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