

Apprenticeship and Industry Training

Carpenter

Apprenticeship Course Outline

0207 (2007)

**Government
of Alberta** ■



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**Carpenter
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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyman or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeymen, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Carpenter Provincial Apprenticeship Committee.

The graduate of the Carpenter apprenticeship program is a certified journeyman who will be able:

- to responsibly do all work tasks expected of a journeyman
- to supervise, train and coach apprentices
- to understand the principles of sound and safe construction
- to know the characteristics and proper use of all building construction materials
- to read blueprints, do layout work and calculate quantities of materials
- to build various types of forms of concrete
- to build all types of wood framed buildings and apply exterior and interior finish of wood or wood substitutes
- to be proficient in the safe use and maintenance of hand and power tools
- to be familiar with the work of other tradesmen in the building industry
- to perform assigned tasks in accordance with quality and production standards required in industry
- to comply with all safety regulations of the construction industry
- to perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- make recommendations to the board about:
 - standards and requirements for training and certification in their trade
 - courses and examinations in their trade
 - apprenticeship and certification
 - designation of trades and occupations
 - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Carpenter PAC Members at the Time of Publication

Mr. B. Regan	Edmonton	Presiding Officer
Mr. T. Androsoff.....	Calgary	Employer
Mr. L. Mullen.....	Edmonton.....	Employer
Mr. R. Tober	Edmonton.....	Employer
Mr. P. James	Grande Prairie.....	Employer
Mr. H. Bruce	Calgary	Employee
Mr. L. Bryden.....	Edmonton.....	Employee
Mr. M. Morin	Lethbridge	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment
- providing and maintaining safety equipment, protective devices and clothing
- enforcing safe working procedures
- providing safeguards for machinery, equipment and tools
- observing all accident prevention regulations

The employee and apprentice are responsible for:

- working in accordance with the safety regulations pertaining to the job environment
- working in such a way as not to endanger themselves, fellow employees or apprentices

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Carpenter apprenticeship technical training:

- Keyano College
- Lethbridge College
- Northern Alberta Institute of Technology (Fairview)
- Red Deer College
- Lakeland College
- Medicine Hat College
- Northern Alberta Institute of Technology
- Southern Alberta Institute of Technology

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Carpenter Provincial Apprenticeship Committee.

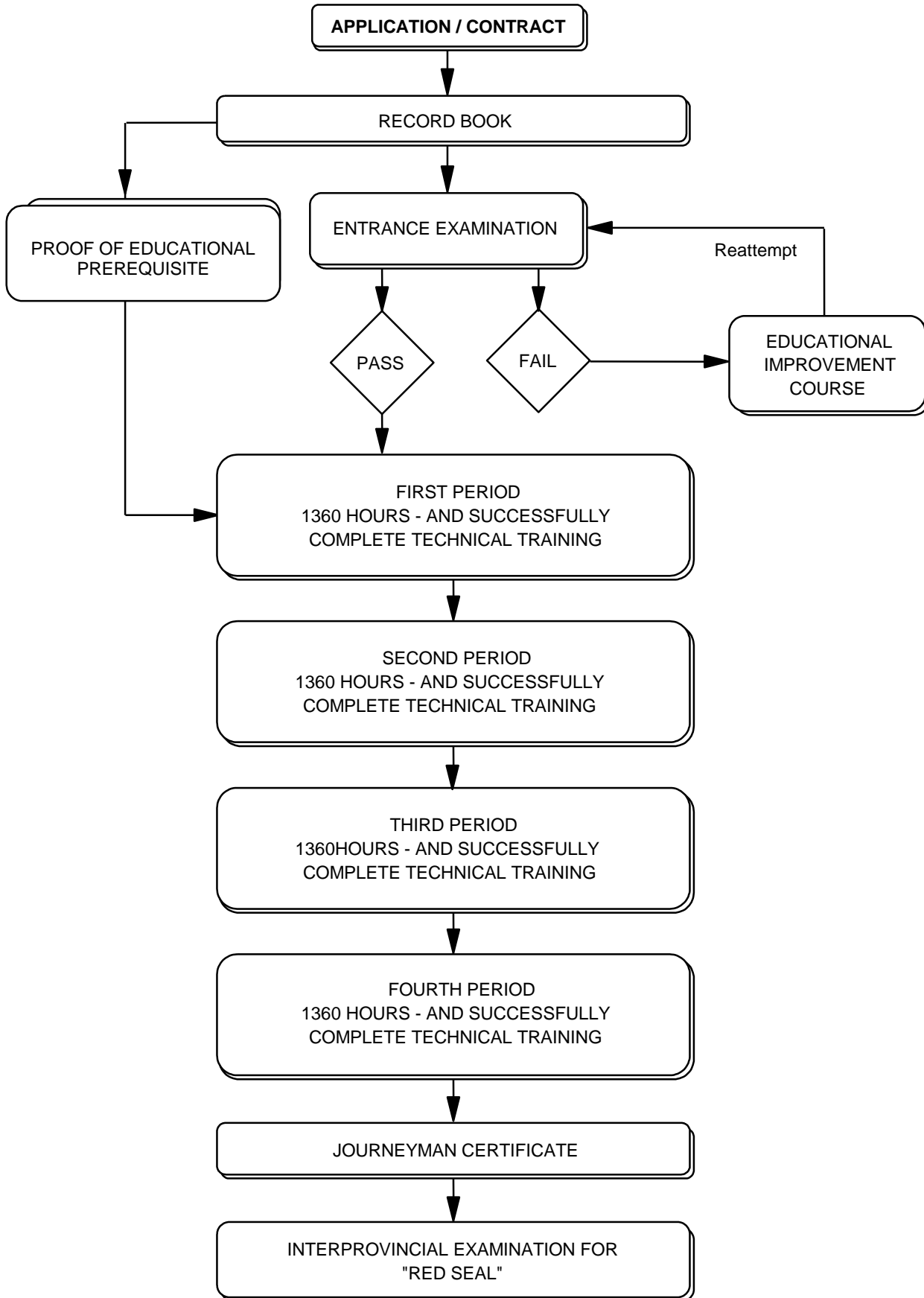
This course outline was approved on March 23rd, 2007 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Carpenter Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Carpenter Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



