-4 Identify appropriate placement for wall switches and fixtures (e.g. not behind a door, outlet by each entryway, switches at each end of stairs)
- ACAD8-5 Identify appropriate placement of service entrance
- ACAD8-6 Demonstrate knowledge of low-voltage devices and installation: doorbells, garage door switches, detectors (smoke, co2)

COMPETENCY

ACAD9 The student will lay out site plans

COMPETENCY

ACAD10 The student will lay out presentation drawings

Architecture and Construction Cluster
TECHNICAL DRAFTING PATHWAY

Pathway Core Competencies & Objectives

COMPETENCY

ACTD1 The student will develop a technical drawing using orthographic projection

OBJECTIVES

- ACTD1-1 Create an orthographic projection
- ACTD1-2 Identify the missing view of an object, given two of three orthographic projections
- ACTD1-3 Demonstrate knowledge of appropriate American National Standards Institute (ANSI)
 - Example 1: Use appropriate line types (center, hidden, phantom, object)
 - Example 2: Dimension using appropriate styles and standards (correct placement of measurement/dimensions)

COMPETENCY

ACTD2 The student will develop technical drawings using standard sectional views.

OBJECTIVES

- ACTD2-1 Create each of the standard sectional views
- ACTD2-2 Identify types of sectional views (full, half, offset, broken-out, removed and revolved)
- ACTD2-3 Select the appropriate type of sectional view for a specific situation

COMPETENCY

ACTD3 The student will be able to demonstrate the use of auxiliary views

OBJECTIVES

- ACTD3-1 Create a primary auxiliary view according to specifications provided
- ACTD3-2 Identify the situations in which auxiliary view is necessary

COMPETENCY

ACTD4 The student will be able to demonstrate knowledge of and create pictorial drawings (isometric, oblique, and perspective)

OBJECTIVES

- ACTD4-1 Identify three types of pictorial drawings
- ACTD4-2 Create an isometric view of a given shape, given an orthographic projection
- ACTD4-3 Pick the appropriate isometric image, given the orthographic projections

COMPETENCY

ACTD5 The student will operate printers, plotters and scanners (including 3-D printers where applicable)

OBJECTIVES

ACTD5-1 Scale and print a drawing on an appropriate size paper

COMPETENCY

ACTD6 The student will demonstrate knowledge of and create working drawings (body of evidence activity/capstone activity)

OBJECTIVES

ACTD6-1 Draw all necessary views of each part

ACTD6-2 Apply necessary notes, material specifications, symbols, and other data

ACTD6-3 Complete a parts list of the parts, which include parts number, mfg name, mfg stock number, material specs, quantity of each part, and notes for assembly

ACTD6-4 Complete an assembly drawing showing the relationship of the parts to each other

The following are competencies that are NOT OFFERED STATEWIDE. Accordingly, these core competencies apply only to those programs that cover these topics.

COMPETENCY

ACTD7 The student will demonstrate the use of intersections, parallel and radial line developments

COMPETENCY

ACTD8 The student will demonstrate the use of fasteners

OBJECTIVES

ACTD8-1 Identify various types of fasteners

ACTD8-2 Define thread terminology

ACTD8-3 Develop different thread forms

ACTD8-4 Calculate thread pitch

ACTD8-5 Draw simplified and schematic views of threads (internal and external)

ACTD8-6 Correctly draw, locate and label various fasteners on production, assembly drawings and parts lists

COMPETENCY

ACTD9 The student will demonstrate the basics of Geometric Dimensioning and Tolerancing (GD&T)

OBJECTIVES

- ACTD9-1 Create limit dimensions
- ACTD9-2 Understand basic tolerance terminology

COMPETENCY

ACTD10 The student will demonstrate knowledge of and identify basic welding symbols

OBJECTIVES

- ACTD10-1 Identify and demonstrate knowledge of the basic weld symbols
- ACTD10-2 Demonstrate knowledge of and specify weld types on drawings