Architecture & Construction
CAREER CLUSTER DESIGN

Construction & Design– CIP Code 46.0000

Approved Pathway:

1) Includes minimum of three secondary-level credits.
2) Includes a work-based element.
3) Consists of a sequence: Introductory-level, Technical-level, and Application-level courses.
4) Supporting documentation includes Articulation Agreement(s), Certification, Program Improvement Plan, and a Program of Study.
5) Technical-level and Application-level courses receive .5 state-weighted funding in an approved CTE pathway.

INTRODUCTORY LEVEL

**Introduction to Industrial Technology	38001	.5 credit
Drafting	21102	.5 credit

TECHNICAL LEVEL

Design Strand		
Drafting / CAD	21107	1 credit
Architecture Design	21103	1 credit

Construction Strand		
Carpentry	17002	1 credit
Woodworking Principles	17007	1 credit
Skilled Mechanical Crafts	17062	.5 credit

APPLICATION LEVEL

Design Strand		
Research & Design for Pre-Construction	21109	1 credit
Advanced Studies	38050	.5 credit
Residential Interior Design	22212	.5 credit
Commercial & Industrial Interior Design	38212	.5 credit

Construction Strand		
*Carpentry II	38002	1 credit
Furniture & Cabinetry Fabrication	38007	1 credit
*Sheet Metal & HVACR	38012	1 credit
*Research & Design in Building Trades	17005	1 credit
*Remodel & Building Maintenance	17009	.5 credit
*Sheet Metal	13205	.5 credit
*HVAC Technology	17056	.5 credit
*Plumbing Technology	17058	.5 credit
*Electrical & Security Systems	17113	.5 credit
*Pipefitting Technology	17061	1 credit
***Advanced Materials Technology	38010	1 credit

* Carpentry I (17002) is a Pre-requisite ** Required for Construction Strand *** 17007 & 38007 are Pre-requisites

Approved Pathway must contain 3 credits within one strand before adding courses from other strand.

KANSAS STATE CAREER CLUSTER COMPETENCY PROFILE (C.I.P. 46.0000)

ARCHITECTURE & CONSTRUCTION

CONSTRUCTION & DESIGN PATHWAY

STUDENT_____

Rating Scale:

4 - Exemplary Achievement
3 - Proficient Achievement
2 - Limited Achievement
1 - Inadequate Achievement
0 - No Exposure

Graduation Date _____

I certify that the student has received training in the areas indicated.

Instructor Signature _____

Instructor Signature _____

Instructor Signature _____

Instructor Signature _____

CAREER READY PRACTICES (Taught throughout the cluster courses)

4 3 2 1 0 1. Act as a responsible and contributing citizen and employee (including working knowledge of workplace issues such as sexual harassment, stress & substance abuse)

4 3 2 1 0 2. Apply appropriate academic (math, science, English, social science) and technical skills

4 3 2 1 0 3. Attend to personal health and financial well-being

4 3 2 1 0 4. Communicate clearly, effectively, and with reason (speaking, listening, reading, writing – including giving & following instructions)

4 3 2 1 0 5. Consider the environmental, social, and economic impacts of decisions

4 3 2 1 0 6. Demonstrate creativity and innovation

4 3 2 1 0 7. Employ valid and reliable research strategies (including ability to interpret information)

4 3 2 1 0 8. Utilize critical thinking to make sense of problems and persevere in solving them

4 3 2 1 0 9. Model integrity, ethical leadership, and effective management

4 3 2 1 0 10. Plan education and career path aligned to personal goals

4 3 2 1 0 11. Use technology to enhance productivity

4 3 2 1 0 12. Work productively in teams while using cultural / global competence

ARCHITECTURE & CONSTRUCTION CLUSTER STANDARDS (Taught throughout the cluster courses)

4 3 2 1 0 1. Use vocabulary, symbols, and formulas commonly used in design and construction

4 3 2 1 0 2. Use architecture and construction skills to create and manage a project

4 3 2 1 0 3. Comply with regulations and applicable codes to establish and manage a legal and safe workplace / jobsite

4 3 2 1 0 4. Understand the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction play in society and the economy

4 3 2 1 0 5. Understand the roles and responsibilities among trades and professions, including labor / management relationships

4 3 2 1 0 6. Read, interpret, and use technical drawings, documents, and specifications to plan a project

4 3 2 1 0 7. Evaluate a wide range of career pathway opportunities for success in architecture and construction careers

INTRODUCTORY LEVEL

38001-INTRODUCTION TO INDUSTRIAL TECHNOLOGY (.5 Credit)

An introductory level course designed to instruct students in the basic skills necessary to all occupations in the Construction, Manufacturing & Transportation areas.

4 3 2 1 0 1. **Basic Safety**

-Identify causes of accidents and the impact of accident costs.

- Follow safe behavior procedures on and around ladders, scaffolds and stairs.

-Follow safe behavior procedures around electrical hazards.