**Carpenter Training Profile
First Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

SAFETY
11 HOURS



A
Worksite Safety
2 Hours

B
Fire Prevention and Control
1 Hour

C
Ladders and Scaffolds
1 Hour

D
Workplace Hazardous Materials
Information System (WHMIS)
1 Hour

E
Rigging
6 Hours

SECTION TWO

BUILDING MATERIALS
9 HOURS



A
Solid Wood Products and Wood
Joinery
3 Hours

B
Manufactured Construction
Products
3 Hours

C
Fasteners, Adhesives and
Sealants
2 Hours

D
Introduction to Concrete
1 Hour

SECTION THREE

HAND AND POWER TOOLS
83 HOURS



A
Hand Tools
2 Hours

B
Hand Tool Operations
32 Hours

C
Portable Power Tools
2 Hours

D
Stationary Power Tools
3 Hours

E
Cutters, Bits and Abrasives
4 Hours

F
Wood Working Machines and
Powered Hand Tools
32 Hours

G
Explosive Actuated Tools
6 Hours

H
Pneumatic and Fuel Powered
Tools
2 Hours

SECTION FOUR

**SITE PREPERATION AND
BUILDING LAYOUT**
5 HOURS



A
Preliminary Building Operations
4 Hours

B
Construction Equipment
1 Hour

SECTION FIVE

FOUNDATION
48 HOURS



A
Foundation Supports
4 Hours

B
Concrete Flatwork
2 Hours

C
Conventional Concrete
Foundations
3 Hours

D
Alternate Foundations Systems
3 Hours

E
Layout and Elementary Form
Work
36 Hours

SECTION SIX

FLOOR FRAME
20 HOURS



A
Building Loads and Forces
3 Hours

B
Floor Frame Support Systems
3 Hours

C
Residential Floor Frames
4 Hours

D
Floor Framing
10 Hours

SECTION SEVEN

ESTIMATING AND PLANS
64 HOURS



A
Drafting Basics
4 Hours

B
Orthographic Drawings
6 Hours

C
Pictorial Drawings and Sketching
4 Hours

D
Drawing Standards
6 Hours

E
Blueprint Reading Principles 1 - Paper Language
2 Hours

F
Blueprint Reading Principles 2 - Views and Groups of Drawings
2 Hours

G
Blueprint Reading Principles 3 - Specifications, Discrepancies and Path
2 Hours

H
Basic Blueprint Reading
9 Hours

I
Basic Math Concepts
4 Hours

J
Calculate Perimeters and Centreline Perimeters
4 Hours

K
Calculate Areas and Volumes
6 Hours

L
Calculate Ratio, Proportion, Mechanical Advantage and Percentage
3 Hours

M
Estimate Foundation Forms and Concrete
6 Hours

N
Estimate Residential Floor Systems
6 Hours

**Second Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

FRAME STRUCTURES
40 HOURS



A	B	C
Construction Site Safety 2 Hours	Framing Systems 2 Hours	Wall and Partition Framing 6 Hours
D	E	F
Ceiling Framing 2 Hours	The Building Envelope 4 Hours	Wall Framing 24 Hours

SECTION TWO

RESIDENTIAL ROOFS
60 HOURS



A	B	C
Roof Framing Systems 2 Hours	Gable Roofs 5 Hours	Hip Roofs 4 Hours
D	E	F
Intersecting Roofs 4 Hours	Residential Truss Systems 3 Hours	Roof Framing 42 Hours

SECTION THREE

INTERIOR AND EXTERIOR FINISHES
43 HOURS



A	B	C
Windows and Doors 2 Hours	Window and Door Installation 2 Hours	Exterior Finishes 4 Hours
D	E	F
Roof Coverings 2 Hours	Interior Finish 21 Hours	Exterior Finish 12 Hours

SECTION FOUR

WOOD STAIRS
31 HOURS



A	B	C
Single Flight Stairs 5 Hours	Multi-Flight Stairs 5 Hours	Wood Stairs 21 Hours

SECTION FIVE

ESTIMATING AND PLANS
64 HOURS



A	B	C
Drawing Standards 4 Hours	Blueprint Reading Principles 2 Hours	Residential Blueprint Reading 10 Hours
D	E	F
Light Commercial Blueprint Reading 8 Hours	Reading Engineered Floor and Truss Shop Drawings 4 Hours	Reading Building Codes 4 Hours
G	H	I
Trade Math – Part A 2 Hours	Trade Math – Part B 2 Hours	Wall Framing Calculations 7 Hours
J	K	L
Ceiling Framing Calculations 3 Hours	Roof Framing Calculations 8 Hours	Exterior and Interior Wall Finish Calculations 2 Hours
M		
Straight and Multi-Flight Stair Calculations 8 Hours		

**Third Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

SAFETY
6 HOURS



A

Construction Site Safety
2 Hours

B

Scaffolding
4 Hours

SECTION TWO

CONCRETE
13 HOURS



A

Concrete Design
3 Hours

B

Transporting and Placement of Concrete
3 Hours

C

Finishing and Curing of Concrete
3 Hours

D

Joints and Reinforcement for Concrete
2 Hours

E

Pre-Stressed and Precast Concrete
2 Hours

SECTION THREE

BUILDING LAYOUT
26 HOURS



A

Survey Equipment
3 Hours

B

Layout Procedures
5 Hours

C

Building and Construction Layout
18 Hours

SECTION FOUR

COMMERCIAL FORMWORK
73 HOURS



A

Footings, Grade Beams & Piles
4 Hours

B

Wall and Column Forming
4 Hours

C

Suspended Concrete Slabs
4 Hours

D

Concrete Stairs
4 Hours

E

Commercial Formwork
39 Hours

F

Concrete Stairs
18 Hours

SECTION FIVE

COMMERCIAL INTERIORS AND TIMBER CONSTRUCTION
58 HOURS



A

Interior Systems and Door Frames
5 Hours

B

Fire Protection, Acoustics and Commercial Insulation
2 Hours

C

Commercial Fasteners and Anchors
2 Hours

D

Timber Construction
4 Hours

E

Installation of Metal Fabricated Products
15 Hours

F

Skill Development Projects
30 Hours

SECTION SIX

ESTIMATING AND PLANS
64 HOURS



A

Drawing Standards
12 Hours

B

Blueprint Reading Principles
9 Hours

C

Pole and Timber Frame Blueprint Reading
4 Hours

D

Reinforced Concrete Blueprint Reading
7 Hours

E

Trade Math Part A
4 Hours

F

Trade Math Part B
4 Hours

G

Commercial Concrete Formwork Calculations
4 Hours

H

Commercial Concrete Volume Calculations
6 Hours

I

Cut and Fill Calculations
6 Hours

J

Concrete Stair Calculations
6 Hours

K

Interior Systems Calculations
6 Hours

**Fourth Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

WORKPLACE ORGANIZATION AND SAFETY
10 HOURS



A	B	C
Construction Site Safety 2 Hours	Job Roles and Coaching 3 Hours	Job Scheduling 3 Hours
D		
Material Management 2 Hours		

