COURSE CON1010: CONSTRUCTION TOOLS & MATERIALS

Level: Introductory

Prerequisite: None

Description: Students develop basic hand tool and production skills to transform common building materials safely into useful products.

Parameters: Access to a materials work centre, complete with basic hand tools.

Outcomes: The student will:

1. **create a health and safety plan with special emphasis on conditions and factors related to the specific pathway or series of courses**
   - 1.1 research and identify the following eight common elements of a health and safety management system:
     - 1.1.1 management, leadership and organizational commitment including policies, guidelines and responsibilities
     - 1.1.2 hazard identification and assessment
     - 1.1.3 hazard control
     - 1.1.4 worker competency and training including technical competence, safe work practices and procedures, personal protective equipment
     - 1.1.5 work site inspection
     - 1.1.6 incident investigation
     - 1.1.7 emergency response
     - 1.1.8 management system administration including evaluation, records and statistics, maintenance of system
   - 1.2 explain each of the elements reflecting on occupational health and safety implications
   - 1.3 define health and safety elements relevant to the world-of-work
   - 1.4 present a health and safety plan clarifying its relevance to the work world and society in general
2. **research common processes and methods of hazard identification, assessment and control specific to the pathway or series of courses**
   - 2.1 research and identify common job site hazard identification processes
   - 2.2 research and identify common methods for assessment and control of hazards
   - 2.3 explain and demonstrate appropriate health and safety effective practices
   - 2.4 demonstrate a proactive personal commitment toward improvement of workplace health and safety including concern for others and following instructions, rules and guidelines
3. **identify and describe the safe use of basic hand tools**
   - 3.1 identify and describe basic hand tools that are used to measure, mark, hold, cut, form, fasten and finish materials
4. **identify and compare the properties of common materials used in construction activities**
   - 4.1 identify and compare the properties of a variety of common materials used to make artifacts and structures
   - 4.2 identify common shapes, sizes and forms of construction materials
   - 4.3 describe appropriate methods to handle, recycle, store and dispose of materials

5. apply construction processes and skills to produce a product

- 5.1 outline the typical phases in a production system; e.g., planning, constructing, assembling, finishing or evaluating
- 5.2 select or modify a plan for a simple product that will meet a defined need
- 5.3 identify and select the appropriate tools, materials and processes required to make the product
- 5.4 list the steps that are required to make a product in a safe and logical order
- 5.5 develop basic construction skills by building, assembling and finishing a variety of products
- 5.6 identify and demonstrate the appropriate use of personal protective equipment
- 5.7 identify steps to be taken in the event of an accident
- 5.8 describe ways to improve product quality and productivity

6. demonstrate basic competencies

- 6.1 demonstrate fundamental skills to:
  - 6.1.1 communicate
  - 6.1.2 manage information
  - 6.1.3 use numbers
  - 6.1.4 think and solve problems
- 6.2 demonstrate personal management skills to:
  - 6.2.1 demonstrate positive attitudes and behaviours
  - 6.2.2 be responsible
  - 6.2.3 be adaptable
  - 6.2.4 learn continuously
  - 6.2.5 work safely
- 6.3 demonstrate teamwork skills to:
  - 6.3.1 work with others
  - 6.3.2 participate in projects and tasks

7. make personal connections to the cluster content and processes to inform possible pathway choices

- 7.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
- 7.2 create a connection between a personal inventory and occupational choices

COURSE CON1070: BUILDING CONSTRUCTION

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students examine common building systems and develop basic skills related to building a simple model or full-size system/structure.

Parameters: Access to a materials work centre, complete with basic hand tools.

Outcomes: The student will:

1. **identify and describe the main systems found in a residential structure**
   - 1.1 identify the materials that can be used to construct the:
     - 1.1.1 foundation or support system
     - 1.1.2 floor and wall system
     - 1.1.3 roof system
     - 1.1.4 exterior/interior finishes
   - 1.2 describe how information is gathered and used in the construction industry; e.g., site information, engineering specifications or building codes
   - 1.3 describe systems that are found in most buildings; e.g., structural, electrical, heating, ventilating and air conditioning, or water and waste removal
   - 1.4 describe the methods that are used to communicate ideas and information relative to the design and construction of a project; e.g., blueprints or architectural drawings
   - 1.5 identify the factors that affect the design of a structure including:
     - 1.5.1 safety
     - 1.5.2 function
     - 1.5.3 aesthetics
   - 1.6 identify design techniques that are used to counteract static and dynamic forces on a structure; e.g., braces, trusses or ties
   - 1.7 describe the landscaping features that will be used to complete a project
2. **list and describe the basic materials and hand tools used in building construction**
   - 2.1 describe how structural materials and construction tools are safely used on the work site
3. **apply basic construction techniques to build a simple scale model or full-size structure/system**
   - 3.1 list and describe the major types of construction projects; e.g., residential, industrial, commercial or civil
   - 3.2 select or modify a set of working drawings to build a simple building structure or system
   - 3.3 select or identify an appropriate location
   - 3.4 use the appropriate tools, materials and processes to:
     - 3.4.1 construct a simple shelter, scale model or system
   - 3.5 use the appropriate personal protective clothing and equipment
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
5.2 create a connection between a personal inventory and occupational choices.

COURSE CON1120: PRODUCT MANAGEMENT

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic shop drawing and estimating skills and apply them to build a product.

Parameters: Access to a materials work centre, complete with basic drawing and construction tools, and to instruction from an individual with specialized training in the use of power tools.

Outcomes: The student will:

1. identify and describe the parts of a technological system
- 1.1 describe the following components of a technological system:
  - 1.1.1 input
  - 1.1.2 output
  - 1.1.3 process
  - 1.1.4 feedback

2. apply basic drawing skills to prepare a shop drawing
- 2.1 list and describe common types of shop drawings
- 2.2 identify manual techniques and/or computer processes to create a drawing
- 2.3 create or modify a suitable product design
- 2.4 prepare a working drawing of a product with multiple parts

3. prepare a project timeline, cost estimate and work schedule
- 3.1 identify the method of costing materials using lineal, area and volume measurements
- 3.2 describe methods that are used to estimate the amount of time required to complete a project
- 3.3 analyze the drawing to create a:
  - 3.3.1 materials list
  - 3.3.2 cost estimate
  - 3.3.3 work schedule

4. apply the use of a technological system to construct a simple product with multiple parts
- 4.1 identify a variety of products and describe the types of materials, joints and fastening and finishing systems that are used, and explain how these details are shown on a drawing
- 4.2 for a product with multiple parts, use the appropriate tools, materials and processes to:
  - 4.2.1 lay out, cut, surface and size materials
  - 4.2.2 assemble and fasten parts
  - 4.2.3 prepare for finishing
  - 4.2.4 apply a simple finish
- 4.3 match the manufacturer's recommendations and Workplace Hazardous Materials Information System (WHMIS) regulations when using hazardous finishing materials
- 4.4 use personal protective equipment
- 4.5 identify methods to improve quality and productivity through:
  - 4.5.1 accurate measurements
  - 4.5.2 choice of correct tools
  - 4.5.3 use of tools that are in good condition

5. demonstrate basic competencies

5.1 demonstrate fundamental skills to:
- 5.1.1 communicate
- 5.1.2 manage information
- 5.1.3 use numbers
- 5.1.4 think and solve problems

5.2 demonstrate personal management skills to:
- 5.2.1 demonstrate positive attitudes and behaviours
- 5.2.2 be responsible
- 5.2.3 be adaptable
- 5.2.4 learn continuously
- 5.2.5 work safely

5.3 demonstrate teamwork skills to:
- 5.3.1 work with others
- 5.3.2 participate in projects and tasks

6. make personal connections to the cluster content and processes to inform possible pathway choices

6.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences

6.2 create a connection between a personal inventory and occupational choices

COURSE CON1130: SOLID STOCK CONSTRUCTION

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic hand and power tool skills to build a product made from solid wood.

Parameters: Access to a materials work centre, complete with basic hand and power tools, and to instruction from an individual with specialized training in the use of power tools.

Supporting Course: CON1120: Product Management

Outcomes: The student will:

1. **identify and describe the physical characteristics of a variety of hard and soft woods**
   - 1.1 describe the physical characteristics of a variety of hard and soft woods
   - 1.2 list and describe common wood faults
   - 1.3 identify and describe correct methods of handling and storing lumber
2. **apply basic drawing and transfer skills to prepare a pattern or template**
   - 2.1 identify common shapes and lines used in product design
   - 2.2 select or modify a plan for a free-standing or wall-mounted product that is made from solid or built-up stock
   - 2.3 produce a pattern or template from a scale drawing
   - 2.4 develop a cutting list and event sequence
3. **construct a wooden product, using basic joinery techniques**
   - 3.1 describe common methods of making a built-up surface using edge joints and reinforce with dowels, biscuits or splines
   - 3.2 describe the process of squaring solid stock
   - 3.3 describe the safe operation of hand and power equipment that is used to:
     - 3.3.1 joint and surface solid stock
     - 3.3.2 cut and shape irregular surfaces
     - 3.3.3 scrape and sand flat and irregular surfaces
   - 3.4 use the appropriate tools, materials and processes to:
     - 3.4.1 cut and surface stock
     - 3.4.2 joint, glue and clamp
     - 3.4.3 measure and lay out parts
     - 3.4.4 cut and shape parts
     - 3.4.5 assemble and fasten
     - 3.4.6 prepare for finishing
     - 3.4.7 apply a finish
   - 3.5 complete a visual inspection of the product to see that the joints are tight fitting and surfaces are free of marks, gouges, burns and voids

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences

5.2 create a connection between a personal inventory and occupational choices

COURSE CON1140: TURNING OPERATIONS

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students use wood turning equipment and techniques to create a faceplate and spindle turning made from solid and/or built-up stock.

Parameters: Access to a materials work centre, complete with basic hand and power tools, and to instruction from an individual with specialized training in the use of power tools.

Supporting Course: CON1120: Product Management

Outcomes: The student will:

1. **safely operate a power wood lathe**
   - 1.1 identify the common lathe chisels and accessories associated with wood turning
   - 1.2 describe recommended tools and accessories for faceplate and spindle turning
   - 1.3 identify and describe accepted work piece mounting and supporting techniques
   - 1.4 describe the turning characteristics of a number of common woods
   - 1.5 identify finishes and finishing procedures suitable for common turned products
   - 1.6 identify and demonstrate the safe use and operation of the wood lathe
2. **apply drawing and transfer skills to prepare a full-size pattern or template**
   - 2.1 select, modify or design a faceplate and/or spindle-type product that incorporates three or more different types of cuts
   - 2.2 create a full-size pattern or template
3. **produce a faceplate and spindle turning, using solid or built-up stock**
   - 3.1 prepare a material list and cost estimate
   - 3.2 show a sequence of operations that facilitates the safe and efficient use of materials, tools and equipment
   - 3.3 calculate the appropriate turning speeds using tables
   - 3.4 demonstrate the appropriate skills to:
     - 3.4.1 prepare stock for turning
     - 3.4.2 lay out and size a rough turning
     - 3.4.3 rough cut and finish cut according to a predetermined pattern/template or free-forming principles
     - 3.4.4 sand and apply the recommended finish
     - 3.4.5 remove and assemble finished product
   - 3.5 complete a visual inspection of a product to determine if the structure is sound and if surfaces are free of scratches, gouges, burns and voids
   - 3.6 demonstrate efficient methods to improve quality and productivity
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
5.2 create a connection between a personal inventory and occupational choices

COURSE CON1160: MANUFACTURED MATERIALS

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students select and use the appropriate materials and tools to build a product or structure from a wood composite or another manufactured material.

Parameters: Access to a materials work centre, complete with basic hand and power tools, and to instruction from an individual with specialized training in the use of power tools.