-Demonstrate the use, care and inspection of appropriate personal protective equipment (PPE)
-Explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs).
-Respond to hazardous-materials and hazardous-waste emergency situations in accordance with regulatory requirements.
- Follow safety procedures required for lifting heavy objects.
-Demonstrate a working knowledge of safety education, environment, and enforcement for life and work.
- Apply safe practices while using tools and equipment.
-Apply safe practices for housekeeping,
dress, fire, chemicals & personal protection while working in a shop.
-Describe fire prevention and firefighting techniques.
-Explain the purpose of OSHA and how it promotes safety on the job.

4 3 2 1 0 2. **Industrial Math**
-Add, subtract, multiply, and divide whole numbers, fractions, decimals and percentages.
-Use a standard ruler, a metric ruler, and a measuring tape to measure.
-Demonstrate conversion skills for decimals and fractions.
-Recognize and perform calculations using metric units of length, weight, volume and temperature.

4 3 2 1 0 3. **Hand Tools**
-Recognize and identify some of the basic hand tools and their proper uses in industrial trades.
-Demonstrate the safe use of common hand tools.

4 3 2 1 0 4. **Power Tools**
-Recognize and identify some of the basic power tools and their proper uses in the industrial trades.
-Demonstrate the safe use of common power tools.
-Perform preventive maintenance on basic power tools used in the industrial trades.

4 3 2 1 0 5. **Blueprint Reading**
-Perform the drafting principles needed to draw the basic geometric shapes.
-Develop a pictorial sketch of an object.
-Develop a multi-view drawing.
-Identify basic symbols used in blueprints.
-Identify various types of blueprint views used in Architecture, Construction, Manufacturing and Engineering.

4 3 2 1 0 6. **Communication Skills**
-Interpret information and follow instructions presented in both verbal and written form.
-Communicate effectively in on-the-job situations using verbal and written skills in various delivery modes (face-to-face, paper, & electronic).
-Create and complete various written documents used in industrial trades.
-Demonstrate knowledge and use of computer systems and word processing software in effective communication.

4 3 2 1 0 7. **Employability Skills**
-Create and utilize employment documents including a resume and portfolio.
-Demonstrate job seeking and interview skills.
-Understand and respond to performance reviews.

4 3 2 1 0 8. **21st Century/Foundation Skills**
-Demonstrate critical thinking skills and the ability to solve problems using those skills.
-Define effective relationship skills.
-Demonstrate a working knowledge of workplace issues such as sexual harassment, stress, and substance abuse.
-Demonstrate the ability to achieve common goals through team work

4 3 2 1 0 8. **Materials Handling**
-Verify that health, safety, environmental and government regulations are met.
-Recognize hazards and follow safety procedures required for materials handling.
-Demonstrate ability to load and unload materials properly and safely.

4 3 2 1 0 9.

21102-DRAFTING (Architectural & Mechanical) (.5 Credit)

An introductory course designed to expose students to both architectural and mechanical (technical) drafting skills.

4 3 2 1 0 1. Identify types of architectural and mechanical drawings.

4 3 2 1 0 2. Display knowledge of careers in architecture and drafting.

4 3 2 1 0 3. Display knowledge of drafting standards (line styles, dimensions, sheet layout, etc.)

4 3 2 1 0 4. Demonstrate ability to perform manual drafting skills.

4 3 2 1 0 5. Demonstrate ability to do lettering on a drawing.

4 3 2 1 0 6. Demonstrate ability to perform sketching, geo construction and 2d drafting.

4 3 2 1 0 7. Demonstrate the ability to dimension a drawing.

4 3 2 1 0 8. Demonstrate visualization skills in orthographic projection.
4 3 2 1 0 9. Display knowledge of architectural symbols.
4 3 2 1 0 10.
4 3 2 1 0 11.

CONSTRUCTION STRAND

TECHNICAL LEVEL

17002-RESIDENTIAL CARPENTRY I (1 Credit) Pre-requisite for Residential Carpentry II

A comprehensive course designed to instruct students in the basic knowledge and skills required for construction of residential structures.

4 3 2 1 0 1. Demonstrate a working knowledge of tools, skills, materials vocabulary and construction methods for all types of construction including residential and commercial.
4 3 2 1 0 2. Safely utilize and maintain hand and power tools used in the construction industry.
4 3 2 1 0 3. Demonstrate Blueprint reading skills including the interpretation of plans, elevations, schedules, sections and details.
4 3 2 1 0 4. Estimate building materials and cost for a project.
4 3 2 1 0 5. Set up and utilize leveling instruments
4 3 2 1 0 6. Install sill seal and sill plate to the foundation.
4 3 2 1 0 7. Describe the need for, and install thermal and sound insulation and vapor barriers
4 3 2 1 0 8. Identify and install carious types of floor systems to include: layout, bridging, joists, and subflooring
4 3 2 1 0 9. Install a single floor system using tongue-and-groove plywood/OSB
4 3 2 1 0 10. Identify different framing types and systems
4 3 2 1 0 11. Lay out, construct and erect walls and partitions.
4 3 2 1 0 12. Lay out, cut and install ceiling joists.