SECTION TWO

INTERIOR FINISHES
75 HOURS



A	B	C
Cabinet Installation 2 Hours	Trim Installation 2 Hours	Walls and Storage 1 Hour
D	E	F
Wood Finishing 1 Hour	Flooring 2 Hours	Interior Finish 41 Hours
G		
Practical Examination 26 Hours		

SECTION THREE

EXTERIOR FINISHES
8 HOURS



A	B	C
Commercial Doors and Windows 2 Hours	Commercial Exteriors 5 Hours	Commercial Roofs 1 Hour

SECTION FOUR

ROOF FRAME AND STAIRS
55 HOURS



A	B	C
Advanced Roof Framing 4 Hours	Housed Stairs 2 Hours	Winder Stairs 2 Hours
D	E	F
Curved Stairs 2 Hours	Stairs 27 Hours	Roof Framing 18 Hours

SECTION FIVE

BUILDING DESIGN AND RENOVATIONS
10 HOURS



A	B	C
Renovations 4 Hours	Additions 2 Hours	Architectural Design and Planning 2 Hours
D		
Barrier-Free Design & Ergonomics 2 Hours		

SECTION SIX

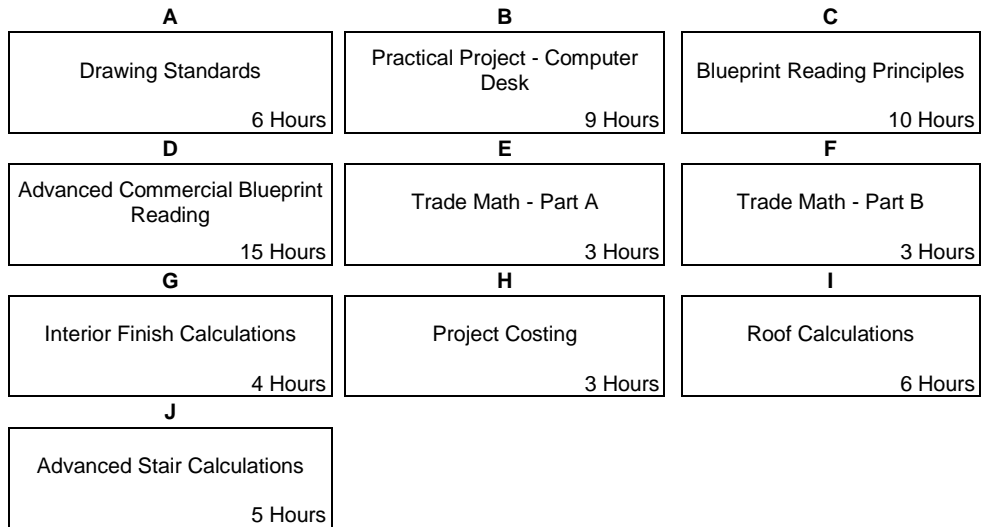
ENERGY EFFICIENCY AND BUILDING SCIENCE
18 HOURS



A	B	C
Energy Efficient Construction 2 Hours	Energy Efficient Framing 2 Hours	Energy Efficient Housing Design 2 Hours
D	E	
Insulation and Air Barriers 4 Hours	Energy Efficient Construction 8 Hours	

SECTION SEVEN

ESTIMATING AND PLANS
64 HOURS



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

**FIRST PERIOD TECHNICAL TRAINING
CARPENTER TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: SAFETY 11 HOURS

A. Worksite Safety2 Hours

Outcome: ***Apply Occupational Health and Safety Regulations and safe work practices in the workplace.***

1. Interpret Occupational Health and Safety regulations/code.
2. Describe requirements related to personal protective equipment and safety measures.
3. Describe emergency procedures for dealing with injured workers.
4. Describe potential health hazards.

B. Fire Prevention and Control.....1 Hour

Outcome: ***Identify and describe fire classes, extinguishers, prevention and detection.***

1. Describe the classes of fires and the appropriate fire extinguishers suitable to fight each of these fires.
2. Describe procedures and equipment related to preventing, detecting and warning of fires.

C. Ladders and Scaffolds1 Hour

Outcome: ***Identify and describe types and safe applications of ladders and scaffolding.***

1. Describe the use of various types of ladders.
2. Describe the use of various types of scaffolds.

D. Workplace Hazardous Materials Information System (WHMIS)1 Hour

Outcome: ***Describe WHMIS requirements and labeling used by the construction industry.***

1. Describe the three key elements of WHMIS.
2. Identify WHMIS labels and describe the hazards associated to controlled products.

E. Rigging6 Hours

Outcome: ***Describe and demonstrate rigging methods.***

1. Demonstrate slings and hitches used for lifting material:
 - a) types of slings
 - b) uses
 - c) sling configurations
 - d) location of chokers and slings on loads
2. Demonstrate the ability to select and tie knots and hitches:
 - a) types of ropes
 - b) uses
 - c) load limits

- 3. Demonstrate the ability to select hand signals to operators of lifting equipment.
- 4. Identify safe working loads (S.W.L.).
- 5. Identify and describe scaffold systems.

SECTION TWO: BUILDING MATERIALS 9 HOURS

A. Solid Wood Products and Wood Joinery3 Hours

Outcome: *Identify and describe solid wood products and joinery.*

- 1. Describe common types and characteristics of solid wood products.
- 2. Describe how lumber is milled, seasoned, stored and ordered.
- 3. Identify and describe the application of commonly used mouldings.
- 4. Identify and describe the application of wood joints for fabrication and installation.

B. Manufactured Construction Products3 Hours

Outcome: *Identify and describe manufactured building products used in the construction industry.*

- 1. Identify and describe the application of panel products.
- 2. Identify and describe the application of engineered wood products.
- 3. Identify and describe the application of synthetic and metal products.

C. Fasteners, Adhesives and Sealants.....2 Hours

Outcome: *Identify different types, functions and applications of some of the more common fasteners, adhesives and sealants.*

- 1. Identify the types and function of fasteners commonly used in construction.
- 2. Identify the types and function of adhesives commonly used in construction.
- 3. Identify the types and function of sealants commonly used in construction.

D. Introduction to Concrete1 Hour

Outcome: *Describe the ingredients, production, placing and curing of concrete.*

- 1. Identify the ingredients and production of concrete.
- 2. Describe the placement and curing of concrete.

SECTION THREE: HAND AND POWER TOOLS 83 HOURS

A. Hand Tools.....2 Hours

Outcome: *Identify and describe hand tools and their proper uses.*

- 1. Identify and describe the use of measuring, marking, laying-out, aligning and squaring tools.
- 2. Identify and describe the use of cutting tools (edge, tooth, scraping and sanding abrasives), boring and drilling tools.
- 3. Identify and describe the use of assembling, dismantling and clamping tools.