Supporting Course: CON1120: Product Management

Outcomes: The student will:

1. **identify and describe the characteristics of common manufactured materials**
   - 1.1 identify the various types of manufactured materials; e.g., plywood, hardboard, particle board
   - 1.2 describe how a common manufactured material is made
   - 1.3 explain the advantages of using manufactured materials
2. **demonstrate the safe use of a given hand and power tool**
   - 2.1 describe the safe operation of hand and power tools to make dado, rabbet and mitre joints in plywood and other manufactured materials
   - 2.2 use the appropriate tools, materials and processes to:
     - 2.2.1 measure and lay out the components
     - 2.2.2 cut to size and surface all edges
     - 2.2.3 edge bond all exposed surfaces, as required
     - 2.2.4 machine the appropriate joints
     - 2.2.5 assemble and clamp
     - 2.2.6 attach the appropriate hardware
     - 2.2.7 prepare for finishing
     - 2.2.8 apply a suitable finish
3. **create a product from a manufactured material, using basic joinery techniques**
   - 3.1 describe typical methods of constructing a product from a manufactured material; e.g., types of joints, fastening systems, edge treatments
   - 3.2 identify the factors that determine the quality of a wood joint
   - 3.3 select or modify a plan for a project that incorporates basic joinery and edge treatment techniques
   - 3.4 create a bill of materials, cutting list and event sequence
   - 3.5 identify and describe common methods used to finish plywood and other wood substitutes
   - 3.6 conduct a visual inspection of components to see that the joints are tight fitting, surfaces are free of marks and edges are covered and finished appropriately
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
5.2 create a connection between a personal inventory and occupational choices

COURSE CON1180: MOULD MAKING & CASTING

Level: Introductory

Prerequisite: CON1010: Construction Tools & Materials

Description: Students apply knowledge of casting and moulding materials and processes to prepare a mould and produce a casting.

Parameters: Access to a materials work centre, complete with moulding and casting equipment.

Outcomes: The student will:

1. list and describe common materials and processes used in casting/moulding
- 1.1 identify and describe materials used to cast/mould including:
  - 1.1.1 clay slip
  - 1.1.2 concrete
  - 1.1.3 polystyrene beads
  - 1.1.4 plastisol
  - 1.1.5 model metal
- 1.2 describe common processes of casting/moulding clay, concrete and plastic
- 1.3 differentiate between hardening by cooling, curing and drying
- 1.4 describe the kinds of materials and methods that are used to make patterns and moulds
- 1.5 describe factors that affect the quality of a cast or moulded product

2. apply principles of pattern making to create a simple mould
- 2.1 identify and describe the health and safety hazards associated with heating plastic and firing ceramic products
- 2.2 design or prepare a mould for a ceramic or plastic product

3. cast and finish a product, using the appropriate skills, materials and processes
- 3.1 calculate the quantities of materials required to make a casting
- 3.2 prepare a detailed step-by-step set of procedures to make a cast or moulded product
- 3.3 locate the necessary personal protective clothing and equipment for a specific casting/moulding process
- 3.4 describe a plan of action in the event of an accident
- 3.5 use the appropriate tools, materials and processes to:
  - 3.5.1 make or prepare a mould
  - 3.5.2 measure and mix quantities of materials
  - 3.5.3 pour, cure and finish a cast and/or moulded product
- 3.6 use the appropriate personal protective equipment

4. demonstrate basic competencies
- 4.1 demonstrate fundamental skills to:
  - 4.1.1 communicate
  - 4.1.2 manage information
  - 4.1.3 use numbers
  - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
5.2 create a connection between a personal inventory and occupational choices

COURSE CON1910: CON PROJECT A

Level: Introductory

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Introductory project courses must connect with a minimum of two CTS courses, one of which must be at the introductory level and be in the same occupational area as the project course. The other CTS course(s) can be either at the same level or at the intermediate level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

1. **identify the connection between this project course and two or more CTS courses**
   - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
   - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
2. **propose the project and/or performance**
   - 2.1 identify the project and/or performance by:
     - 2.1.1 preparing a plan
     - 2.1.2 clarifying the purposes
     - 2.1.3 defining the deliverables
     - 2.1.4 specifying time lines
     - 2.1.5 explaining terminology, tools and processes
     - 2.1.6 defining resources; e.g., materials, costs, staffing
   - 2.2 identify and comply with all related health and safety standards
   - 2.3 define assessment standards (indicators for success)
   - 2.4 present the proposal and obtain necessary approvals

The student will:

3. **meet goals as defined within the plan**
   - 3.1 complete the project and/or performance as outlined
   - 3.2 monitor the project and/or performance and make necessary adjustments
   - 3.3 present the project and/or performance, indicating the:
     - 3.3.1 outcomes attained
     - 3.3.2 relationship of outcomes to goals originally set

3.4 evaluate the project and/or performance, indicating the:
    3.4.1 processes and strategies used
    3.4.2 recommendations on how the project and/or performance could have been improved

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. make personal connections to the cluster content and processes to inform possible pathway choices

5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences
5.2 create a connection between a personal inventory and occupational choices

COURSE CON2010: SITE PREPARATION

Level: Intermediate

Prerequisite: CON1070: Building Construction

Description: Students develop the knowledge and skills to acquire a building permit and to locate and prepare a site for excavation and foundation work.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Outcomes: The student will:

1. **identify and describe a typical building site layout and excavation processes**
   - 1.1 describe a typical method of establishing lot and building lines as well as grade levels
   - 1.2 explain the use of a plumb bob, builder's level and transit and string line
   - 1.3 use a site plan and elevation drawings to determine the amount of soil to be excavated
2. **complete an application for a building permit**
   - 2.1 explain the purpose of local, provincial and national building regulations
   - 2.2 identify local zoning regulations that limit the type, size and location of new buildings
   - 2.3 identify the parameters for selecting a building site
   - 2.4 identify the information that is needed to complete an application for a building permit
3. **apply site preparation skills to assist in the location of building site lines and features**
   - 3.1 locate and mark all underground and overhead services
   - 3.2 identify soil conditions that may require shoring
   - 3.3 use an approved method to:
     - 3.3.1 position batterboards
     - 3.3.2 locate lot and building lines
     - 3.3.3 excavate
     - 3.3.4 establish locations and elevations for wall and pier footings
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely
   - 4.3 demonstrate teamwork skills to:
     - 4.3.1 work with others
     - 4.3.2 participate in projects and tasks
5. **identify possible life roles related to the skills and content of this cluster**
   - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
   - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2020: CONCRETE FORMING

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop knowledge and skills related to the preparation and construction of a concrete foundation.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Courses: CON1070: Building Construction
CON2010: Site Preparation

Outcomes: The student will:

1. list and describe factors that affect footing and wall design
- 1.1 describe how soils are tested for:
  - 1.1.1 resistance to penetration
  - 1.1.2 shear resistance
  - 1.1.3 moisture content
- 1.2 explain how soil, water and frost conditions affect the design and construction of a foundation as well as excavation and safety procedures

2. identify and describe common forming materials and processes
- 2.1 explain the purpose of a footing
- 2.2 describe one or more common techniques to form footings, walls and piers
- 2.3 describe methods of reinforcing a footing and wall section
- 2.4 identify the parts of a typical concrete wall form
- 2.5 explain the difference between box-sill and cast-in-place construction
- 2.6 identify release agents and coatings used on forms
- 2.7 describe types of cement and concrete mixers used in footing and wall systems
- 2.8 describe factors that determine the size and strength of a footing and wall components

3. apply concrete forming skills to assist in forming and placing a concrete foundation
- 3.1 prepare a detailed list of materials and supplies to form a footing and wall
- 3.2 calculate the volume of concrete required for a footing and wall component
- 3.3 use the appropriate tools and materials to:
  - 3.3.1 construct a set of forms for a rectangular footing and wall section
  - 3.3.2 square level, align and brace
  - 3.3.3 place, consolidate and finish a concrete footing and wall section
  - 3.3.4 make provisions to attach a sill plate, if necessary
  - 3.3.5 seal walls below ground level and install weeping tile
  - 3.3.6 backfill, taking into account lateral pressure

4. demonstrate basic competencies
- 4.1 demonstrate fundamental skills to:
  - 4.1.1 communicate
  - 4.1.2 manage information
  - 4.1.3 use numbers
  - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2030: ALTERNATIVE FOUNDATIONS

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic knowledge and skills related to the design and construction of an alternative foundation system.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Courses: CON1070: Building Construction
CON2020: Concrete Forming

Outcomes: The student will:

1. **identify and describe the components of an alternative foundation system**
   - 1.1 describe alternative foundation systems and materials including:
     - 1.1.1 concrete masonry block
     - 1.1.2 preserved wood
     - 1.1.3 foam form
   - 1.2 label and describe the parts of a typical preserved wood, masonry block and/or foam form foundation
   - 1.3 list and describe the factors that determine the design and construction of a footing and wall section for one or more alternative systems
   - 1.4 describe levelling and plumbing techniques that are used with a particular foundation system
   - 1.5 describe recommended methods that are used to control drainage and damp proof an alternative foundation system
   - 1.6 describe the flooring options that can be used with an alternative foundation system
2. **identify the health hazards and precautions related to the use of engineered materials**
   - 2.1 identify local building codes that pertain to the design and construction of alternative foundation systems
   - 2.2 identify suitable personal protective equipment and recommended procedures related to the use of alternative materials
   - 2.3 describe suitable methods used to dispose of scrap materials
3. **apply construction skills to assist in the design/construction of an alternative foundation system**
   - 3.1 prepare a sketch of an alternative foundation that identifies construction details, size and spacing of components, as well as sealing, drainage and damp proofing features
   - 3.2 use the appropriate tools, materials and processes to:
     - 3.2.1 level the footings and create the necessary drainage system
     - 3.2.2 lay out and assemble the wall section
     - 3.2.3 seal joints and apply a vapour seal/damp proofing
     - 3.2.4 backfill without damaging the moisture barrier
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2035: FRAMING SYSTEMS – FLOOR

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic framing knowledge and skills associated with the construction of a floor and wall system.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe the parts of a floor framing system**
   - 1.1 describe common wood defects associated with natural growth and milling operations
   - 1.2 compare the span limitations of different species and grades of lumber and manufactured components
   - 1.3 identify common types of subflooring materials
   - 1.4 identify the adhesives and fasteners used in conjunction with floor framing
   - 1.5 identify the layout and installation procedure of a typical floor framing system
   - 1.6 compare platform framing to post and beam construction
   - 1.7 describe the consequences of a floor system that has not been sized or constructed properly
2. **read and interpret the appropriate drawings and specifications to create a floor framing and sheathing estimate**
   - 2.1 use a frame structure drawing to determine the location, type and sizes of joists and beams, as well as subflooring requirements
   - 2.2 prepare a quantity takeoff for a floor
3. **apply framing skills to assist in the layout and construction of floor components**
   - 3.1 identify and describe the proper and safe use of portable electric and air-activated tools
   - 3.2 demonstrate proper methods of lifting materials and components
   - 3.3 use proper personal protective equipment
   - 3.4 cover openings and build railings, where needed
   - 3.5 use the appropriate hand tools and portable equipment to:
     - 3.5.1 lay out components
     - 3.5.2 cut and assemble floor joists
     - 3.5.3 square floor
     - 3.5.4 install subflooring
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2045: FRAMING SYSTEMS – WALL

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic framing knowledge and skills associated with the construction of a wall system.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe the parts of a wall framing system**
   - 1.1 describe common wood defects associated with natural growth and milling operations
   - 1.2 compare the span limitations of different species and grades of lumber and manufactured components
   - 1.3 identify common types of sheathing materials
   - 1.4 identify the adhesives and fasteners used in conjunction with wall framing
   - 1.5 identify the parts and purpose of a typical wall framing system
   - 1.6 compare platform framing to post and beam construction
   - 1.7 describe the components of an engineered wall system
2. **read and interpret the appropriate drawings and specifications to create a wall framing and sheathing estimate**
   - 2.1 use a frame structure drawing to determine the location, type and sizes of sills and headers, as well as sheathing requirements
   - 2.2 use a wall frame elevation to determine the size and locations of studs, headers and rough opening sizes
   - 2.3 prepare a quantity takeoff for a wall section
3. **apply framing skills to assist in the layout and construction of wall components**
   - 3.1 identify and describe the proper use of portable electric and air-activated tools
   - 3.2 demonstrate proper methods of lifting materials and components
   - 3.3 use proper personal protective equipment
   - 3.4 cover openings and build railings, where needed
   - 3.5 use the appropriate hand tools and portable equipment to:
     - 3.5.1 lay out components
     - 3.5.2 cut materials for wall sections
     - 3.5.3 lay out and assemble a wall section
     - 3.5.4 square floor and wall components
     - 3.5.5 install sheathing
     - 3.5.6 erect, plumb and brace wall sections
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2050: ROOF STRUCTURES 1