(Divide competencies here if teaching as two .5 cr. Courses)

4 3 2 1 0 13.Identify different styles of roofs and their layouts
4 3 2 1 0 14. Measure and calculate roof area to determine material needs
4 3 2 1 0 15. Layout and construct a frame roof and apply sheathing.
4 3 2 1 0 16. Apply fiberglass shingles with a 5" exposure, including at least one rooftop projection.
4 3 2 1 0 17. Install a pre-hung window.
4 3 2 1 0 18. Install a pre-hung exterior door with weather-stripping.
4 3 2 1 0 19. Install a pre-hung interior door.
4 3 2 1 0 20. Install a lockset on an entry door.
4 3 2 1 0 21. Describe the types of and demonstrate the application of common wood sidings used as exterior finishes.
4 3 2 1 0 22. Install factory-made cabinets, countertops, and backsplashes.
4 3 2 1 0 23. Identify terminology found in MBMA systems including structural loads and safety.
4 3 2 1 0 24. Research the completion of a concrete block foundation and brick veneer project from blueprints.

17007-WOODWORKING PRINCIPLES (1 Credit) Pre-requisite for Furniture & Cabinetry Fabrication

A comprehensive course designed to instruct students in the basic knowledge and skills required for cabinetmaking and furniture design

4 3 2 1 0 1. Utilize hand tools for cutting, scraping or planing the stock for a project.
4 3 2 1 0 2. Apply math skills to control distance, spacing &/or angle measurements and placements for constructing a project.
4 3 2 1 0 3. Utilize portable power tools to construct a project.
__belt sander __router __hand drill
__power plane __finish sander __nail gun
__circular saw __reciprocating saw
4 3 2 1 0 4. Utilize machines to construct a project.
__radial arm __jointer __planer/surface
__table saw __band saw __drill press
__power miter saw __shaper __mortiser
__thickness sander __lathe __scroll saw
__panel saw __disc/belt sander __grinder

(Divide competencies here if teaching as two .5 cr. Courses)

4 3 2 1 0 5. Perform the steps to interpret, transfer and layout lines &/or markings to be used for constructing a project.
4 3 2 1 0 6. Construct a project, incorporating the elements & principles of design as related to traditional styles in history.
4 3 2 1 0 7. Select and perform "best-method" for joining and assembling project parts.
4 3 2 1 0 8. Apply a quality finish on a project utilizing appropriate materials & equipment.
4 3 2 1 0 9. Obtain the OSHA 10 Hour Safety Training Certificate of Completion.
4 3 2 1 0 10.
4 3 2 1 0 11.

17062 – SKILLED MECHANICAL CRAFTS (.5 Credit)

A technical level course designed to instruct students in the basic skills necessary for occupations in skilled mechanical crafts.

4 3 2 1 0 1. Utilize technology resources to investigate training, education and careers available in the mechanical trades fields of construction.

4 3 2 1 0 2. Perform the drafting and sketching principles needed to draw basic geometric shapes.
4 3 2 1 0 3. Develop a pictorial sketch of an object.
4 3 2 1 0 4. Develop a multi-view drawing.
4 3 2 1 0 5. Develop a flat-view of an object as it would be seen before assembly.
4 3 2 1 0 6. Develop a materials list for the construction of a project.
4 3 2 1 0 7. Recognize and identify basic blueprint terms, components and symbols.
4 3 2 1 0 8. Demonstrate the ability to read a ruler and calculate square feet and cubic feet.

APPLICATION LEVEL

The following 4 competencies are to be taught within the application level courses offered in your school's approved pathway.

4 3 2 1 0 1. Demonstrate Time Management Skills
4 3 2 1 0 2. Create and utilize employment documents including a resume and portfolio.
4 3 2 1 0 3. Demonstrate job seeking and interview skills.
4 3 2 1 0 4. Understand and respond to performance reviews.

38002- RESIDENTIAL CARPENTRY II (1 Credit)

An advanced comprehensive course designed to instruct students in skills pertaining to rough construction and finish work.

4 3 2 1 0 1. Erect, plumb and brace concrete forms.
4 3 2 1 0 2. Demonstrate knowledge of mixing components and how they affect concrete strength.
4 3 2 1 0 3. Use a slump test to measure consistency of concrete and describe methods for controlling cracking.
4 3 2 1 0 4. Install footings and foundations.
4 3 2 1 0 5. Describe the need for, and install thermal and sound insulation and vapor barriers.
4 3 2 1 0 6. Identify and install carious types of floor systems to include: layout, bridging, joists, and subflooring.
4 3 2 1 0 7. Lay out, construct and erect walls and partitions.
4 3 2 1 0 8. Install gypsum drywall panels on stud walls and ceilings using different types of fastening systems.
4 3 2 1 0 9. Demonstrate ability to properly finish drywall and patch damaged drywall.
4 3 2 1 0 10. Construct a frame roof, including hips, valleys, commons, jack rafters and sheathing.
4 3 2 1 0 11. Install a BUR and EPDM roof system on mockup roof.