B. Hand Tool Operations32 Hours

Outcome: *Demonstrate the use of hand tools to construct projects using wood materials.*

1. Competently use hand tools as listed in theory in the construction of projects using wood materials:
 - a) solid woods, plywood's, chip and particle boards
 - b) practice with making and fitting joints of wood
 - c) practice with fitting of mouldings (butt, mitre, cope)
 - d) gluing, clamping and lay up
2. Sharpen and maintain hand tools.

C. Portable Power Tools2 Hours

Outcome: *Identify and describe the safe operation and maintenance for portable power tools.*

1. Identify and describe the safe operation and regular maintenance of portable saws.
2. Identify and describe the safe operation and regular maintenance of portable planing and shaping equipment.
3. Identify and describe the safe operation and regular maintenance of portable drilling and fastening equipment.
4. Identify and describe the safe operation and regular maintenance of portable abrasive tools.

D. Stationary Power Tools3 Hours

Outcome: *Identify and describe the safe operation and maintenance of stationary power tools.*

1. Identify and describe the safe operation and regular maintenance for stationary saws.
2. Identify and describe the safe operation and regular maintenance of stationary planing tools.
3. Identify and describe the safe operation and regular maintenance for stationary drilling, grinding and sanding tools.

E. Cutters, Bits and Abrasives4 Hours

Outcome: *Describe the use and maintenance of cutting tools and abrasives.*

1. Describe the action of a cutting edge on a work piece.
2. Identify and describe the abrasive materials, machines and tools used to maintain chisels, plane irons and scrapers.
3. Describe the types and uses of sanding abrasives.
4. Identify and describe the types, uses and maintenance of saw blades.
5. Identify and describe the types, uses and maintenance of drill bits and router bits.

F. Woodworking Machines and Powered Hand Tools.....32 Hours**Outcome: *Demonstrate the safe use of woodworking machines and powered hand tools.***

1. Describe and demonstrate the safe use of a table saw.
2. Describe and demonstrate the safe use of a radial arm saw.
3. Describe and demonstrate the safe use of a jointer.
4. Describe and demonstrate the safe use of a thickness planer.
5. Describe and demonstrate the safe use of a band saw.
6. Describe and demonstrate the safe use of a drill press.
7. Describe and demonstrate the safe use of grinders.
8. Describe and demonstrate the safe use of sanders.
9. Describe and demonstrate the safe use of power mitre saws.
10. Describe and demonstrate the safe use of hand electric saws.
11. Describe and demonstrate the safe use of power routers and spline cutters.
12. Describe and demonstrate the safe use of power drills and screw guns.
13. Describe and demonstrate the safe use of pneumatic and gas fasteners.
14. Describe and demonstrate the safe use of hand power plane.
15. Describe and demonstrate the safe use of hammer drills.
16. Describe and demonstrate the safe use of chainsaws.
17. Describe routine maintenance for the power tools identified above.
18. Demonstrate proficiency by making selected shop projects that make use of a variety of building materials.

G. Explosive Actuated Tools6 Hours**Outcome: *Describe and demonstrate the safe operation of explosive actuated tools.***

1. Differentiate between high and low velocity explosive actuated tools.
2. Describe explosive actuated tool power loads (low and high velocity), power load strength and safety requirements.
3. Describe explosive actuated tool fasteners, accessories and applications.
4. Assess base material suitability and related fastening requirements.
5. Describe explosive actuated system safety, firing procedure and tool maintenance.
6. Perform tool maintenance and use an explosive actuated tool safely.
7. Describe the safe use of low velocity tools and their operation.
8. Be aware of the safety features and the different types of fasteners and charges.
9. Learn the safety codes and regulations.
10. State causes of misfire. Identify the operator's responsibility.
11. Explain the relationships between pins, charges and materials.
12. Discuss the hidden features of fastening surfaces.
13. Demonstrate servicing of tools and supplies.
14. Learn proper and safe storage of tools and charges and the disposal of misfired charges.

- 15. Demonstrate operation and the actual firing of a low velocity tool.
- 16. Prove proficiency upon successful completion of test and course.

H. Pneumatic and Fuel Powered Tools2 Hours

Outcome: *Identify and describe the safe operation of pneumatic and fuel-powered tools.*

- 1. Identify and describe the safe operation and maintenance of pneumatic tools.
- 2. Identify and describe the safe operation and maintenance of fuel-powered tools.

SECTION FOUR:SITE PREPERATION AND BUILDING LAYOUT..... 5 HOURS

A. Preliminary Building Operations4 Hours

Outcome: *Identify preliminary building operations required prior to the footings being placed.*

- 1. Describe initial site procedures and requirements.
- 2. Describe building layout procedures.
- 3. Describe the application levelling equipment.
- 4. Describe the excavation and shoring procedures.

B. Construction Equipment1 Hour

Outcome: *Identify light and heavy equipment used in construction, and employ safe procedures when working with cranes and hoisting equipment.*

- 1. Identify and describe typical construction equipment.
- 2. Identify and describe hoisting and rigging equipment, methods and procedures.

SECTION FIVE:..... FOUNDATION 48 HOURS

A. Foundation Supports.....4 Hours

Outcome: *Describe continuous and independent footings for light construction.*

- 1. Describe the types of and design considerations for concrete footings.
- 2. Describe the layout and construction of concrete footings.
- 3. Describe the various types of piles and their construction.

B. Concrete Flatwork.....2 Hours

Outcome: *Describe the preparation, formwork, reinforcement and concrete placement procedures for slabs on grade.*

- 1. Describe the sub grade preparation, reinforcement, and concrete placing requirements for slabs on grade.
- 2. Describe forming methods and concrete placement method for slabs on grade.

C. Conventional Concrete Foundations3 Hours**Outcome: Describe construction methods for conventional concrete foundations.**

1. Describe the components and erection processes for Strip-Ease and other modular foundation form systems.
2. Describe steel reinforcement, concrete placement and form removal for concrete foundations.
3. Describe the dampproofing, drainage and backfill requirements for concrete foundations.

D. Alternate Foundations Systems3 Hours**Outcome: Describe alternate foundation systems.**

1. Identify and describe the components of a permanent wood foundation system and the required construction procedures.
2. Identify and describe the components of insulated concrete systems and the basic construction procedures.
3. Identify and describe other foundation systems.