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic knowledge and skills associated with framing and finishing a simple roof system.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe the different styles and parts of a roof system**
   - 1.1 list and describe the common styles of roofs
   - 1.2 define roof terms such as span, run, rise, slope and overhang
   - 1.3 describe the parts of a common rafter
   - 1.4 describe the parts of a typical roof truss
   - 1.5 describe the advantages of using roof trusses versus standard common rafters
   - 1.6 list and describe the parts of a boxed cornice
   - 1.7 identify sheathing grades and types, and joint and nailing patterns
   - 1.8 list and describe the types of roof finishes
2. **read and interpret the appropriate drawings and specifications to create a roof framing and finishing estimate**
   - 2.1 make a roof sketch indicating the location of roof trusses, lookout rafters, bridging, fascia headers, boxed cornices and sheathing patterns
   - 2.2 prepare a materials list specifying:
     - 2.2.1 the size, slope and number of roof trusses or common rafters
     - 2.2.2 thickness and quantities of sheathing
     - 2.2.3 quantities of H-clips and metal anchors
     - 2.2.4 style, colour, weight and quantities of asphalt shingles
3. **apply roofing skills to assist in the framing and finishing of a roof structure**
   - 3.1 check condition of ladders before using and observe safe angle ratios
   - 3.2 use proper foot and head protection
   - 3.3 identify hazards associated with wet or frosty conditions on sloped surfaces
   - 3.4 identify safety devices that are used in conjunction with roof construction
   - 3.5 use the appropriate tools and equipment to:
     - 3.5.1 locate, fasten, square and plumb roof trusses
     - 3.5.2 cut and install common rafters
   - 3.6 install lookouts, fascia and braces
   - 3.7 apply sheathing and shingling
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2060: DOORS, WINDOWS & SIDING

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students apply and develop basic knowledge of door, window and siding systems and of installation skills and procedures.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe common types of exterior doors, windows and siding materials**
   - 1.1 list and describe common types of exterior doors and windows
   - 1.2 identify methods of sizing windows and exterior doors
   - 1.3 describe the procedures used to install an exterior door and a window
   - 1.4 list and describe the components used in conjunction with the installation of vinyl and aluminum siding
   - 1.5 describe the purpose and use of building papers and other housewrap materials
2. **read and interpret the appropriate drawings and specifications to create a door and window schedule and siding estimate**
   - 2.1 use elevation drawings and specifications to develop a door and window schedule
   - 2.2 use an elevation drawing to identify the types of siding and cornice materials and estimated amounts
3. **apply finishing skills to install a prehung door, a window unit and siding materials**
   - 3.1 use the appropriate tools and processes to:
     - 3.1.1 level, plumb, seal and fasten a prefabricated door and a window unit
     - 3.1.2 install exterior finishes
     - 3.1.3 check and secure all scaffolding
     - 3.1.4 observe proper handling and lifting procedures
     - 3.1.5 use appropriate eye and ear protection
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2070: ELECTRICAL SYSTEMS

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students apply electrical principles and develop an understanding of residential electrical code requirements and installation procedures.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in electrical work.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. list and describe the electrical systems and components associated with residential wiring
- 1.1 identify the principal hazards associated with electrical work; e.g., shocks, burns, fire, falls
- 1.2 outline methods that are commonly used to prevent contact with a live electric circuit
- 1.3 identify the nonconducting extinguishing agents that can be used with electrical fires
- 1.4 describe and provide examples of:
  - 1.4.1 alternating and direct current
  - 1.4.2 series and parallel circuits
- 1.5 define the terms and explain the relationships between voltage, amperage and resistance in a typical circuit
- 1.6 identify the common types of electrical systems found in a modern home such as lighting, utility, heating, communication and alarm systems
- 1.7 describe the symbols that are used to indicate a wall plug, light fixture, range, dryer plug, etc., on an electrical drawing
- 1.8 identify the code requirements for installing outlets in a kitchen, bathroom, living room and bedroom
- 1.9 list and describe the types of conductors and connection devices that are used in conventional construction
- 1.10 identify design and framing requirements when installing electrical fixtures and wires

2. apply wiring principles and code requirements to create a wiring diagram
- 2.1 make a wiring diagram for a typical residential wiring project
- 2.2 prepare a list of materials for a wiring project
- 2.3 complete an application for a wiring permit

3. apply wiring skills to assist in the installation of a residential wiring system
- 3.1 use the appropriate tools and materials to frame and install a typical residential wiring circuit including:
  - 3.1.1 general purpose and split receptacle
  - 3.1.2 single-pole and three-way switch
  - 3.1.3 ceiling fixture
  - 3.1.4 outside outlet
  - 3.1.5 service panel
- 3.2 test a circuit for power, grounding and continuity

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2080: PLUMBING SYSTEMS

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic knowledge and skills to fabricate and make repairs to residential drainage, waste and vent (DWV) and water supply systems.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in plumbing.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe the parts of a residential plumbing system**
   - 1.1 identify and describe the piping systems in a conventional residence such as water supply, vent, drainage and gas supply
   - 1.2 examine the principles related to proper sizing, venting, pressures and drainage angles
   - 1.3 investigate and compare the use of iron, copper, brass and plastic components
   - 1.4 identify the symbols that are used to depict common fixtures and fittings
   - 1.5 identify the code requirements for installing a residential plumbing system
   - 1.6 identify appropriate methods of cutting iron, copper, steel and plastic pipe
2. **create a drawing of a water supply system and a DWV system for a typical plumbing fixture**
   - 2.1 sketch a typical water supply system and a DWV system for a typical household fixture
3. **apply plumbing skills to assist in the installation of a water supply system and a DWV system**
   - 3.1 describe and demonstrate approved methods of joining pipe using solder, cohesives, mechanical joints and threaded fasteners
   - 3.2 determine when to use face-to-face, centre-to-centre and shoulder-to-shoulder measurements
   - 3.3 use a plumbing layout drawing to create a detailed materials list and cost estimate
   - 3.4 locate and use the appropriate fire extinguisher for a given type of fire
   - 3.5 describe the health hazards associated with the use of solder and plastic adhesives
   - 3.6 use the appropriate tools, materials and techniques to:
     - 3.6.1 rough in a water supply system and a DWV system
     - 3.6.2 pressure test a supply system
     - 3.6.3 install a fixture and connect supply and drainage lines
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2090: CLIMATE CONTROL SYSTEMS

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students investigate common heating, ventilating and air conditioning (HVAC) systems and principles and participate in the installation or maintenance of one of these systems.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in sheet metal and climate control installation/service.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **list and describe the major components of a typical HVAC system**
   - 1.1 research the methods heat is transferred; e.g., convection, radiation, gravity
   - 1.2 identify the parts of a typical HVAC system
   - 1.3 compare hot water with forced air heating
   - 1.4 identify and describe the types of warm/cold air distribution systems; e.g., perimeter loop, radial, trunk, branch
   - 1.5 explain how heating systems are sized, how the number of outlets is calculated and how locations are determined
   - 1.6 examine a typical heating system and determine how room temperatures are regulated
   - 1.7 explain the effects on air quality when there is a lack of ventilation
   - 1.8 describe the cost effectiveness of heating with various fuels
2. **prepare a preventive maintenance schedule for an HVAC system**
   - 2.1 identify the service routines that should be followed for a heating and cooling system
   - 2.2 prepare a service schedule for the HVAC component
3. **service or install an HVAC system**
   - 3.1 prepare a layout for a part of an HVAC system
   - 3.2 assist in the installation of an HVAC system
   - 3.3 service a component of an HVAC system
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2100: AGRI-STRUCTURES

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students apply construction principles and skills and use pre-engineered designs to build a structure to be used for agricultural purposes.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry or metal work.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify the major issues that must be addressed when designing an agri-structure**
   - 1.1 describe the types of materials and structures used in agriculture businesses
   - 1.2 list the factors that affect the choice of materials and design of agri-structure including:
     - 1.2.1 human and environmental safety standards
     - 1.2.2 animal comfort and safety
     - 1.2.3 crop protection
     - 1.2.4 conditions of use
     - 1.2.5 ease of construction and maintenance
     - 1.2.6 material cost
2. **read and interpret the appropriate drawings and specifications to create a material and cost estimate**
   - 2.1 produce/select an agri-structure design that:
     - 2.1.1 uses two or more types of structural materials
     - 2.1.2 applies basic construction principles and processes
     - 2.1.3 meets industry standards
   - 2.2 estimate the cost of materials and prepare a work schedule
3. **construct a structure for use in agriculture**
   - 3.1 use the appropriate tools, materials and processes to construct and finish a structure
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely
   - 4.3 demonstrate teamwork skills to:
     - 4.3.1 work with others
     - 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2120: MULTIPLE MATERIALS

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students develop a product that incorporates two or more types of material in its construction.

Parameters: Access to a fully equipped materials facility and to instruction from an individual with specialized training in the use of common materials and tools.

Outcomes: The student will:

1. **identify advantages of using different materials in a product**
   - 1.1 describe the properties of common production materials
   - 1.2 research and state the reasons for using combinations of wood, metal, plastic, ceramic and other materials
   - 1.3 identify indicators of a quality product
2. **apply knowledge of structural materials, planning and construction techniques to produce a product from different materials**
   - 2.1 select, modify or design a product that incorporates two or more materials in its construction
   - 2.2 identify the methods by which different materials are fastened together
   - 2.3 identify health and safety concerns associated with a given material
   - 2.4 prepare a detailed sequence of operations that facilitates the safe and efficient use of materials and tools
   - 2.5 create a cutting list and cost estimate
   - 2.6 use the appropriate tools and supplies to safely:
     - 2.6.1 measure and lay out components
     - 2.6.2 cut and remove waste from materials
     - 2.6.3 form components, where required
     - 2.6.4 fasten or bond components
     - 2.6.5 align and clamp components
     - 2.6.6 prepare for finishing
   - 2.7 identify the types of finishes that are compatible with wood, metal, plastic, ceramic and other surfaces
   - 2.8 select compatible finishes
   - 2.9 finish the product using appropriate finishes
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

4. identify possible life roles related to the skills and content of this cluster

4.1 recognize and then analyze the opportunities and barriers in the immediate environment

4.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2130: FURNITURE – BOX CONSTRUCTION

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students develop basic joinery skills and knowledge related to case construction by producing a box-type piece of furniture.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with formal, specialized training in cabinetry/carpentry.

Outcomes: The student will:

1. **identify and describe the design features and processes used to construct a box-type furniture product**
   - 1.1 research typical design and joinery techniques that are commonly used in box construction
   - 1.2 identify construction features including:
     - 1.2.1 door
     - 1.2.2 drawer
     - 1.2.3 plinth
   - 1.3 describe the safe set-up and operation of hand and/or power tools to make a series of joints; e.g., reinforced butt, reinforced mitre, rabbet, dado, finger
   - 1.4 identify and describe the use of common fasteners and clamping procedures used with a specific joint
   - 1.5 identify common fittings and construction techniques used to make the following doors:
     - 1.5.1 flush
     - 1.5.2 sliding
     - 1.5.3 tambour
     - 1.5.4 fall-flap
2. **apply basic furniture making skills to plan and construct a piece of furniture based on box construction techniques**
   - 2.1 select a box-type product that requires the use of:
     - 2.1.1 solid wood and/or composites
     - 2.1.2 a variety of joints and fasteners
     - 2.1.3 typical lay-up and clamping procedures
   - 2.2 prepare a materials list and cost estimate from a working drawing
   - 2.3 prepare a work schedule
   - 2.4 use the appropriate tools, materials and processes to:
     - 2.4.1 measure and lay out stock
     - 2.4.2 cut stock to size
     - 2.4.3 machine surfaces and joints
     - 2.4.4 lay-up, glue, fasten and clamp
     - 2.4.5 fill or plug exposed fasteners
     - 2.4.6 prepare for finishing

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:

- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:

- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:

- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

4. identify possible life roles related to the skills and content of this cluster

4.1 recognize and then analyze the opportunities and barriers in the immediate environment

4.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2140: FURNITURE – FRAME & PANEL

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students use solid and/or composite materials to build a frame and panel product or component.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with formal specialized training in cabinetry/carpentry.