(Divide competencies here if teaching as two .5 cr. Courses)

4 3 2 1 0 12. For a stairway of given dimensions, determine the total rise, the number and size of the risers, and the number and size of the treads.
4 3 2 1 0 13. Construct a staircase according to a specific plan.
4 3 2 1 0 14. Install interior trim, including door, window, base, and ceiling trims.
4 3 2 1 0 15. Use technology and resources to research licensing certification and credentialing in the construction industry.
4 3 2 1 0 16. Identify the components of simple Electrical Systems.
4 3 2 1 0 17. Articulate (written or verbal) how Electrical systems fit into the total construction project.
4 3 2 1 0 18. Demonstrate understanding of climatic control systems.
4 3 2 1 0 19. Identify the components of simple HVAC and Plumbing Ssytems.
4 3 2 1 0 20. Articulate (written or verbal) how HVAC and Plumbing Systems fit into the total construction project; including how teamwork plays an important role in the timely completion of the project.
4 3 2 1 0 21. Demonstrate the completion of a concrete block foundation and brick veneer project from blueprints.
4 3 2 1 0 22. Work with client to construct project according to client specifications.

17005-RESEARCH & DESIGN IN BUILDING TRADES (1 Credit)

An advanced research and application course covering specific topics in building construction to include management and "green building" skills.

4 3 2 1 0 1. Draw set of house plans.
4 3 2 1 0 2. Research building permits and codes.
4 3 2 1 0 3. Research footings and foundations.
4 3 2 1 0 4. Research post and beam construction.
4 3 2 1 0 5. Research system-built housing.
4 3 2 1 0 6. Research careers in building trades.
4 3 2 1 0 7. Research applications of "green building".

(Divide competencies here if teaching as two .5 cr. Courses)

4 3 2 1 0 8. Demonstrate knowledge of advanced roof systems, including seam metal roofs.
4 3 2 1 0 9. Demonstrate knowledge of advanced floor systems and floor coverings.
4 3 2 1 0 10. Demonstrate knowledge of advanced wall systems including firewalls and sound control walls.
4 3 2 1 0 11. Demonstrate knowledge of advanced stair systems including stairs for commercial construction.
4 3 2 1 0 12. Research Modern & Future trends in equipment, methods & techniques

4 3 2 1 0 13. Research Modern & Future trends in material management
4 3 2 1 0 14. Utilize effective management techniques to organize work flow.
4 3 2 1 0 15.

17113- ELECTRICAL & SECURITY SYSTEMS (.5 Credit)

A course designed to instruct students in the basic skills required for installation of electrical and security systems.

4 3 2 1 0 1. Cut, ream, thread and bend conduit.
4 3 2 1 0 2. Compute branch circuit loads and explain installation requirements.
4 3 2 1 0 3. Demonstrate the procedure for safely using a clamp-on ammeter and a voltage tester.
4 3 2 1 0 4. Demonstrate procedures for installing raceways and boxes.
4 3 2 1 0 5. Demonstrate ability to correctly pull wire through conduit.
4 3 2 1 0 6. Select and install appropriate service entrance equipment according to codes.
4 3 2 1 0 7. Demonstrate the ability to properly ground electrical circuits according to codes.
4 3 2 1 0 8. Install breakers, plugs and switches.
4 3 2 1 0 9. Explain basic characteristics of series and parallel circuits.
4 3 2 1 0 10. Recognize and install various types of lighting fixtures.
4 3 2 1 0 11. Describe characteristics and functions of various fire alarm systems.
4 3 2 1 0 12. Describe characteristics and functions of various security and burglar alarm systems.
4 3 2 1 0 13. Describe the uses, characteristics and theory of low voltage systems.
4 3 2 1 0 14. Demonstrate knowledge of the uses and installation process for Closed Circuit TV.
4 3 2 1 0 15. Describe the components of and uses for electric lock hardware.
4 3 2 1 0 16. Demonstrate safe use of electric hand and power tools.
4 3 2 1 0 17. Understand and interact with LAN systems as a part of an overall security installation.
4 3 2 1 0 18. Demonstrate ability to install a lightning protection system.
4 3 2 1 0 19. Troubleshoot and repair problems in lighting fixtures, including ballast replacement.

17009-REMODEL & BUILDING MAINTENANCE (.5 Credit)

An application level course designed to instruct students in the skills required for residential remodeling and maintenance.