E. Layout and Elementary Formwork36 Hours**Outcome: Demonstrate layout procedures and construct complete foundation formwork.**

1. Establish excavation lines and building perimeters from given reference points.
2. Construct and brace batter boards.
3. Square with tape using diagonals and 3-4-5 methods.
4. Transfer building lines to bottom of excavation.
5. Construct footing forms:
 - a) rectangular, "T" or "L" shape perimeters
 - b) pad footings
 - c) step footings
 - d) squaring, levelling, alignment, bracing
 - e) keyways
6. Construct footing forms for columns, posts and bearing partitions (also stepped types).
7. Construct a built-in-place wall form, as would be done on a job site.
8. Use prefabricated panels for wall forms; use the various types of hardware and ties.
9. Fabricate and install:
 - a) bucks
 - b) bulkheads
 - c) window units
 - d) pilasters
 - e) beams
 - f) reinforcements
10. Establish elevations and wall heights.
11. Provide for anchoring and level joist system with:
 - a) ledgers
 - b) anchor bolts
12. Layout setting forms, pegs and screeds for concrete slabs on or below grade (basement floors, grade slabs, sidewalks). Use elevations, slopes and control joints.

- 13. Form round or circular slabs with various radii.

SECTION SIX:FLOOR FRAME..... 20 HOURS

A. Building Loads and Forces.....3 Hours

Outcome: *Identify and describe the forces that act upon buildings and the design principles used to counteract these forces.*

- 1. Describe the forces, live and dead loads, which act upon a building.
- 2. Describe the compressive, tensile and lateral forces that act on a building and how these forces are counteracted.
- 3. Describe construction design and principles used to counteract loads and forces.

B. Floor Frame Support Systems.....3 Hours

Outcome: *Describe floor frame support systems.*

- 1. Describe the design and construction of beam supports.
- 2. Describe the design and construction of commonly used beams.
- 3. Describe the methods used to anchor the floor frame to the foundation.

C. Residential Floor Frames4 Hours

Outcome: *Identify and describe the components and the installation of a residential floor frame.*

- 1. Identify and describe the components of a residential floor frame.
- 2. Describe the layout and installation procedures for floor frame systems.
- 3. Describe joist restraints and subfloor sheathing installation.
- 4. Describe the components and the installation of engineered floor systems.

D. Floor Framing10 Hours

Outcome: *Design and construct floor framing.*

- 1. Layout built-up wood beams, and identify nailing patterns.
- 2. Layout joists for consideration of loads and other trades, including bearing and non-bearing partitions, floor openings, plumbing stacks and fixtures and fireplaces.
- 3. Construct floor assembly using common techniques and materials:
 - a) checking and aligning crowns of joists
 - b) bridging systems
 - c) application systems (fasteners and adhesives) used for common boards, T & G, plywood and other sheathing

SECTION SEVEN:ESTIMATING AND PLANS..... 64 HOURS

A. Drafting Basics.....4 Hours

Outcome: *Identify and demonstrate the use of basic drawing instruments.*

- 1. Describe the functions of basic drawing instruments.
- 2. Use drafting equipment to complete geometric exercises.

3. Describe the applications of geometry in trade situations.
4. Practice producing shapes, angles and drawing to scale with the basic drafting instruments.

B. Orthographic Drawings6 Hours

Outcome: *Use the principles of orthographic drawing to sketch orthographic projections of objects.*

1. Describe the concept and principles of orthographic projection.
2. Sketch orthographic projections of objects that have surfaces parallel to the viewing plane.
3. Sketch orthographic projections of objects that have hidden edges or surfaces.
4. Sketch orthographic projections of objects that have sloped surfaces.
5. Sketch orthographic projections of objects that have oblique surfaces.
6. Sketch orthographic projections of objects that have curved surfaces or holes.

C. Pictorial Drawings and Sketching4 Hours

Outcome: *Identify and practice the drawing techniques and principles used to produce isometric drawings.*

1. Describe pictorial drawing methods.
2. Describe the isometric principles.
3. Describe how isometric angles are shown and drawn.
4. Describe how to develop isometric circles and arcs.

D. Drawing Standards6 Hours

Outcome: *Use basic drawing guidelines and interpretation skills to create the orthographic, sectional views, details and cutting list required for a shop project.*

1. Describe line types used in orthographic drawings.
2. Demonstrate correct dimensioning methods and techniques.
3. Describe page layout and centering techniques.
4. Describe section and details and the use of material symbols.

E. Blueprint Reading Principles 1 - Paper Language2 Hours

Outcome: *Describe and interpret the paper language used in producing a set of working drawings (blueprints).*

1. Identify and describe the different lines styles used in a set of working drawings.
2. Identify the common symbols used in a set of working drawings.
3. Identify abbreviations commonly used on blueprints.
4. Describe the page layout for drawings.
5. Identify and describe different dimensioning techniques.

- F. Blueprint Reading Principles 2 - Views and Groups of Drawings2 Hours**
- Outcome:** *Identify and interpret the information contained in the different views presented in a set of working drawings (blueprints).*
1. Identify the different views (drawings) and how they are viewed and describe the paths between views.
 2. Identify the different groups of drawings.
 3. Describe the different views found in a set of plans.
- G. Blueprint Reading Principles 3 - Specifications, Discrepancies and Path2 Hours**
- Outcome:** *Describe and interpret the information contained in a set of blueprints.*
1. Describe specifications.
 2. Describe the standards for resolving discrepancies between drawings and specifications.
 3. Describe the steps used to navigate through a set of working drawings.
- H. Basic Blueprint Reading9 Hours**
- Outcome:** *Find required information on a set of blueprints using systematic steps and guidelines for blueprint reading.*
1. Find information and navigate between the different views in a set of blueprints.
- I. Basic Math Concepts.....4 Hours**
- Outcome:** *Use a calculator and apply basic math concepts to solve trade-related math problems in both the metric and imperial systems of measurement.*
1. Describe basic math concepts and operations.
 2. Describe the basic calculator functions and operations.
 3. Describe the metric measurement system (SI).
 4. Describe the imperial measurement system.
 5. Describe calculations involving fractions.
 6. Convert measurements between metric and imperial systems.
 7. Working with equations.
 8. Describe calculations using the Pythagorean Theorem.
- J. Calculate Perimeters and Centreline Perimeters4 Hours**
- Outcome:** *Use a calculator and the appropriate formulas to determine the perimeter and centerline perimeter for various shapes and buildings.*
1. Identify and use formulas dealing with perimeter.
 2. Complete calculations for centreline perimeter.
- K. Calculate Areas and Volumes.....6 Hours**
- Outcome:** *Use a calculator and the appropriate formulas to determine the area and volume for various shapes and objects.*
1. Identify and use formulas dealing with area.
 2. Identify and use formulas dealing with volume.