Outcomes: The student will:

1. **identify and describe the design features and processes used to construct a frame and panel product**
   - 1.1 identify the construction details of a typical frame and panel component
   - 1.2 identify the typical wood joints that are used in frame and panel construction
   - 1.3 identify and describe the types of fastening systems that are used in flat frame construction; e.g., reinforcing plates, dowelling, biscuits, splines
   - 1.4 describe the safe set-up and operation of hand and/or power tools used to make a series of joints; e.g., mortise and tenon, dowel, biscuit, lap, mitre, loose tenon
2. **apply basic furniture making skills to plan and construct a component or piece of furniture based on frame and panel construction techniques**
   - 2.1 select a frame and panel product or component that requires:
     - 2.1.1 interpretation and development of simple working drawings
     - 2.1.2 use of solid woods and/or composites
     - 2.1.3 use of a variety of wood joints, fasteners and other hardware components
     - 2.1.4 typical lay-up and clamping procedures
   - 2.2 show a detailed materials list, cost estimate and work schedule
   - 2.3 use the appropriate tools, machines and processes to:
     - 2.3.1 measure and lay out stock
     - 2.3.2 cut stock to size
     - 2.3.3 machine and fit joints
     - 2.3.4 lay-up, glue, fasten and/or clamp
     - 2.3.5 fill or plug exposed fasteners, where applicable
     - 2.3.6 finish the project
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems
   - 3.2 demonstrate personal management skills to:
     - 3.2.1 demonstrate positive attitudes and behaviours
     - 3.2.2 be responsible
     - 3.2.3 be adaptable
     - 3.2.4 learn continuously
     - 3.2.5 work safely

3.3 demonstrate teamwork skills to:
    3.3.1 work with others
    3.3.2 participate in projects and tasks

4. identify possible life roles related to the skills and content of this cluster

4.1 recognize and then analyze the opportunities and barriers in the immediate environment
4.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2150: FINISHING & REFINISHING

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students use knowledge of finishing materials and finishing techniques to apply new and replacement finishes.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with specialized training in finishing/refinishing.

Outcomes: The student will:

1. identify common finishes and finishing/refinishing techniques
- 1.1 describe techniques that are used to:
  - 1.1.1 identify an existing finish
  - 1.1.2 remove a stain or finish
  - 1.1.3 prepare a surface for refinishing
- 1.2 explain:
  - 1.2.1 bleaching and staining
  - 1.2.2 filling and sealing
  - 1.2.3 creating a distressed finish
- 1.3 identify common finishes and applications
- 1.4 explain the purpose of a filler and sealer
- 1.5 identify the preferred method of applying each of the above finishes; e.g., brush, roller, rag, spray gun
- 1.6 describe what thinners and cleaners are used in conjunction with a given finish

2. identify and describe the health hazards and Workplace Hazardous Materials Information System (WHMIS) regulations associated with the products used in finishing/refinishing
- 2.1 describe the manufacturers' recommendations and WHMIS regulations that apply to the use and storage of a given product
- 2.2 for a refinishing project, identify:
  - 2.2.1 the nature of the existing finish and finish removers
  - 2.2.2 appropriate personal protective equipment
- 2.3 for new and old surfaces, do the following:
  - 2.3.1 select a suitable new or replacement finish
  - 2.3.2 prepare a detailed set of step-by-step finishing procedures
  - 2.3.3 clean the product and the work site

3. demonstrate appropriate finishing/refinishing techniques
- 3.1 use the appropriate tools, materials and techniques to:
  - 3.1.1 remove an existing finish
  - 3.1.2 stain and seal
  - 3.1.3 apply the necessary topcoats
  - 3.1.4 sand, rub and polish, as required
- 3.2 discard all rags and used materials in the appropriate containers
- 3.3 identify ways to improve the quality of a finish

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2160: CABINETMAKING – WEB & FACE FRAME

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students apply web and face frame construction techniques and use solid and/or manufactured materials to produce a built-in or modular cabinet.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with formal, specialized training in cabinetry/carpentry.

Outcomes: The student will:

1. **identify and describe the design features and processes used to construct a web and face frame product**
   - 1.1 describe the principal methods used to construct a built-in cabinet; e.g., on-site construction, modular system
   - 1.2 identify the parts of a web frame cabinet
   - 1.3 describe the types of joints used in web and face frame construction
   - 1.4 describe safe set-up procedures to make common joints associated with web and face frame construction
   - 1.5 identify the appropriate fastening systems used in economy and premium grade construction
2. **prepare a detailed materials list and event sequence**
   - 2.1 select or modify a cabinet drawing that uses web and face frame construction
   - 2.2 create a work schedule
   - 2.3 prepare a material cutting list
3. **build a cabinet, using web and face frame construction techniques**
   - 3.1 use the appropriate tools, materials and processes to:
     - 3.1.1 measure and lay out materials
     - 3.1.2 rough out materials
     - 3.1.3 machine joints and surfaces
     - 3.1.4 assemble, glue, fasten and clamp
     - 3.1.5 fill, scrape and sand
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely
   - 4.3 demonstrate teamwork skills to:
     - 4.3.1 work with others
     - 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2170: CABINETMAKING – DOOR & DRAWER

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students use solid and composite materials to develop skills in building cabinet doors and drawers.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with formal, specialized training in cabinetry/carpentry.

Outcomes: The student will:

1. **identify and describe common methods of designing and constructing cabinet doors and drawers**
   - 1.1 research methods of producing various door treatments including:
     - 1.1.1 raised panel
     - 1.1.2 flush
     - 1.1.3 glass inset
   - 1.2 research common door and drawer construction techniques and hardware options
   - 1.3 identify the common joints used in door and drawer construction
   - 1.4 identify the equipment and describe safe set-up procedures to make a given drawer and door component
2. **apply cabinetmaking skills to plan and construct door/drawer components**
   - 2.1 select or modify a cabinet drawing of a drawer and built-up door
   - 2.2 select the appropriate door and dresser material
   - 2.3 identify an appropriate door guiding system
   - 2.4 create a material and procedural list
   - 2.5 use the appropriate tools, materials and processes to:
     - 2.5.1 measure and lay out materials
     - 2.5.2 machine surfaces and joints
     - 2.5.3 assemble, glue, fasten and clamp
     - 2.5.4 prepare for finishing
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems
   - 3.2 demonstrate personal management skills to:
     - 3.2.1 demonstrate positive attitudes and behaviours
     - 3.2.2 be responsible
     - 3.2.3 be adaptable
     - 3.2.4 learn continuously
     - 3.2.5 work safely
   - 3.3 demonstrate teamwork skills to:
     - 3.3.1 work with others
     - 3.3.2 participate in projects and tasks

4. identify possible life roles related to the skills and content of this cluster

4.1 recognize and then analyze the opportunities and barriers in the immediate environment

4.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2180: WOOD FORMING

Level: Intermediate

Prerequisite: CON1120: Product Management

Description: Students apply skills in mould making and wood conditioning to make a formed part or component.

Parameters: Access to a woodworking or materials facility and to instruction from an individual with specialized training in woodworking.

Outcomes: The student will:

1. **describe common wood forming techniques**
   - 1.1 research and describe typical methods of bending solid stock and laminates including:
     - 1.1.1 soaking in water
     - 1.1.2 steaming
     - 1.1.3 chemical conditioning
   - 1.2 describe how to determine the correct spacing for cross and parallel kerfing
   - 1.3 describe a system to moisten or steam wood (plasticize) prior to bending
   - 1.4 identify woods that lend themselves to cold water or steam bending
   - 1.5 identify methods of building up—moulding and clamping veneer stock
   - 1.6 select the most appropriate adhesive for a given application and process
2. **build or obtain the necessary moulds and clamping devices to bend a piece of solid stock or wood laminate**
   - 2.1 select or design a formed product or component
   - 2.2 calculate the spacing of kerfs for a given radius bend
   - 2.3 design a mould for bending or contouring solid stock
   - 2.4 obtain suitable stock for bending
3. **apply wood forming skills and techniques to make a product or component**
   - 3.1 use the appropriate tools, materials and processes to:
     - 3.1.1 prepare solid and/or veneer stock for bending
     - 3.1.2 condition, glue and secure
     - 3.1.3 release and finish
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2190: MANUFACTURING SYSTEMS

Level: Intermediate

Prerequisite: None

Description: Students investigate the nature of manufacturing systems used to produce durable goods.

Parameters: Access to in-school and community resources related to manufacturing.

Supporting Course: CON1010: Construction Tools & Materials

Outcomes: The student will:

1. **describe current production systems used to manufacture durable goods**
   - 1.1 describe the development of modern manufacturing from its early roots in the domestic, cottage and factory systems
   - 1.2 explain the advantages and disadvantages of a strong manufacturing base in a community
   - 1.3 describe the operations of a typical manufacturing system's input requirements, types of processes and outputs, as well as its feedback mechanisms
   - 1.4 research a manufacturing company and describe its:
     - 1.4.1 organizational structure
     - 1.4.2 methods of decision making
     - 1.4.3 methods of financing
     - 1.4.4 training practices
     - 1.4.5 research and development
     - 1.4.6 marketing practices
   - 1.5 explain how manufacturing is being altered by the global economy and the use of technology
2. **identify the lines of communication and decision making in a typical production system**
   - 2.1 show how a typical manufacturer is able to:
     - 2.1.1 increase productivity
     - 2.1.2 provide for choice
     - 2.1.3 reduce skill level requirements
     - 2.1.4 reduce costs per unit produced
3. **explain how the production of durable goods is being altered by the effects of technology and the global economy**
   - 3.1 describe how computer-assisted manufacturing, just-in-time and total quality management systems increase:
     - 3.1.1 productivity
     - 3.1.2 quality
     - 3.1.3 profitability
   - 3.2 explain why manufacturers are interested in locating near:
     - 3.2.1 skilled population bases
     - 3.2.2 resources
     - 3.2.3 markets
   - 3.3 describe the place that organized labour has in manufacturing

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2200: PRODUCT DEVELOPMENT

Level: Intermediate

Prerequisite: CON1010: Construction Tools & Materials

Description: Students work, individually or as team members, to research, design and build a product suitable for mass production and marketing.

Parameters: Access to a materials/construction facility and to instruction from an individual with specialized training in the use of tools and materials.