4 3 2 1 0 1. Apply needed caulking and/or paint to interior and exterior finishes.
4 3 2 1 0 2. Demonstrate ability to repair/replace damaged wallboard, wood trim and cabinetry.
4 3 2 1 0 3. Utilize knowledge of bearing walls when reconfiguring room design and/or constructing building additions.
4 3 2 1 0 4. Repair/replace floor coverings.
4 3 2 1 0 5. Troubleshoot and repair problems with HVAC systems.
4 3 2 1 0 6. Troubleshoot and repair water supply, water heater, and water drainage problems.
4 3 2 1 0 7. Troubleshoot and repair problems in lighting fixtures, including ballast replacement.
4 3 2 1 0 8. Utilize appropriate meters/tools to locate electrical circuit problems.
4 3 2 1 0 9. Replace breakers, plugs, switches and light fixtures.
4 3 2 1 0 10. Repair/Replace windows, storm windows, doors and storm doors.
4 3 2 1 0 11. Install and perform maintenance procedures on electric motors.
4 3 2 1 0 12. Evaluate and assess the extent and condition of remodeling/maintenance problems.
4 3 2 1 0 13. Develop a checklist to track preventative maintenance.
4 3 2 1 0 14.

38007-FURNITURE & CABINETRY FABRICATION (1 Credit) Pre-requisite for Advanced Materials Technology

An advanced level application course designed to provide students with experience in constructing cases, cabinets, counters, furniture and interior woodwork

4 3 2 1 0 1. Properly use, maintain & care for hand tools common to woodworking industry.
4 3 2 1 0 2. Properly set up, maintain and care for machines and power tools as they are used for constructing projects.
4 3 2 1 0 3. Apply traditional history with the principles and elements of design to create project plans, which fulfills the criteria for the project to be constructed.
4 3 2 1 0 4. Select quality wood, based upon; strength, appearance and durability requirements of the project designed.
4 3 2 1 0 5. Create a bill of material, and a plan of procedure for a project being planned for construction.
4 3 2 1 0 6. Estimate costs of a project.

(Divide competencies here if teaching as two .5 cr. Courses)

4 3 2 1 0 7. Utilize the common styles and methods to construct and install cabinet and/or furniture sub-assemblies:
__ bases __flush drawer __lip drawer
__flush door __lip door __ overlay door
__frame & panel door __mouldings
__carved appliqués __hardware

4 3 2 1 0 8. Select and apply “best method” joint construction and fitting for project being constructed.
4 3 2 1 0 9. Select and perform “best-method” assembly techniques for cabinet or furniture construction.
4 3 2 1 0 10. Select and perform the appropriate finish for the cabinet or furniture project being constructed.
4 3 2 1 0 11. Properly set up, maintain and care for the tools and equipment used for finishing cabinets and furniture.
4 3 2 1 0 12.

17056 – HVAC TECHNOLOGY (.5 Credit)
A course designed to provide students with exposure to and training in the theories, equipment and skills needed to install and maintain HVAC systems.
4 3 2 1 0 1. Safely utilize and maintain tools common to the mechanical trades industry.
4 3 2 1 0 2. Describe the heating and cooling process.
4 3 2 1 0 3. Demonstrate the use of a duct calculator and the formulas used to calculate heat loads.
4 3 2 1 0 4. Apply layout to HVAC projects.
4 3 2 1 0 5. Describe various types of heating and cooling systems, including the pros, cons and applications of each.
4 3 2 1 0 6. Demonstrate basic electrical knowledge of how electrical circuits work and how they are used within the industry.
4 3 2 1 0 7. Install basic and programmable heat/cool thermostats.
4 3 2 1 0 8. Describe thermostat wire and identify what each color should be used for.
4 3 2 1 0 9. Research future trends in “green technology” for the HVAC industry.
4 3 2 1 0 10. Troubleshoot and repair problems with HVAC systems.
4 3 2 1 0 11. Correctly measure, cut and join piping/tubing.
4 3 2 1 0 12. Demonstrate proper soldering techniques.
4 3 2 1 0 13. Demonstrate ability to maintain appropriate maintenance documentation.

13205 – SHEET METAL TECHNOLOGY (.5 Credit)
A course designed to provide students with exposure to and training in the theories, equipment and skills needed to perform sheet metal techniques.
4 3 2 1 0 1. Safely utilize and maintain tools common to the sheet metal trade.
4 3 2 1 0 2. Demonstrate blueprint reading skills including the interpretation of plans, elevations, schedules, and details.
4 3 2 1 0 3. Identify the three basic types of layout: parallel line, radial line, and triangulation.
4 3 2 1 0 4. Layout and fabricate a basic joint of ductwork, including seams and transverse joints.
4 3 2 1 0 5. Utilize a tape measure to obtain correct measurements for a ductwork detail.
4 3 2 1 0 6. Describe types and thicknesses of sheet metal.
4 3 2 1 0 7. Layout and fabricate basic sheet metal fittings.
4 3 2 1 0 8. Describe the different seams commonly used for ductwork and explain the advantages of each.