L. Calculating, Ratios, and Proportion, Mechanical Advantage and Percentage.....3 Hours

Outcome: *Use a calculator and the appropriate math operations to solve various trade-related problems involving ratio and proportion, mechanical advantage and percentage.*

1. Describe ratio and proportion and its application to solve trade related calculations.
2. Describe mechanical advantage and related calculations for levers, pulleys and gears.
3. Describe percentage calculations and their trade related applications.

M. Estimate Foundation Forms and Concrete6 Hours

Outcome: *Calculate the quantity of forming material and concrete required for typical residential concrete foundations.*

1. Describe the difference between a material takeoff and an estimate.
2. Estimate material requirements for forming strip footings, pad footings and foundation walls.
3. Estimate concrete volumes for footings and foundation walls.
4. Estimate concrete floor areas and volumes.

N. Estimate Residential Floor Systems6 Hours

Outcome: *Calculate the quantity of framing materials required for conventionally framed residential floor and floor support systems.*

1. Calculate material takeoffs for floor support systems.
2. Describe the use of on-centre formulas to calculate the number of floor frame components.
3. Calculate material takeoffs for floor frames.

**SECOND PERIOD TECHNICAL TRAINING
CARPENTER TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... FRAME STRUCTURES 40 HOURS

A. Construction Site Safety 2 Hours

Outcome: *Safety considerations for personal and worksite safety.*

1. Describe the personal, equipment and worksite safety considerations for residential carpentry.

B. Framing Systems 2 Hours

Outcome: *Describe the various wall framing systems for wood frame buildings.*

1. Identify and describe different framing systems.
2. Describe how load transfer and material shrinkage affect these systems.

C. Wall and Partition Framing 6 Hours

Outcome: *Describe the layout, assembly and erection of framed walls.*

1. Identify wall frame members and their functions.
2. Describe wall layout and wall plate layout.
3. Describe the assembly and erection of exterior walls.
4. Describe the layout and assembly of interior walls.
5. Describe the consideration for other trades, vapour barriers and other special features.

D. Ceiling Framing 2 Hours

Outcome: *Describe the design, layout and erection of ceiling joists.*

1. Describe the layout and installation of ceiling joists.
2. Interpret building code span tables to design ceiling joists.

E. The Building Envelope 4 Hours

Outcome: *Describe the materials and techniques used to reduce heat loss.*

1. Describe heat transfer and heat loss through building components.
2. Describe insulation and sound reduction techniques.
3. Describe the function of air, vapour and weather barriers.
4. Describe basic energy efficient construction techniques.

F. Wall Framing 24 Hours

Outcome: *Layout and construct wall framing.*

1. Layout plates using common spacings of members, including:
 - a) corners, intersecting walls
 - b) doors and window openings
 - c) considerations for special items, frames for pocket doors and bifolds fireplaces, insulation
 - d) backing requirements for fixtures
 - e) beam supports

SECTION TWO: RESIDENTIAL ROOFS 60 HOURS

A. Roof Framing Systems 2 Hours

Outcome: *Identify residential roof systems.*

1. Identify and describe roof systems.
2. Define and use roof terminology.
3. Describe cornice systems used in wood frame construction.

B. Gable Roofs 5 Hours

Outcome: *Describe the procedures for the calculating, layout and erecting of gable roofs.*

1. Calculate line lengths of common rafters.
2. Define and describe the layout and cutting of common rafters.
3. Describe the calculation, layout and cutting of gable studs.
4. Describe the assembly of a gable roof.
5. Using building codes to determine rafter dimensions and spacing.
6. Describe intermediate supports for rafters and layout procedures.

C. Hip Roofs 4 Hours

Outcome: *Describe the procedures for the calculating, layout and erecting of hip roofs.*

1. Describe the components of a hip roof and the math involved for layout.
2. Describe the layout of a hip rafter.
3. Describe the layout of a hip jack rafter and the ridge board.
4. Describe the steps to erect and complete a hip roof.

D. Intersecting Roofs 4 Hours

Outcome: *Describe the procedures for the calculation, layout and assembly of intersecting roofs.*

1. Identify terminology used for rafters and roof systems.
2. Describe formulas used for rafter calculations.
3. Describe the layout of the components of an intersecting roof.
4. Describe the erection of an intersecting roof.

E. Residential Truss Systems 3 Hours

Outcome: *Describe proper receiving, unloading, storage and handling procedures for wood trusses.*

1. Identify and describe wood trusses.
2. Describe the loads and forces acting on a wood trusses.
3. Describe proper receiving, unloading, storage and handling of wood trusses.
4. Describe the methods of erecting and bracing wood trusses.
5. Describe bracing of wood trusses.

F. Roof Framing 42 Hours

Outcome: *Layout and construct roof framing.*

1. Layout and cut:
 - a) pattern common rafter
 - b) barge board line lengths, plumb and level cuts
 - c) shortenings
2. Layout and install collar ties.
3. Cut gable studs for standard and dropped gables.
4. Build and install soffits and fascias:
 - a) butt or lapped joints
 - b) ribbons, strongbacks
 - c) integrating parallel partitions
 - d) backing for finish materials
 - e) location and framing requirements for attic access
5. Install wood and asphalt shingles.

SECTION THREE: INTERIOR AND EXTERIOR FINISHES 43 HOURS

A. Windows and Doors 2 Hours

Outcome: *Describe window and door selection and hardware.*

1. Describe typical residential window types and their use.
2. Describe typical residential door types and their use.
3. Describe door hardware and accessories.

B. Window and Door Installation 2 Hours

Outcome: *Describe the installation of residential windows and doors including related hardware.*

1. Describe exterior window and door installation.
2. Describe the installation of interior doors and related hardware.
3. Describe interior window and door trim installation.

C. Exterior Finishes..... 4 Hours

Outcome: **Describe exterior finishes and their installation.**

1. Describe typical residential exterior finishes and their use.
2. Describe installation of siding and trim.
3. Describe preparation required for stucco or brick exteriors.

D. Roof Coverings 2 Hours

Outcome: **Describe installation procedures for residential roof coverings.**

1. Describe the preparation required for residential roof coverings.
2. Identify residential roof coverings.
3. Identify application procedures for asphalt shingles, wood and roll roofing.

E. Interior Finish..... 21 Hours

Outcome: **Install and trim doors.**

1. Install a door jamb into a prepared opening (using building paper).
2. Hang and trim an interior door.
3. Install a lock (latch) set.
4. Install other frames and doors (interior pocket, bifold and bi-pass doors).