Supporting Course: CON2190: Manufacturing Systems

Outcomes: The student will:

1. **list and describe the steps involved in developing a product for manufacturing**
   - 1.1 describe the life cycle of a typical product from the time of introduction to its decline
   - 1.2 identify reasons for a product being successful; e.g., physical and emotional need, marketing practice, pricing, reputation
   - 1.3 explain how new product ideas are generated
   - 1.4 outline how ideas are developed into new products
   - 1.5 identify the major steps involved in engineering a new product
2. **apply designing and planning skills to assist in the development of a prototype**
   - 2.1 select or design a product for manufacturing
   - 2.2 create the necessary detail, assembly and schematic drawings
   - 2.3 identify the appropriate materials
   - 2.4 create a prototype product
   - 2.5 test the product
   - 2.6 analyze the design related to:
     - 2.6.1 function
     - 2.6.2 aesthetic appeal
     - 2.6.3 reliability
     - 2.6.4 manufacturability
     - 2.6.5 profitability
   - 2.7 create a market survey
3. **describe the marketing and manufacturing potential of a product**
   - 3.1 state the importance of product testing and market surveys
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2910: CON PROJECT B

Level: Intermediate

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Intermediate project courses must connect with a minimum of two CTS courses, one of which must be at the intermediate level and be in the same occupational area as the project course. The other CTS course(s) can be at any level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

1. **identify the connection between this project course and two or more CTS courses**
   - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
   - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
2. **propose the project and/or performance**
   - 2.1 identify the project and/or performance by:
     - 2.1.1 preparing a plan
     - 2.1.2 clarifying the purposes
     - 2.1.3 defining the deliverables
     - 2.1.4 specifying time lines
     - 2.1.5 explaining terminology, tools and processes
     - 2.1.6 defining resources; e.g., materials, costs, staffing
   - 2.2 identify and comply with all related health and safety standards
   - 2.3 define assessment standards (indicators for success)
   - 2.4 present the proposal and obtain necessary approvals

The student will:

3. **meet goals as defined within the plan**
   - 3.1 complete the project and/or performance as outlined
   - 3.2 monitor the project and/or performance and make necessary adjustments
   - 3.3 present the project and/or performance, indicating the:
     - 3.3.1 outcomes attained
     - 3.3.2 relationship of outcomes to goals originally set

3.4 evaluate the project and/or performance, indicating the:
    3.4.1 processes and strategies used
    3.4.2 recommendations on how the project and/or performance could have been improved

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2920: CON PROJECT C

Level: Intermediate

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Intermediate project courses must connect with a minimum of two CTS courses, one of which must be at the intermediate level and be in the same occupational area as the project course. The other CTS course(s) can be at any level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

1. **identify the connection between this project course and two or more CTS courses**
   - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
   - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
2. **propose the project and/or performance**
   - 2.1 identify the project and/or performance by:
     - 2.1.1 preparing a plan
     - 2.1.2 clarifying the purposes
     - 2.1.3 defining the deliverables
     - 2.1.4 specifying time lines
     - 2.1.5 explaining terminology, tools and processes
     - 2.1.6 defining resources; e.g., materials, costs, staffing
   - 2.2 identify and comply with all related health and safety standards
   - 2.3 define assessment standards (indicators for success)
   - 2.4 present the proposal and obtain necessary approvals

The student will:

3. **meet goals as defined within the plan**
   - 3.1 complete the project and/or performance as outlined
   - 3.2 monitor the project and/or performance and make necessary adjustments
   - 3.3 present the project and/or performance, indicating the:
     - 3.3.1 outcomes attained
     - 3.3.2 relationship of outcomes to goals originally set

3.4 evaluate the project and/or performance, indicating the:
    3.4.1 processes and strategies used
    3.4.2 recommendations on how the project and/or performance could have been improved

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment
5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON2950: CON INTERMEDIATE PRACTICUM

Level: Intermediate

Prerequisite: None

Description: Students apply prior learning and demonstrate the attitudes, skills and knowledge required by an external organization to achieve a credential/credentials or an articulation.

Parameters: This practicum course, which may be delivered on- or off-campus, should be accessed only by students continuing to work toward attaining a recognized credential/credentials or an articulation offered by an external organization. This course must be connected to at least one CTS course from the same occupational area and cannot be used in conjunction with any advanced (3XXX) level course. A practicum course cannot be delivered as a stand-alone course, cannot be combined with a CTS project course and cannot be used in conjunction with the Registered Apprenticeship Program or the Green Certificate Program.

Outcomes: The student will:

1. perform assigned tasks and responsibilities, as required by the organization granting the credential(s) or articulation

- 1.1 identify regulations and regulatory bodies related to the credential(s) or articulation
- 1.2 describe personal roles and responsibilities, including:
  - 1.2.1 key responsibilities
  - 1.2.2 support functions/responsibilities/expectations
  - 1.2.3 code of ethics and/or conduct
- 1.3 describe personal work responsibilities and categorize them as:
  - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
  - 1.3.2 non-routine tasks; e.g., emergencies
  - 1.3.3 tasks requiring personal judgement
  - 1.3.4 tasks requiring approval of a supervisor
- 1.4 demonstrate basic employability skills and perform assigned tasks and responsibilities related to the credential(s) or articulation

2. analyze personal performance in relation to established standards

- 2.1 evaluate application of the attitudes, skills and knowledge developed in related CTS courses
- 2.2 evaluate standards of performance in terms of:
  - 2.2.1 quality of work
  - 2.2.2 quantity of work
- 2.3 evaluate adherence to workplace legislation related to health and safety
- 2.4 evaluate the performance requirements of an individual who is trained, experienced and employed in a related occupation in terms of:
  - 2.4.1 training and certification
  - 2.4.2 interpersonal skills
  - 2.4.3 technical skills
  - 2.4.4 ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

4. identify possible life roles related to the skills and content of this cluster

4.1 recognize and then analyze the opportunities and barriers in the immediate environment

4.2 identify potential resources to minimize barriers and maximize opportunities

COURSE CON3010: CONCRETE – STRUCTURES & FINISHES

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop essential skills to form, place and finish a concrete project.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in concrete work.

Supporting Courses: CON1070: Building Construction
CON2010: Site Preparation
CON2020: Concrete Forming

Outcomes: The student will:

1. **identify and describe concrete forming, placing and finishing techniques**
   - 1.1 research the effect aggregate, water and cement ratios have on the workability and quality of a concrete mix
   - 1.2 list and describe the purpose of different cement types
   - 1.3 identify the types of tests and reasons for concrete testing
   - 1.4 describe standard forming and reinforcing practices for a project including:
     - 1.4.1 slab on grade
     - 1.4.2 retaining wall
     - 1.4.3 poured stairs
   - 1.5 explain the purpose of a control and expansion joint in a concrete structure
   - 1.6 identify the purpose and describe the process of:
     - 1.6.1 screeding
     - 1.6.2 puddling
     - 1.6.3 striking off
     - 1.6.4 floating
     - 1.6.5 trowelling
     - 1.6.6 finishing
     - 1.6.7 curing
   - 1.7 describe common methods of installing fasteners in concrete before and after the concrete has set up and cured
2. **use the appropriate tools, materials and processes to form, reinforce, place and finish a concrete structure**
   - 2.1 select a concrete project that requires:
     - 2.1.1 forming
     - 2.1.2 reinforcement
     - 2.1.3 consolidation and finishing
   - 2.2 produce a list of materials and schedule of events for an on-site project
   - 2.3 use the appropriate tools, materials and processes to:
     - 2.3.1 prepare the grade and base
     - 2.3.2 assemble/build and condition a form
     - 2.3.3 install damp proof member
     - 2.3.4 fabricate and install the required reinforcement
     - 2.3.5 mix/order, place and consolidate

2.3.6 impart desired finish/colour
2.3.7 provide proper curing conditions
2.3.8 remove forms

2.4 describe the safe use and storage of explosive actuated tools and supplies
2.5 identify power loads and strengths for a given application
2.6 describe prefiring and firing routines

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
3.1.1 communicate
3.1.2 manage information
3.1.3 use numbers
3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
3.2.1 demonstrate positive attitudes and behaviours
3.2.2 be responsible
3.2.3 be adaptable
3.2.4 learn continuously
3.2.5 work safely

3.3 demonstrate teamwork skills to:
3.3.1 work with others
3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals
4.2 identify steps to achieve goals

COURSE CON3020: MASONRY WORK – STRUCTURES & FINISHES

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic knowledge and skills related to masonry materials, structures and finishes.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in masonry work.

Supporting Courses: CON1070: Building Construction
CON3010: Concrete – Structures & Finishes

Outcomes: The student will:

1. **identify and describe common types of masonry materials and finishes**
   - 1.1 explain reasons for using a masonry finish over other types of finishes
   - 1.2 analyze a brick veneer wall section and determine the method that is used to:
     - 1.2.1 support the weight of the brick
     - 1.2.2 attach the bricks to the wall surface
     - 1.2.3 prevent moisture build-up between the wall surfaces
   - 1.3 describe the different sizes, textures and grades of bricks
   - 1.4 identify common types of patterns and bonds used in brick structures and veneering
   - 1.5 examine a stucco wall section and identify the:
     - 1.5.1 moisture barrier
     - 1.5.2 corner and stop beads
     - 1.5.3 lath or wire
     - 1.5.4 scratch coat
     - 1.5.5 screeds
     - 1.5.6 finish coat
   - 1.6 identify and describe common stucco finishes and application methods; e.g., smooth, spatter, old English
   - 1.7 identify the differences and similarities between applying a stucco finish to a frame wall and applying parging to a cement or block wall
2. **read and interpret a working drawing to prepare a cost estimate of a masonry surface**
   - 2.1 estimate the amount of material required to brick veneer a wall section and stucco or parge a surface
3. **apply masonry skills to assist in the application of a masonry finish or in the construction of a masonry structure**
   - 3.1 list and describe the basic tools that are used in laying brick and concrete blocks
   - 3.2 describe the techniques that are used to:
     - 3.2.1 cut brick
     - 3.2.2 keep courses level and plumb
     - 3.2.3 build a lead
     - 3.2.4 tool joints
   - 3.3 describe the steps that are taken to compensate for extreme weather conditions
   - 3.4 describe the proper mixing proportions to prepare a mortar, stucco and parging mix

3.5 use appropriate materials, tools and techniques to:
    3.5.1 apply a brick veneer finish or build a brick structure
    3.5.2 stucco or parge a wall surface

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3030: WALL & CEILING FINISHING

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop basic knowledge and skills to insulate, install and finish an interior wall/ceiling surface.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Supporting Courses: CON1070: Building Construction
CON2035: Framing Systems – Floor
CON2045: Framing Systems – Wall

Outcomes: The student will:

1. **describe the procedures related to the installation of insulation and vapour barrier to an exterior wall and ceiling**
   - 1.1 list and describe the types of wall and ceiling insulation and soundproofing materials
   - 1.2 identify the building codes that relate to the installation of insulation, vapour barrier and drywall
2. **identify and describe the health hazards and safety precautions associated with the use of insulating, drywalling and finishing materials**
3. **prepare, apply and finish a wall and ceiling surface**
   - 3.1 estimate the amount and type of drywall, insulation, vapour barrier, paint and decorating supplies required to install and finish a wall or ceiling surface
   - 3.2 describe the different types of drywall and conditions of use
   - 3.3 identify and describe the different types of tapes, corner beads, adhesives and fastening devices used with gypsum board
   - 3.4 describe methods of cutting, attaching, taping, filling, sanding and texturing a gypsum board
   - 3.5 check alignment of studs and identify starting points
   - 3.6 mark stud locations on floor and ceiling
   - 3.7 install metal protectors for wiring and plumbing, where necessary
   - 3.8 identify and locate appropriate personal protective equipment, and describe the working conditions and skills required of a drywall mechanic and/or painter/decorator
   - 3.9 use the appropriate tools, materials and processes to:
     - 3.9.1 install insulation, vapour barrier and gypsum board
     - 3.9.2 tape, fill, sand, texture and paint, as required
     - 3.9.3 repair a gypsum board surface
     - 3.9.4 seal, paint and/or apply a wall covering
   - 3.10 describe methods of making repairs to small and large holes in a drywall surface
   - 3.11 identify the materials used to paint and decorate a wall surface
   - 3.12 research common methods used to apply paint to a surface; e.g., brush, roller, spray

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:

- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:

- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:

- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals

5.2 identify steps to achieve goals

COURSE CON3040: STAIR CONSTRUCTION

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop the knowledge and skills required to build a straight flight of stairs.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Supporting Courses: CON1070: Building Construction
CON2035: Framing Systems – Floor
CON2045: Framing Systems – Wall

Outcomes: The student will:

1. **identify and describe different stair types, component parts and construction techniques**
   - 1.1 identify stair types, materials and methods of construction
   - 1.2 research and identify the parts of a stair and railing system
   - 1.3 identify a typical layout procedure for a wooden stringer
   - 1.4 read and interpret a drawing to determine the:
     - 1.4.1 number of runs and risers
     - 1.4.2 stair width
     - 1.4.3 tread, riser and stringer dimensions
     - 1.4.4 joints
     - 1.4.5 types of materials and fasteners
     - 1.4.6 guard and railing requirements
   - 1.5 research methods of attaching and finishing treads and risers; e.g., housed, semi-housed, built-up stringer, notched stringer
2. **interpret building code regulations pertaining to residential stair design**
   - 2.1 describe the specific building code regulations regarding headroom, rise, run and railing specifications
3. **design, lay out and construct a straight flight of stairs**
   - 3.1 prepare a detailed material list and cost estimate
   - 3.2 use the appropriate tools, materials and processes to:
     - 3.2.1 prefabricate a set of stairs
     - 3.2.2 install a suitable railing
     - 3.2.3 check for code conformity
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3050: ROOF STRUCTURES 2

Level: Advanced

Prerequisite: CON2050: Roof Structures 1

Description: Students develop basic competencies in laying out, cutting and assembling common, hip and valley rafters in relation to specialized structures and coverings.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Outcomes: The student will:

1. **identify and describe the design features of intersecting sloped roofs**
   - 1.1 describe roof types and terminology
   - 1.2 explain the purpose of a roof overhang
   - 1.3 explain how roof dormers and Dutch gables are built
   - 1.4 investigate and describe alternate roof coverings including:
     - 1.4.1 wood shakes
     - 1.4.2 metal shingles
     - 1.4.3 clay tiles
2. **calculate the length of rafters, using ratio and proportion techniques**
   - 2.1 explain how roof slopes are described and calculated
   - 2.2 from a set of drawings and specifications, calculate the:
     - 2.2.1 roof slope
     - 2.2.2 amount of overhang
     - 2.2.3 length of hip, valley and related jack rafters
   - 2.3 describe three methods of determining the length of a common rafter
3. **lay out, cut and assemble a set of rafters for a roof assembly**
   - 3.1 sketch a rafter plan for a hip and valley roof system
   - 3.2 describe the types of cuts and features of a:
     - 3.2.1 common rafter
     - 3.2.2 hip rafter and valley rafter
     - 3.2.3 hip rafter and valley jack rafter
   - 3.3 lay out a rafter pattern for a given slope and type of rafter
   - 3.4 prepare and check the condition of required ladders and scaffolding
   - 3.5 create a work schedule and material list
   - 3.6 for a given roof section, use the appropriate tools, materials and techniques to:
     - 3.6.1 lay out the required patterns
     - 3.6.2 cut the appropriate rafters to size
     - 3.6.3 assemble and fasten
     - 3.6.4 sheath and apply a sample of one or more alternative roof coverings
   - 3.7 estimate the cost of at least one alternative roof covering

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:

- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:

- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:

- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals

5.2 identify steps to achieve goals

COURSE CON3060: DOORS & TRIM

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students apply basic finish carpentry knowledge and skills to install doors, railings and mouldings.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. identify common types of doors, hardware and trim products
- 1.1 list and describe the types of components and mouldings that are used in conjunction with the installation and finishing of:
  - 1.1.1 railings
  - 1.1.2 doors
  - 1.1.3 columns
  - 1.1.4 floors and ceilings
- 1.2 describe the different ways doors are constructed
- 1.3 label the parts of a panel door
- 1.4 describe the common types of joints and methods of measuring and cutting used to install various mouldings and casings such as mitre, coped and butt joint
- 1.5 from a set of drawings, identify the styles of mouldings and calculate the amounts of material to be ordered to finish a door

2. install doors, mouldings and other trim products
- 2.1 use the appropriate tools, materials and processes to:
  - 2.1.1 install a prefabricated door or bifold unit
  - 2.1.2 install a lock set
  - 2.1.3 prefinish mouldings and casing, where possible
  - 2.1.4 install room mouldings and casings

3. demonstrate basic competencies
- 3.1 demonstrate fundamental skills to:
  - 3.1.1 communicate
  - 3.1.2 manage information
  - 3.1.3 use numbers
  - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
  - 3.2.1 demonstrate positive attitudes and behaviours
  - 3.2.2 be responsible
  - 3.2.3 be adaptable
  - 3.2.4 learn continuously
  - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
  - 3.3.1 work with others
  - 3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals

4.2 identify steps to achieve goals

COURSE CON3070: FLOORCOVERING

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop skills in selecting and installing typical floor coverings used in residential, institutional and commercial buildings.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in floorcovering.

Supporting Course: CON1070: Building Construction

Outcomes: The student will:

1. **identify and describe common types of residential, institutional and commercial floorcoverings**
   - 1.1 list and describe common types of residential and commercial floorcovering materials; e.g., resilient (vinyl, rubber, cork), carpet, ceramic tile, wood
   - 1.2 identify the factors that are used to determine the selection of a floorcovering
   - 1.3 explain how concrete and wood floors differ in the way they are prepared for a floorcovering
   - 1.4 identify appropriate adhesives and fasteners for a given covering
2. **apply flooring skills to assist in the installation of a floorcovering**
   - 2.1 describe the appropriate flooring for a given application
   - 2.2 calculate the cost of materials and supplies for a given area
   - 2.3 measure an area and prepare a layout sketch of starter courses
   - 2.4 describe the processes used to:
     - 2.4.1 rough fit, seam and stretch a carpet
     - 2.4.2 rough fit and seam a vinyl covering
     - 2.4.3 lay out a floor surface for tile, parquet and wood flooring
     - 2.4.4 nail square edge and tongue-and-groove wood flooring
     - 2.4.5 fill, sand and finish a wood floor
     - 2.4.6 set, grout and seal ceramic tile
   - 2.5 use the appropriate tools, materials and processes to:
     - 2.5.1 prepare a floor surface
     - 2.5.2 install a floorcovering
     - 2.5.3 seal and finish, where applicable
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems
   - 3.2 demonstrate personal management skills to:
     - 3.2.1 demonstrate positive attitudes and behaviours
     - 3.2.2 be responsible
     - 3.2.3 be adaptable
     - 3.2.4 learn continuously
     - 3.2.5 work safely

3.3 demonstrate teamwork skills to:
    3.3.1 work with others
    3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals
4.2 identify steps to achieve goals

COURSE CON3080: ENERGY-EFFICIENT HOUSING

Level: Advanced

Prerequisite: CON1070: Building Construction

Description: Students investigate construction practices and support systems to create an energy-efficient housing design.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in carpentry.

Outcomes: The student will:

1. **identify and describe energy-efficient construction materials and techniques**
   - 1.1 identify the factors that have contributed to more energy-efficient housing
   - 1.2 describe the construction techniques that are used in energy-efficient buildings
   - 1.3 list and describe the materials that are used to improve the energy efficiency of a building
   - 1.4 define the term R factor
   - 1.5 describe the ways heat can enter or escape from a building
   - 1.6 describe corrective measures that can be undertaken in existing buildings to improve energy efficiency
   - 1.7 identify and describe passive and active heating and cooling systems
   - 1.8 research the effects of landscaping on energy efficiency
2. **calculate the energy efficiency of a typical residence or commercial structure**
   - 2.1 analyze an existing structure to estimate the heat loss through ceilings, walls, doors and windows
3. **write a proposal outlining how to improve the energy efficiency of a given building**
   - 3.1 prepare a proposal for an existing building outlining the work to be done to improve efficiency and its cost effectiveness
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely
   - 4.3 demonstrate teamwork skills to:
     - 4.3.1 work with others
     - 4.3.2 participate in projects and tasks
5. **create a transitional strategy to accommodate personal changes and build personal values**
   - 5.1 identify short-term and long-term goals
   - 5.2 identify steps to achieve goals

COURSE CON3090: RENOVATIONS/RESTORATIONS

Level: Advanced

Prerequisite: CON1070: Building Construction

Description: Students work with a client to plan and complete a building renovation and/or restoration.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Outcomes: The student will:

1. **complete a feasibility study and cost estimate of a renovation/restoration project**
   - 1.1 identify the types of renovations that are most common; e.g., changing or adding windows, creating a new entrance or opening a room, building an addition, replacing exterior finish
   - 1.2 identify types of renovations that require local permits or work that requires special skills and certification
   - 1.3 predict, by considering the age of the original building, the types of materials and construction techniques used in the original construction
   - 1.4 identify sources of information regarding construction methods and materials used in historic buildings
   - 1.5 list the materials that, for health reasons, require special care when renovating
   - 1.6 identify local regulations regarding the disposal of hazardous materials
   - 1.7 prepare a feasibility study by determining the:
     - 1.7.1 usefulness of the renovation
     - 1.7.2 cost of materials and labour
     - 1.7.3 disruption to the use of other living space
     - 1.7.4 structural as well as aesthetic considerations
     - 1.7.5 impact on support systems such as heating, lighting and plumbing
   - 1.8 prepare a working drawing of a typical renovation
   - 1.9 prepare a work schedule for a typical renovation/restoration project
2. **apply construction skills to assist in a building renovation/restoration project, using traditional and modern construction materials and techniques**
   - 2.1 apply planning, management and construction skills to complete a renovation and/or restoration project
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems
   - 3.2 demonstrate personal management skills to:
     - 3.2.1 demonstrate positive attitudes and behaviours
     - 3.2.2 be responsible
     - 3.2.3 be adaptable
     - 3.2.4 learn continuously
     - 3.2.5 work safely

3.3 demonstrate teamwork skills to:
    3.3.1 work with others
    3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals
4.2 identify steps to achieve goals

COURSE CON3105: COMMERCIAL STRUCTURES

Level: Advanced

Prerequisite: CON1070: Building Construction

Description: Students investigate structural designs, construction techniques and work site practices related to commercial construction.

Parameters: Access to a commercial construction site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Outcomes: The student will:

1. **compare the differences between residential, institutional and commercial construction**
   - 1.1 identify the major differences between a residential and a commercial/institutional construction project
   - 1.2 compare structural steel framing techniques with those of reinforced concrete framing
   - 1.3 describe the various floor systems and components that are used in commercial/institutional construction
2. **describe common types of materials and construction techniques used in commercial construction**
   - 2.1 describe the techniques used to build a shallow and a deep foundation for commercial/institutional buildings
   - 2.2 explain the advantage of using curtain walls in highrise buildings
   - 2.3 describe typical methods of installing utilities in commercial buildings
   - 2.4 identify common methods of finishing exterior and interior surfaces
3. **demonstrate commercial construction job site expectations and skill requirements**
   - 3.1 identify the personal protective equipment that is required on the job site
   - 3.2 describe worker expectations on a typical job site
   - 3.3 describe the role of a safety supervisor on a job site
   - 3.4 produce a scale model or illustrated log that features common materials and techniques used in commercial/residential construction
4. **identify and describe typical crane, hoisting and rigging equipment methods and procedures**
   - 4.1 identify typical rigging techniques that are used to transport materials
   - 4.2 demonstrate the basic lift signals used on the construction site
   - 4.3 demonstrate the proper use of:
     - 4.3.1 slings and hitches
     - 4.3.2 knots
     - 4.3.3 hand signals
   - 4.4 define the term “safe working load”
   - 4.5 describe correct methods of installing and securing scaffolding
5. **demonstrate basic competencies**
   - 5.1 demonstrate fundamental skills to:
     - 5.1.1 communicate
     - 5.1.2 manage information
     - 5.1.3 use numbers
     - 5.1.4 think and solve problems

5.2 demonstrate personal management skills to:
    5.2.1 demonstrate positive attitudes and behaviours
    5.2.2 be responsible
    5.2.3 be adaptable
    5.2.4 learn continuously
    5.2.5 work safely
5.3 demonstrate teamwork skills to:
    5.3.1 work with others
    5.3.2 participate in projects and tasks

6. create a transitional strategy to accommodate personal changes and build personal values

6.1 identify short-term and long-term goals
6.2 identify steps to achieve goals

COURSE CON3110: SITE MANAGEMENT

Level: Advanced

Prerequisite: CON1070: Building Construction

Description: Students consider the efficient and timely delivery of a quality product. They investigate and report on site management theories and practices to produce a project management plan.