17058 – PLUMBING TECHNOLOGY (.5 Credit)
A course designed to provide students with exposure to and training in the theories, equipment and skills needed to install and maintain plumbing systems.
4 3 2 1 0 1. Demonstrate proper use of basic hand and power tools used in the plumbing trade.
4 3 2 1 0 2. Correctly measure, cut and join plastic, carbon steel and/or stainless steel piping/tubing.
4 3 2 1 0 3. Identify and install the most common types of sinks and toilets.
4 3 2 1 0 4. Identify and describe the functions of the major components of a water distribution system.
4 3 2 1 0 5. Identify and install pipe hangers and supports.
4 3 2 1 0 6. Identify the types of schedules and drawings used within the plumbing trade.
4 3 2 1 0 7. Demonstrate proper soldering techniques.
4 3 2 1 0 8. Identify different types of plumbing systems and their components.
4 3 2 1 0 9. Demonstrate proper safety procedures within the plumbing trade.

17061 – PIPEFITTING TECHNOLOGY (1 Credit)
A course designed to provide students with exposure to and training in the theories, equipment and skills needed to perform pipefitting techniques.
4 3 2 1 0 1. Demonstrate proper safety procedures within the pipefitting trade.
4 3 2 1 0 2. Identify piping schedules (thickness) and applications.
4 3 2 1 0 3. Correctly measure, cut, ream, thread, and join carbon steel pipe.
4 3 2 1 0 4. Describe and identify common fitting used in the pipefitting trade.
4 3 2 1 0 5. Identify and install pipe hanging systems and supports.
4 3 2 1 0 6. Demonstrate proper use basic hand and power tools used in the pipefitting trade.

4 3 2 1 0 7. Demonstrate proper mathematical equations used to figure piping offsets.
4 3 2 1 0 8. Identify the types of drawings/schedules used in the pipefitting trade.

38012 – SHEET METAL & HVACR (1 Credit)
A course designed to provide students with exposure to and training in the theories, equipment, and skills needed to perform sheet metal techniques, and to install and maintain HVAC and refrigeration systems.
4 3 2 1 0 1. Safely utilize and maintain tools common to the sheet metal trade.
4 3 2 1 0 2. Demonstrate blueprint reading skills including the interpretation of plans, elevations, schedules, and details.
4 3 2 1 0 3. Identify the three basic types of layout: parallel line, radial line, and triangulation.
4 3 2 1 0 4. Layout and fabricate a basic joint of ductwork, including seams and transverse joints.
4 3 2 1 0 5. Utilize a tape measure to obtain correct measurements for a ductwork detail.
4 3 2 1 0 6. Describe types and thicknesses of sheet metal.
4 3 2 1 0 7. Layout and fabricate basic sheet metal fittings.
4 3 2 1 0 8. Describe the different seams commonly used for ductwork and explain the advantages of each.
(Divide competencies here to change from Sheet Metal to HVACR concentration)
4 3 2 1 0 9. Safely utilize and maintain tools common to the mechanical trades industry.
4 3 2 1 0 10. Describe the refrigeration/cooling and heating process.
4 3 2 1 0 11. Describe various types of heating and cooling systems, including the pros, cons and applications of each.
4 3 2 1 0 12. Demonstrate basic electrical knowledge of how electrical circuits operate.
4 3 2 1 0 13. Correctly use a multi-meter to identify voltage, continuity, and ohms.
4 3 2 1 0 14. Install basic programmable heat/cool thermostat.
4 3 2 1 0 15. Describe thermostat wire and identify what each color should be used for.
4 3 2 1 0 16. Correctly measure, cut, and join piping/tubing.
4 3 2 1 0 17. Explain different types of refrigerant and their applications.
4 3 2 1 0 18. Connect and read manifold gauges for troubleshooting.
4 3 2 1 0 19. Recover, vacuum, and refill refrigerant.
4 3 2 1 0 20. Troubleshoot and repair problems with HVAC/Refrigeration systems.
4 3 2 1 0 21. Research future trends in "green technology" for the HVAC industry.
4 3 2 1 0 22. Demonstrate ability to maintain appropriate maintenance documentation.

38010 – ADVANCED MATERIALS TECHNOLOGY (1 Credit)
A progressive application level course furthering the study of CNC equipment, composite panel products, and veneering, and the processes involved with fabricating goods with these technologies.
4 3 2 1 0 1. Research and apply composite materials fabrication.
4 3 2 1 0 2. Research and apply overlay/veneer materials fabrication.
4 3 2 1 0 3. Research and apply appropriate tooling methods for chosen materials.
4 3 2 1 0 4. Research and apply appropriate adhesives for materials and applications.
4 3 2 1 0 5. Research and apply appropriate finishes and proper finish procedure of chosen materials.
4 3 2 1 0 6. Design and engineer a product using CAD and/or CAM software systems.
4 3 2 1 0 7. Understand and demonstrate operations of advanced technology systems.
4 3 2 1 0 8. Demonstrate effective techniques to manage and organize production flow.
4 3 2 1 0 9. Research and understand related career fields and postsecondary training opportunities.
4 3 2 1 0 10. Implement and manage a safety program for procedures and hazardous materials.