F. Exterior Finish..... 12 Hours

Outcome: **Install wood, metal and vinyl siding.**

1. Install vertical and horizontal applications of siding:
 - a) air/moisture barriers, trims, starter strips, drip caps and water table
 - b) installation around window and door units
 - c) flashing and sealants

SECTION FOUR: WOOD STAIRS..... 31 HOURS

A. Single Flight Stairs 5 Hours

Outcome: **Construct a straight flight stair.**

1. Define stair terms and understand code limitations.
2. Make stair calculations.
3. Construct a semi-housed stair.

B. Multi-Flight Stairs 5 Hours

Outcome: **Describe multi-flight stair construction.**

1. Describe stair types and classifications.
2. Calculate multi-flight stair dimensions.
3. Describe stair construction techniques.

C. Wood Stairs.....21 Hours

Outcome: *Layout and construct stairs.*

1. Layout stair stringers (notched, mitred and semi-housed).
2. Use templates and jigs.
3. Cut components and assemble stair units.

SECTION FIVE: ESTIMATING AND PLANS 64 HOURS

A. Drawing Standards..... 4 Hours

Outcome: *Use basic drawing guidelines and interpretation skills to create the orthographic views, sectional views and details for a shop project.*

1. Describe line types used in orthographic drawings.
2. Demonstrate correct dimensioning methods and techniques.
3. Describe page layout and centring techniques.
4. Describe section and details and the use of material symbols.

B. Blueprint Reading Principles 2 Hours

Outcome: *Describe and interpret a set of working drawings.*

1. Describe and interpret the paper language used in reading a set of drawings.
2. Identify and interpret the information contained in the different views presented in a set of drawings.
3. Describe the steps used to navigate through a set of drawing.

C. Residential Blueprint Reading 10 Hours

Outcome: *Follow the blueprint reading pattern and path to find information on a set of residential blueprint.*

1. Practice skills related to finding information and navigating between the different views in a set of residential blueprints.

D. Light Commercial Blueprint Reading 8 Hours

Outcome: *Find information in a set of commercial drawing relating to the architectural, structural, mechanical and electrical aspects of the building.*

1. Describe reading and locating information on a set of light commercial blueprints.

E. Reading Engineered Floor and Truss Shop Drawings 4 Hours

Outcome: *Interpret engineered floor and truss drawings for assembly, layout and support systems related to the blueprints for a construction project.*

1. Interpret engineered floor joist shop drawings.
2. Interpret roof truss drawings.

F. Reading Building Codes 4 Hours

Outcome: *Understand the application of the National Building Code as it relates to different types of buildings and how to find pertinent information within it.*

1. Describe the National Building Code and related documents.
2. Describe methods of finding information in the National Building Code (NBC).

G. Trade Math - Part A..... 2 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform and perform calculations based on basic math concepts and skills.
2. Perform calculations for perimeter and centreline perimeter.
3. Perform calculations for areas and volumes.
4. Perform calculations for ratio and proportion, mechanical advantage and percentage.

H. Trade Math - Part B..... 2 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform calculations based on basic math concepts and skills.
2. Perform calculations for perimeter and centreline perimeter.
3. Perform calculations for areas and volumes.
4. Perform calculations for ratio and proportion, mechanical advantage and percentage.

I. Wall Framing Calculations..... 7 Hours

Outcome: *Produce a material takeoff for wood wall framing.*

1. Calculate material quantities using set spacings.
2. Describe a method of calculating the amount of linear material required.
3. Describe a method of calculating regular studs required for exterior and interior walls.
4. Describe where additional studs are required in walls for estimating purposes.
5. Describe a method of determining lintel lengths from rough door and window dimensions.
6. Describe a method of calculating the amount of sheathing required for the exterior walls.
7. Describe the order for assembly of a material takeoff for all components of exterior and interior walls.

J. Ceiling Framing Calculations 3 Hours

Outcome: *Produce a material takeoff for stick framing a ceiling.*

1. Produce the ceiling framing material takeoff for a gable roof.
2. Produce the ceiling framing material takeoff for a hip roof.

K. Roof Framing Calculations 8 Hours

Outcome: *Produce material takeoffs for roof systems.*

1. Describe calculations using set spacings.
2. Describe calculating material required for gable roofs.
3. Describe calculating material required for hip roofs.

4. Describe calculating material required for intersecting roofs.
5. Describe calculating sheathing and roof covering materials.
6. Describe calculating material required for truss roofs.

L. Exterior and Interior Wall Finish Calculations.....2 Hours

Outcome: ***Produce a material takeoff for exterior and interior wall finish materials.***

1. Calculate interior wall finish materials.
2. Calculate cornice and rake finish materials.
3. Calculate exterior wall finish materials.
4. Assemble a material takeoff for interior and exterior finish materials.

M. Straight and Multi-Flight Stair Calculations.....8 Hours

Outcome: ***Calculate the required dimensions for openings and stairs, working within the limits imposed by building codes, existing openings, limited headroom and floor space.***

1. Calculate the unit rise, unit run, finished opening and rough opening for straight-flight stairs.
2. Calculate the unit rise, unit run, finished opening and rough opening for multi-flight stairs.
3. Use a blueprint, to produce a material takeoff for stair construction.

**THIRD PERIOD TECHNICAL TRAINING
CARPENTER TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... SAFETY 6 HOURS

A. Construction Site Safety 2 Hours

Outcome: ***Describe large job hazardous situations and their minimum safety requirements.***

1. Identify typical commercial construction safety hazards.
2. Describe potential hazards with hoisting and lifting equipment.

B. Scaffolding 4 Hours

Outcome: ***Describe the safe erection of various scaffold systems and identify safety concerns.***

1. Describe general scaffold terms and components and the requirements for safe use and erection.
2. Identify and describe scaffold systems and erection.
3. Describe scaffold structures.

SECTION TWO:..... CONCRETE 13 HOURS

A. Concrete Design 3 Hours

Outcome: ***Describe the design and use of architectural and structural concrete as it related to the construction industry.***

1. Identify the scope of concrete use with in the concrete industry.
2. Describe concrete materials, design and testing.
3. Describe concrete additives and treatments.
4. Identify grouts and mortars.

B. Transporting and Placement of Concrete 3 Hours

Outcome: ***Describe how concrete is transported and placed, from initial mixing to final position.***

1. Describe how to transfer elevations to the top of concrete pours.
2. Describe how concrete is transported from batching to pour location.
3. Describe concrete placement and consolidation.
4. Describe concrete forces before and after set.

C. Finishing and Curing of Concrete..... 3 Hours

Outcome: *Identify and describe concrete placing, finishing and curing techniques.*

1. Describe concrete placing finishing tools.
2. Describe the concrete slab finishing.
3. Describe concrete hardeners, toppings and sealers and their uses.
4. Describe special surface treatments and finishes.
5. Describe concrete curing procedures.