Parameters: Access to appropriate in-school and community resources.

Outcomes: The student will:

1. **identify and describe the key elements of project management related to commercial and residential construction**
   - 1.1 identify the key elements of project management including:
     - 1.1.1 planning
     - 1.1.2 scheduling
     - 1.1.3 implementing
     - 1.1.4 controlling
   - 1.2 describe the need for good communication and cooperation between various trades and occupations on a construction site
2. **outline the roles and responsibilities of the principal players on a construction project**
   - 2.1 describe the roles and responsibilities of the project manager in relation to:
     - 2.1.1 reviewing contractual agreements and deliverables
     - 2.1.2 establishing effective lines of communication with: clients, suppliers, contractors, inspectors
     - 2.1.3 determining site conditions and amenities; e.g., electrical, plumbing and gas supplies
   - 2.2 report on the roles and responsibilities for one or more of the following job site positions:
     - 2.2.1 site superintendent
     - 2.2.2 safety supervisor
     - 2.2.3 subtrade contractor
     - 2.2.4 foreman
     - 2.2.5 skilled worker
3. **apply site management theories and practices to create a management plan for a construction project**
   - 3.1 compare the advantages and disadvantages of using the critical path and bar chart methods for scheduling a project
   - 3.2 identify strategies to help bring a project back on schedule
   - 3.3 identify the primary tasks of completing a project in relation to:
     - 3.3.1 managing supplies
     - 3.3.2 managing contractors
     - 3.3.3 arranging inspections
     - 3.3.4 communicating with the client
     - 3.3.5 keeping records

3.4 research procedures to control:
    3.4.1 safety on the work site
    3.4.2 quality of work
    3.4.3 removal and disposal of materials
    3.4.4 project costs
3.5 develop a work plan for a given project by determining:
    3.5.1 what is to be done
    3.5.2 how it will be done
    3.5.3 who will do it
    3.5.4 when it should be done
3.6 schedule the work using a bar chart or critical path technique
3.7 analyze a project and identify procedures to improve:
    3.7.1 time management
    3.7.2 quality of work
    3.7.3 health and safety
    3.7.4 cost efficiencies

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3120: TOOL MAINTENANCE

Level: Advanced

Prerequisite: CON1010: Construction Tools & Materials

Description: Students develop skills in preventive maintenance by routinely inspecting and servicing production tools and equipment.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with specialized training in hand and power tool maintenance.

Outcomes: The student will:

1. **identify and describe the essential elements and desired outcomes of a preventive maintenance program**
   - 1.1 explain reasons for establishing a preventive maintenance program
   - 1.2 identify the essential elements of a preventive maintenance program; e.g., scheduling and performing periodic maintenance functions, repairing faulty equipment, keeping records of service and maintenance work, tagging or removing equipment that is out of order
   - 1.3 identify tools that require safety accessories such as a push stick
2. **prepare a maintenance schedule for a piece of equipment**
   - 2.1 show a list of parameters for setting up a maintenance schedule; e.g., age of equipment, frequency of use, manufacturer's recommendations, past performance
   - 2.2 list and describe the types of adjustments and service requirements of shop equipment including:
     - 2.2.1 table saws
     - 2.2.2 band saws
     - 2.2.3 scroll saws
     - 2.2.4 jointers
     - 2.2.5 surface planers
     - 2.2.6 portable equipments
     - 2.2.7 drill presses
   - 2.3 prepare a service schedule for a number of production tools and pieces of equipment
3. **apply established maintenance procedures to assess and maintain hand and power tools**
   - 3.1 identify recommended grinding and honing angles for:
     - 3.1.1 plane irons
     - 3.1.2 wood chisels
     - 3.1.3 wood turning tools
   - 3.2 calculate twist drill point angles and lip clearances for drilling metals and plastics
   - 3.3 design a safety accessory for a specific tool
   - 3.4 demonstrate a routine inspection of laboratory tools and equipment
   - 3.5 perform maintenance services, as required
   - 3.6 build a safety accessory
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3130: FURNITURE – LEG & RAIL

Level: Advanced

Prerequisite: CON1120: Product Management

Description: Students use solid and/or manufactured materials and leg-and-rail or pedestal construction techniques to build a free-standing piece of furniture.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with formal, specialized training in furniture and cabinetmaking.

Supporting Courses: CON2130: Furniture – Box Construction
CON2140: Furniture – Frame & Panel

Outcomes: The student will:

1. **identify and describe the design features and joinery techniques of a typical leg-and-rail piece of furniture**
   - 1.1 describe typical design and joinery techniques used in leg-and-rail and pedestal construction
   - 1.2 identify common methods and fastening systems to secure a wood top to an under frame; e.g., wood buttons, metal plates, pocket drilling, blocks
   - 1.3 describe common methods of transferring a pattern to a work piece such as a table leg or pedestal
   - 1.4 describe an appropriate method to reed and flute a surface
2. **apply drawing and estimating skills and techniques to prepare a shop drawing, detailed materials list and cost estimate**
   - 2.1 select a product that requires the use of:
     - 2.1.1 leg-and-rail or pedestal components
     - 2.1.2 solid woods and/or composite materials
   - 2.2 interpret a working drawing to prepare a detailed materials list and event schedule
3. **plan and build a piece of furniture, using leg-and-rail construction techniques**
   - 3.1 design and build the required jigs and templates
   - 3.2 use the appropriate tools, material and processes to:
     - 3.2.1 measure and lay out stock
     - 3.2.2 cut and shape components
     - 3.2.3 machine appropriate joints
     - 3.2.4 assemble with suitable fasteners
     - 3.2.5 prepare for finishing
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3140: FURNITURE – SURFACE ENHANCEMENT

Level: Advanced

Prerequisite: CON1120: Product Management

Description: Students explore and demonstrate the use of veneer, inlay, carving and/or marquetry techniques to enhance the appearance of a product or component.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with formal, specialized training in furniture and cabinetmaking.

Outcomes: The student will:

1. **identify and describe methods of matching wood veneer**
   - 1.1 describe the principal methods used to produce a wood veneer; e.g., rotary cutting, flat or plain slicing, quarter slicing, right and half round cutting
   - 1.2 identify the methods used to match veneer including:
     - 1.2.1 slip
     - 1.2.2 diamond
     - 1.2.3 checkerboard
     - 1.2.4 book
   - 1.3 describe successful cutting and applying techniques
2. **differentiate between inlay, marquetry and carving techniques**
   - 2.1 differentiate between marquetry and inlaying
   - 2.2 explain how hand and machine carving differ
   - 2.3 identify a product or component that:
     - 2.3.1 requires veneering
     - 2.3.2 is enhanced by a carved, inlaid or marquetry feature
3. **create a veneer, inlay or carving feature for a product or component**
   - 3.1 select an appropriate veneer
   - 3.2 sketch the desired veneer match
   - 3.3 sketch a design for a carved, inlaid or marquetry feature
   - 3.4 use appropriate tools, materials and processes to:
     - 3.4.1 cut and fit a veneer
     - 3.4.2 apply and glue a veneer
     - 3.4.3 create an inlay, marquetry or carving feature
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3150: FURNITURE REPAIR

Level: Advanced

Prerequisite: CON1120: Product Management

Description: Students apply basic knowledge of furniture construction and materials to repair or replace existing components or coverings.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with formal, specialized training in carpentry/cabinetry.

Supporting Courses: CON2150: Finishing & Refinishing
FAS2150: Upholstery

Outcomes: The student will:

1. **assess the condition of a piece of furniture to determine whether it can be economically repaired or restored**
   - 1.1 identify the factors that determine whether a piece of furniture is worth repairing or restoring
   - 1.2 describe safe and efficient methods to:
     - 1.2.1 loosen old glue and clean joints
     - 1.2.2 remove and replace dowel pins
     - 1.2.3 tighten loose joints
     - 1.2.4 patch or repair a veneer surface
     - 1.2.5 splice a component
     - 1.2.6 repair and/or replace a plastic moulding
   - 1.3 identify practical methods to determine the nature of the original structural materials and finishes
   - 1.4 identify the design features that might have caused a component to fail
   - 1.5 describe the hazards associated with stripping old paint, varnish and lacquer finishes
2. **prepare a repair/restoration plan and cost estimate**
   - 2.1 describe the overall condition and feasibility of restoring a given piece of furniture
   - 2.2 estimate the time, supply and material cost to:
     - 2.2.1 disassemble
     - 2.2.2 strip down
     - 2.2.3 repair
     - 2.2.4 reassemble
     - 2.2.5 refinish
3. **repair/restore a piece of furniture**
   - 3.1 use the appropriate tools, materials and processes to repair and restore a piece of furniture
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3160: CABINETMAKING – CABINETS & COUNTERTOPS

Level: Advanced

Prerequisite: CON1120: Product Management

Description: Students develop the knowledge and skills required to build and install a simple cabinet/countertop, complete with an appropriate backsplash and edge treatment.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with formal, specialized training in carpentry/cabinetry.

Supporting Course: CON1160: Manufactured Materials

Outcomes: The student will:

1. identify and describe common types of cabinets/countertops and installation procedures
- 1.1 identify common countertop materials including:
  - 1.1.1 ceramic tile
  - 1.1.2 plastic laminate
  - 1.1.3 natural and synthetic marble
  - 1.1.4 moulded laminates
- 1.2 identify typical methods and materials used to seal components
- 1.3 describe the processes used to:
  - 1.3.1 apply ceramic tile
  - 1.3.2 apply plastic laminates
  - 1.3.3 install manufactured tops
- 1.4 describe standard procedures to:
  - 1.4.1 cut and trim plastic laminates
  - 1.4.2 cut ceramic tile

2. identify and describe a suitable edge treatment for a given application
- 2.1 identify and describe typical edge treatments used with a given cabinet/countertop material
- 2.2 select the appropriate material and edge treatment for a given application

3. apply/install a given material to produce a suitable cabinet/countertop
- 3.1 prepare a detailed material and procedural list
- 3.2 identify and note the location of fixtures
- 3.3 list and demonstrate the safe use of power tools used to install cabinet/countertop materials
- 3.4 describe the health and safety issues that pertain to the use of specific solvents and adhesives
- 3.5 use the appropriate tools, materials and processes to:
  - 3.5.1 measure and mark stock
  - 3.5.2 cut and fit materials
  - 3.5.3 attach components
  - 3.5.4 apply materials and edge treatments
  - 3.5.5 locate and prepare openings for fixtures
  - 3.5.6 clean and seal

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:

- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:

- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:

- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals

5.2 identify steps to achieve goals

COURSE CON3170: CABINETMAKING – LAYOUT & INSTALLATION

Level: Advanced

Prerequisite: CON1120: Product Management

Description: Students develop a floor/wall cabinet plan and order and install a set of pre-built cabinets.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry/cabinetry.

Outcomes: The student will:

1. **design a room layout and prepare a cabinet schedule**
   - 1.1 identify and describe the principles of various kitchen, bathroom and workroom layouts
   - 1.2 use a set of drawings and specifications to determine the size, location and type of modular units
   - 1.3 prepare a story pole or master layout on plywood or cardboard for a specified section of a cabinet installation
2. **lay out and install a set of cabinets and countertops**
   - 2.1 describe the procedures used to level a set of cabinets
   - 2.2 describe the techniques and fasteners used to attach cabinets together and to floor, ceiling and wall structures
   - 2.3 check and note irregularities in walls and floors
   - 2.4 identify cabinet modifications owing to irregularities and service outlets
   - 2.5 use the appropriate tools, materials and processes to:
     - 2.5.1 locate and level units
     - 2.5.2 assemble and install units
     - 2.5.3 install countertops
     - 2.5.4 apply fillers and mouldings
     - 2.5.5 adjust fit of doors and drawers
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems
   - 3.2 demonstrate personal management skills to:
     - 3.2.1 demonstrate positive attitudes and behaviours
     - 3.2.2 be responsible
     - 3.2.3 be adaptable
     - 3.2.4 learn continuously
     - 3.2.5 work safely
   - 3.3 demonstrate teamwork skills to:
     - 3.3.1 work with others
     - 3.3.2 participate in projects and tasks
4. **create a transitional strategy to accommodate personal changes and build personal values**
   - 4.1 identify short-term and long-term goals
   - 4.2 identify steps to achieve goals

COURSE CON3190: PRODUCTION PLANNING

Level: Advanced

Prerequisite: CON2200: Product Development

Description: Students plan, individually or as team members, a production system and create the necessary work cells and floor plan to produce a given product in a safe and efficient manner.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with specialized training in production work.