DESIGN STRAND

TECHNICAL LEVEL

21107 - DRAFTING/CAD (1 Credit)
A comprehensive course designed to instruct students in the use of CAD design and software.
4 3 2 1 0 1. Identify and demonstrate the use of CAD commands and system peripherals.
4 3 2 1 0 2. Demonstrate the ability to dimension drawings on the CAD system.
4 3 2 1 0 3. Demonstrate proficiency in setting limits and scale on the CAD system.
4 3 2 1 0 4. Demonstrate proficiency in setting, turning on and turning off layers.

4 3 2 1 0 5. Create standard drawings for templates.
4 3 2 1 0 6. Demonstrate the ability to create drawings in 3D.
4 3 2 1 0 7. Demonstrate the ability to load, store files, and transport files via Internet.
4 3 2 1 0 8. Place text on a drawing and be able to change to different font styles, sizes and angles.
4 3 2 1 0 9. Be proficient in the use of printer/plotter operations.
4 3 2 1 0 10. Demonstrate ability to place text on a drawing and change to different font styles, sizes and angles.
4 3 2 1 0 11. Demonstrate ability to dimension drawings on the CAD system.
4 3 2 1 0 12. Demonstrate proficiency in setting limits and scale on the CAD system.
4 3 2 1 0 13. Construct drawings using straight line, circle, and hidden line statements, etc.
4 3 2 1 0 14. Construct isometric and 3D drawings.
4 3 2 1 0 15. Set grid and snap specifications.
4 3 2 1 0 16. Define and use commands to modify a drawing.
4 3 2 1 0 17. Use symbols (from a symbol library) in a drawing.
4 3 2 1 0 18.

21103 – ARCHITECTURAL DESIGN (1 Credit)
A comprehensive course designed to instruct students in the basic skills of architectural design with a particular emphasis on residential and light commercial applications.

4 3 2 1 0 1. Identify historical styles of architecture and types of structural designs.
4 3 2 1 0 2. Design a functional structure suitable for a particular site.
4 3 2 1 0 3. Calculate/estimate building costs for a particular structure and develop brief specifications for the project.
4 3 2 1 0 4. Produce a floor plan with all walls, doors, windows and stairs properly identified.
4 3 2 1 0 5. Draw plumbing and electrical layers.
4 3 2 1 0 6. Draw a foundation plan for a single family dwelling.
4 3 2 1 0 7. Draw elevations and pictorial presentations e.g. exterior, interior, etc.
4 3 2 1 0 8. Dimension and draw wall section with all components identified.
4 3 2 1 0 9. Develop Plot Plan with house, out buildings, trees, utility supply lines and communications supply lines identified.
4 3 2 1 0 10. Demonstrate the ability to 3D model a structure using different mediums in design.
4 3 2 1 0 11. Draw a roof framing plan for a single family dwelling.
4 3 2 1 0 12. Draw interior elevations with fixtures, built-ins, trims, utilities and openings.
4 3 2 1 0 13. Construct an interior finish schedule.
4 3 2 1 0 14. Draw an interior one-point perspective drawing.
4 3 2 1 0 15. Create an exterior two-point perspective view.

APPLICATION LEVEL

The following 4 competencies are to be taught within the application level courses offered in your school's approved pathway.

4 3 2 1 0 1. Demonstrate Time Management Skills
4 3 2 1 0 2. Create and utilize employment documents including a resume and portfolio.
4 3 2 1 0 3. Demonstrate job seeking and interview skills.
4 3 2 1 0 4. Understand and respond to performance reviews.

21109-RESEARCH & DESIGN FOR PRE-CONSTRUCTION (1 Credit)
An advanced research and application course covering specific topics in design and pre-construction to include management and "green design" skills.

4 3 2 1 0 1. Work with a client to develop a client-driven product.
4 3 2 1 0 2. Produce a working model (graphic or physical) using advanced software and/or equipment.
4 3 2 1 0 3. Demonstrate ability to apply shading and rendering techniques to 3d surfaces and solid models.
4 3 2 1 0 4. Demonstrate ability to access and utilize industry resources.
4 3 2 1 0 5. Use appropriate grammar and word usage in the creation and implementation of a formal graphic presentation using current standards and technology.
4 3 2 1 0 6. Apply principles of dimensioning/tolerances, fasteners/hardware, and power transmission.
4 3 2 1 0 7. Apply basic principles of environmental impact to enhance project acceptance and quality.
4 3 2 1 0 8. Demonstrate ability to apply design requirements for people needing special accommodations.
4 3 2 1 0 9. Utilize effective management techniques to organize work flow.
4 3 2 1 0 10. Use technology and resources to research licensing certification and credentialing in the architecture and construction industry.
4 3 2 1 0 11. Conduct product and facility evaluations and critique their effectiveness.
4 3 2 1 0 12. Research new technologies to meet future client needs.