Outcomes: The student will:

1. **identify the characteristics of an efficient production system**
   - 1.1 describe the factors that determine whether a product part or component will be built or purchased
   - 1.2 describe the production methods that are used to separate, combine and form materials
   - 1.3 describe common methods of material and product handling
   - 1.4 identify the conditions that contribute to an efficient production system; e.g., use of flexible equipment, zero tolerance, multi-skilled workteams, authority delegated to the workers
   - 1.5 identify methods to control:
     - 1.5.1 inventory
     - 1.5.2 production
     - 1.5.3 quality
   - 1.6 list and describe typical safety regulations that govern:
     - 1.6.1 space between equipment
     - 1.6.2 type of floor surfaces
     - 1.6.3 amount of light
     - 1.6.4 air quality control
2. **analyze a product to determine the necessary production processes and tools**
   - 2.1 break a given product down into its separate parts and identify how each part can be fabricated
3. **create a production flow chart and/or facility layout**
   - 3.1 show a flow chart for the movement of materials and products
   - 3.2 train personnel for specific tasks
   - 3.3 design and build the necessary jigs, fixtures and templates for a given part and process
   - 3.4 organize the required equipment to create a required work cell or shop layout
   - 3.5 test and improve the production processes, if necessary
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3200: PRODUCTION MANAGEMENT

Level: Advanced

Prerequisite: CON3190: Production Planning

Description: Students identify and enhance management skills in relation to the development and deployment of people and physical resources.

Parameters: Access to a materials and/or construction facility and to instruction from an individual with formal, specialized training in production work.

Outcomes: The student will:

1. **describe effective production management strategies**
   - 1.1 define the role of management in a production system
   - 1.2 identify and describe key management elements; e.g., planning, organizing, leading, controlling
   - 1.3 identify functions that are the responsibility of a management team; e.g., marketing, research and development, production, servicing, finance, training
   - 1.4 identify and describe typical scheduling techniques used by production managers such as a Program Evaluation Review Technique (PERT) chart
   - 1.5 differentiate between quality control and total quality management
   - 1.6 compare labour-management relations in traditional and automated settings
   - 1.7 describe the role government has in overseeing production including:
     - 1.7.1 the Occupational Health and Safety Council
     - 1.7.2 the Workers' Compensation Board
     - 1.7.3 Alberta Environment
2. **develop a system to manage, schedule work, control materials and complete products**
   - 2.1 prepare a PERT chart or another scheduling device for a production project
3. **use effective management skills to operate an efficient production system**
   - 3.1 produce a simple business plan by outlining its purpose, performing a cash flow analysis and predicting its profitability
   - 3.2 plan, implement and monitor a safety program for a production project or create a system to improve working conditions and job satisfaction
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely

4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3210: FRAMING SYSTEMS – ADVANCED

Level: Advanced

Prerequisite: CON2035: Framing Systems – Floor
CON2045: Framing Systems – Wall

Description: Students develop appropriate layout and assembly skills to install conventional and/or engineered framing components associated with residential and/or light commercial construction.

Parameters: Access to a building site and/or construction facility and to instruction from an individual with formal, specialized training in carpentry.

Outcomes: The student will:

1. compare conventional and engineered framing systems and components

- 1.1 describe the parts of a typical residential floor and wall frame support system
- 1.2 identify and describe two common types of posts used in floor framing support systems
- 1.3 compare the advantages and disadvantages of using:
  - 1.3.1 built-up beams
  - 1.3.2 solid timber beams
  - 1.3.3 laminated beams
  - 1.3.4 steel beams
- 1.4 compare the advantages and disadvantages of using:
  - 1.4.1 conventional framing materials
  - 1.4.2 truss joists
  - 1.4.3 wooden I-beams
  - 1.4.4 metal joists/studs
- 1.5 identify and describe typical procedures that are used to join floor joists to a foundation or wall section
- 1.6 compare different methods used to attach floor joists to steel and to built-up beams
- 1.7 identify typical framing procedures used in relation to:
  - 1.7.1 load- and nonload-bearing partitions
  - 1.7.2 stair, chimney and stack openings
  - 1.7.3 parallel and 90° cantilevers
- 1.8 identify and describe common methods of bridging floors and bracing walls including:
  - 1.8.1 cross-bridging
  - 1.8.2 continuous wood strapping
  - 1.8.3 solid blocking
  - 1.8.4 continuous steel strapping
- 1.9 identify code requirements related to notching and drilling floor joists and wall studs
- 1.10 identify common types of subflooring materials, underlayments and wall sheathing
- 1.11 identify the purpose and types of connectors/ties and adhesives that are used in conjunction with the application of flooring and sheathing components
- 1.12 identify appropriate methods to cover floor/wall openings and construct temporary railings to code
- 1.13 describe the safe operation of portable electric and air-activated hand tools
- 1.14 identify appropriate personal protective equipment used on the job site

2. **apply print reading and estimating principles to prepare a materials list and cost estimate for a structure that incorporates conventional and/or engineered framing components**
   - 2.1 use the appropriate tables to determine the clear spans and actual lengths of joists/headers for a variety of framing materials and applications
   - 2.2 estimate the size and quantities of materials required to construct a floor/wall/ceiling system
3. **demonstrate advanced framing, layout and assembly skills**
   - 3.1 develop skills in relation to:
     - 3.1.1 built-up beam and header construction and installation
     - 3.1.2 cutting, layout and installation and sheathing of floor, wall and ceiling components
     - 3.1.3 squaring and applying subfloor materials
     - 3.1.4 framing walls and ceiling
   - 3.2 demonstrate the proper lifting techniques
   - 3.3 use proper personal protective equipment
   - 3.4 demonstrate appropriate temporary bracing techniques
   - 3.5 demonstrate the proper care and use of hand and power assisted tools
   - 3.6 secure all floor, wall and ceiling openings
   - 3.7 check the alignment of crowns and bridging systems, as well as the application of fasteners and adhesives
4. **demonstrate basic competencies**
   - 4.1 demonstrate fundamental skills to:
     - 4.1.1 communicate
     - 4.1.2 manage information
     - 4.1.3 use numbers
     - 4.1.4 think and solve problems
   - 4.2 demonstrate personal management skills to:
     - 4.2.1 demonstrate positive attitudes and behaviours
     - 4.2.2 be responsible
     - 4.2.3 be adaptable
     - 4.2.4 learn continuously
     - 4.2.5 work safely
   - 4.3 demonstrate teamwork skills to:
     - 4.3.1 work with others
     - 4.3.2 participate in projects and tasks
5. **create a transitional strategy to accommodate personal changes and build personal values**
   - 5.1 identify short-term and long-term goals
   - 5.2 identify steps to achieve goals

COURSE CON3910: CON PROJECT D

Level: Advanced

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Advanced project courses must connect with a minimum of two CTS courses, one of which must be at the advanced level and be in the same occupational area as the project course. The other CTS course(s) must be at least at the intermediate level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

1. **identify the connection between this project course and two or more CTS courses**
   - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
   - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
2. **propose the project and/or performance**
   - 2.1 identify the project and/or performance by:
     - 2.1.1 preparing a plan
     - 2.1.2 clarifying the purposes
     - 2.1.3 defining the deliverables
     - 2.1.4 specifying time lines
     - 2.1.5 explaining terminology, tools and processes
     - 2.1.6 defining resources; e.g., materials, costs, staffing
   - 2.2 identify and comply with all related health and safety standards
   - 2.3 define assessment standards (indicators for success)
   - 2.4 present the proposal and obtain necessary approvals

The student will:

3. **meet goals as defined within the plan**
   - 3.1 complete the project and/or performance as outlined
   - 3.2 monitor the project and/or performance and make necessary adjustments
   - 3.3 present the project and/or performance, indicating the:
     - 3.3.1 outcomes attained
     - 3.3.2 relationship of outcomes to goals originally set

3.4 evaluate the project and/or performance, indicating the:
    3.4.1 processes and strategies used
    3.4.2 recommendations on how the project and/or performance could have been improved

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3920: CON PROJECT E

Level: Advanced

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Advanced project courses must connect with a minimum of two CTS courses, one of which must be at the advanced level and be in the same occupational area as the project course. The other CTS course(s) must be at least at the intermediate level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

1. **identify the connection between this project course and two or more CTS courses**
   - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
   - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
2. **propose the project and/or performance**
   - 2.1 identify the project and/or performance by:
     - 2.1.1 preparing a plan
     - 2.1.2 clarifying the purposes
     - 2.1.3 defining the deliverables
     - 2.1.4 specifying time lines
     - 2.1.5 explaining terminology, tools and processes
     - 2.1.6 defining resources; e.g., materials, costs, staffing
   - 2.2 identify and comply with all related health and safety standards
   - 2.3 define assessment standards (indicators for success)
   - 2.4 present the proposal and obtain necessary approvals

The student will:

3. **meet goals as defined within the plan**
   - 3.1 complete the project and/or performance as outlined
   - 3.2 monitor the project and/or performance and make necessary adjustments
   - 3.3 present the project and/or performance, indicating the:
     - 3.3.1 outcomes attained
     - 3.3.2 relationship of outcomes to goals originally set

3.4 evaluate the project and/or performance, indicating the:
    3.4.1 processes and strategies used
    3.4.2 recommendations on how the project and/or performance could have been improved

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CON3950: CON ADVANCED PRACTICUM

Level: Advanced

Prerequisite: None

Description: Students apply prior learning and demonstrate the attitudes, skills and knowledge required by an external organization to achieve a credential/credentials or an articulation.

Parameters: This practicum course, which may be delivered on- or off-campus, should be accessed only by students continuing to work toward attaining a recognized credential/credentials or an articulation offered by an external organization. This course must be connected to at least one CTS course from the same occupational area and cannot be used in conjunction with any introductory (1XXX) level course. A practicum course cannot be delivered as a stand-alone course, cannot be combined with a CTS project course and cannot be used in conjunction with the Registered Apprenticeship Program or the Green Certificate Program.

Outcomes: The student will:

1. perform assigned tasks and responsibilities, as required by the organization granting the credential(s) or articulation

- 1.1 identify regulations and regulatory bodies related to the credential(s) or articulation
- 1.2 describe personal roles and responsibilities, including:
  - 1.2.1 key responsibilities
  - 1.2.2 support functions/responsibilities/expectations
  - 1.2.3 code of ethics and/or conduct
- 1.3 describe personal work responsibilities and categorize them as:
  - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
  - 1.3.2 non-routine tasks; e.g., emergencies
  - 1.3.3 tasks requiring personal judgement
  - 1.3.4 tasks requiring approval of a supervisor
- 1.4 demonstrate basic employability skills and perform assigned tasks and responsibilities related to the credential(s) or articulation

2. analyze personal performance in relation to established standards

- 2.1 evaluate application of the attitudes, skills and knowledge developed in related CTS courses
- 2.2 evaluate standards of performance in terms of:
  - 2.2.1 quality of work
  - 2.2.2 quantity of work
- 2.3 evaluate adherence to workplace legislation related to health and safety
- 2.4 evaluate the performance requirements of an individual who is trained, experienced and employed in a related occupation in terms of:
  - 2.4.1 training and certification
  - 2.4.2 interpersonal skills
  - 2.4.3 technical skills
  - 2.4.4 ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:

- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:

- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:

- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals

4.2 identify steps to achieve goals