4 3 2 1 0 13. Demonstrate ability to access and utilize industry resources.
4 3 2 1 0 14. Demonstrate abilities in design/planning, visual communication and problem solving in current architectural practices.
4 3 2 1 0 15. Integrate alternative construction methods and materials in current architectural drawings.
4 3 2 1 0 16. Demonstrate ability to use CSI – Construction Specifications Institute's Uniform Drawing System and Master Format.
4 3 2 1 0 17. Research various methods for obtaining financing for building projects.
4 3 2 1 0 18. Demonstrate ability to incorporate specific codes as given for a selected jurisdiction.
4 3 2 1 0 19. Demonstrate ability to set and work within defined budget.
4 3 2 1 0 20. Research and use information for product development.
4 3 2 1 0 21. Manipulate materials and processes to meet client needs.
4 3 2 1 0 22. Demonstrate ability to manage and set project goals and timelines

38050 -ADVANCED STUDIES (.5 Credit)
An advanced level application course covering specific research-based topics in architectural design.

4 3 2 1 0 1. Employ basic methods of data collection and analysis to provide information for projects.
4 3 2 1 0 2. Research and report on methods for employing "Green Building" techniques.
4 3 2 1 0 3. Research and report on the latest technology used in HVAC Systems design.
4 3 2 1 0 4. Research and report on the latest technology used in Electrical Systems Design.
4 3 2 1 0 5. Research and report on the latest technology used in Plumbing Systems Design.
4 3 2 1 0 6. Apply suitable practices of environmental impact to enhance project acceptance and quality.
4 3 2 1 0 7. Integrate structural, environmental, safety, building envelopes and building service systems to design and construct buildings and structures.
4 3 2 1 0 8. Develop a landscape design for a commercial building.
4 3 2 1 0 9. Appreciate the diversity of needs, values and social patterns in project design to appropriately meet client needs.
4 3 2 1 0 10. Use communication skills and strategies to work effectively with potential clients.
4 3 2 1 0 11. Develop technical drawings by hand and computer-generated plans to design structures.

22212-RESIDENTIAL INTERIOR DESIGN (.5 Credit)
An application level course designed to instruct students in the skills necessary to design interior spaces that apply design elements and principles to spaces for residential and special needs (e.g. single family homes, multi-family structures, homes for special needs, child care centers, retirement homes, etc.). Topics will include meeting client's needs, legislated codes, historic considerations, current and future trends, and public policy.

4 3 2 1 0 1. Examine Education and training requirements and opportunities for career paths in building/interior design.
4 3 2 1 0 2. Examine legislation, regulations, and public policy affecting the building industry.
4 3 2 1 0 3. Assess community, family and financial resources needed to achieve client's goals.
4 3 2 1 0 4. Compare historical architectural trends to current building/interior design trends.
4 3 2 1 0 5. Consider future trends in building/interior design.
4 3 2 1 0 6. Determine the effects that the principles and elements of design have on the individual, aesthetics and function.
4 3 2 1 0 7. Review measuring, estimating, ordering, purchasing and pricing skills.
4 3 2 1 0 8. Draw an interior space to scale, using correct architectural symbols, and drafting skills.
4 3 2 1 0 9. Create floor plans, using computer design software.
4 3 2 1 0 10. Examine floor plans for efficiency and safety, and areas including, but not limited to, zones, traffic patterns, storage, universal design and space function.
4 3 2 1 0 11. Utilize applicable building codes, universal guidelines, and regulations in space planning.
4 3 2 1 0 12.

38212-COMMERCIAL & INDUSTRIAL INTERIOR DESIGN (.5 Credit)
An application level course designed to instruct students in the skills necessary to design interior spaces that acknowledge client needs, legislated codes, historic, current and future trends, and public policy for commercial and industrial buildings (e.g. office buildings, warehouses and manufacturing sites, etc.).

4 3 2 1 0 1. Examine Education and training requirements and opportunities for career paths in building/interior design.

4 3 2 1 0 2. Examine legislation, regulations, and public policy affecting the building industry.

4 3 2 1 0 3. Assess community, family and financial resources needed to achieve client's goals.

4 3 2 1 0 4. Compare historical architectural trends to current building/interior design trends.

4 3 2 1 0 5. Consider future trends in building/interior design.

4 3 2 1 0 6. Determine the effects that the principles and elements of design have on the individual, aesthetics and function.

4 3 2 1 0 7. Review measuring, estimating, ordering, purchasing and pricing skills.

4 3 2 1 0 8. Draw an interior space to scale, using correct architectural symbols and drafting skills.

4 3 2 1 0 9. Create floor plans, using computer design software.

4 3 2 1 0 10. Examine floor plans for efficiency and safety and areas including, but not limited to, zones, traffic patterns, storage, electrical and mechanical systems.

4 3 2 1 0 11. Utilize applicable building codes, universal guidelines, and regulations in space planning.

OCCUPATIONAL PROFILE RATING SCALE RUBRIC

Rating Scale (Occupational Profile)

4 - Exemplary Achievement:	Student possesses outstanding knowledge, skills or professional attitude. Works Independently.
3 - Proficient Achievement:	Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.
2 - Limited Achievement:	Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.
1 - Inadequate Achievement:	Student lacks knowledge, skills or professional attitude.
0 - No Instruction / Training:	Student has not received instruction or training in this area.