D. Joints and Reinforcement for Concrete 2 Hours

Outcome: *Describe the purpose of concrete joints and the use of reinforcement in concrete structures.*

1. Compare construction joints, control joints, isolation joints, and expansion joints.
2. Identify types and sizes of deformed bars and welded wire fabric.
3. Identify the placement of reinforcing for footings, beams, columns, slabs, walls, and stairs.

E. Pre-Stressed and Precast Concrete 2 Hours

Outcome: *Describe pre-stressed, precast and tilt-up construction and erection procedures.*

1. Describe pre-stressed concrete.
2. Describe precast concrete manufacturing and erection.
3. Describe tilt up construction.

SECTION THREE:BUILDING LAYOUT 26 HOURS

A. Survey Equipment 3 Hours

Outcome: *Describe survey equipment used for basic building layout.*

1. Identify and describe instruments used for layout of elevations and levelling.
2. Identify and describe instruments used for layout of angles and location of building components.
3. Describe basic surveying and use of accessories.

B. Layout Procedures 5 Hours

Outcome: *Use various layout tools to correctly place, straighten and plumb buildings and related parts.*

1. Describe how rural or urban property is described.
2. Identify layout tools and describe their use.
3. Describe how to lay out various elements of a structure.

C. Building and Construction Layout..... 18 Hours

Outcome: Use survey equipment for building layout.

1. Set up and operate builder's level and transit.
2. Sight and record backsights and foresights.
3. Establish elevations.
4. Establish or re-establish straight, off-set and grid lines.
5. Record existing angles.
6. Establish a given angle.
7. Determine actual finish floor elevations from a given datum or bench mark.
8. Record backsights and foresights.
9. Transfer elevations using several set ups.
10. Calculate, cut and fill requirements.
11. Locate building corners, property pins and excavation lines using the transit.
12. Locate footings, piles and other building components.
13. Set up laser equipment.
14. Transfer elevations using laser equipment.
15. Transfer building lines using laser equipment.
16. State the potential hazards of laser exposure.

SECTION FOUR:COMMERCIAL FORM WORK 73 HOURS

A. Footings, Grade Beams & Piles 4 Hours

Outcome: Describe foundation types, piles and grade beams used in commercial construction.

1. Identify foundation, footing types and their requirements.
2. Identify and describe the types of deep foundations.
3. Identify and describe grade beams.

B. Wall and Column Forming 4 Hours

Outcome: Describe the forces encountered and the formwork required to build walls and columns with concrete.

1. Describe the forces encountered during concrete placement.
2. Describe the various wall form systems available.
3. Describe the various column form systems available.
4. Describe the method of achieving architectural concrete finishes.
5. Describe slip forms.

C. Suspended Concrete Slabs 4 Hours

Outcome: *Describe suspended slab forming systems and their alignment, stripping, shoring and reshoring procedures.*

1. Identify types of suspended concrete slab systems.
2. Describe the stationary forming of suspended slabs.
3. Describe the fly forming of suspended slabs.
4. Describe the stripping and reshoring procedures for suspended slabs.

D. Concrete Stairs 4 Hours

Outcome: *Describe concrete stairs, their design and formwork procedures.*

1. Describe concrete stair types.
2. Describe landings, handrails and guards.
3. Complete calculations for concrete stairs.
4. Describe layout, formwork and stripping of concrete stairs.

E. Commercial Formwork..... 39 Hours

Outcome: *Layout and construct commercial formwork.*

1. Erect formwork for columns using a variety of hardware and accessories.
2. Install chamfer strips.
3. Locate, plumb, align and brace columns, and establish elevations.
4. Construct formwork for flared, haunched or multi-sided columns.
5. Erect formwork for a slab (example):
 - a) ribbed slab
 - b) pan slab
 - c) flat slab
 - d) beam and slab
 - e) cantilevered slab
6. Level, align and brace slab forms.
7. Erect formwork for a wall using a variety of hardware and accessories.
8. Install bulkheads, door bucks, window bucks, sleeves and accessories.
9. Align and brace wall forms.
10. Construct a simple gang or giant form.

F. Concrete Stairs 18 Hours

Outcome: *Layout and construct concrete stair forms.*

1. Develop a full size stair layout.
2. Construct the formwork to support a concrete stair and landing.
3. Cut and install inverted and open stringers.
4. Install sloped riser forms.
5. Install shoring to support the concrete stair and formwork.

6. Install bracing to resist lateral movement.

SECTION FIVE:COMMERCIAL INTERIORS AND TIMBER CONSTRUCTION..... 58 HOURS

A. Interior Systems and Door Frames..... 5 Hours

Outcome: *Describe commercial interior systems, including suspended ceiling, metal framing and drywall.*

1. Describe the installation of metal stud.
2. Describe the installation of gypsum board.
3. Describe the installation of demountable partitions.
4. Describe the installation of suspended ceilings.
5. Describe setting and anchoring of metal frames.

B. Fire Protection, Acoustics and Commercial Insulation..... 2 Hours

Outcome: *Identify and describe the commercial materials and installation methods for fire separation and acoustical and thermal insulations and sealants.*

1. Describe the principals of fire protection and separations and the related materials and installation.
2. Describe the principles and materials of acoustic installations.
3. Describe commercial insulation materials and installations.

C. Commercial Fasteners and Anchors 2 Hours

Outcome: *Identify fasteners and anchors used in commercial construction and their usage.*

1. Identify and describe fasteners, anchors, loads and tools.
2. Describe methods of fastening various materials.

D. Timber Construction 4 Hours

Outcome: *Identify the building materials, assembly methods and hardware associated with heavy timber construction.*

1. Describe heavy timber construction details and methods.
2. Describe glue laminated wood products and erection procedures.
3. Describe heavy truss and box beam fabrication and erection procedures.
4. Describe construction methods for Pole Buildings.
5. Describe basic construction requirements for log buildings.

E. Installation of Metal Fabricated Products 15 Hours

Outcome: *Layout, install and erect metal fabricated products.*

1. Install a typical non-bearing partition of metal tracks and studs with emphasis on:
 - a) floor layout
 - b) floor and ceiling runners
 - c) plumbing and aligning procedures
 - d) various metal stud types
 - e) bracing procedures
 - f) intersecting walls
 - g) window, door and access openings
 - h) installation of frames
 - i) resilient sound bars
2. Set, level, plumb and secure metal door jambs for use in block walls.
3. Describe application procedures for gypsum wall boards.
4. Layout and install a suspended ceiling system.
5. Erect scaffold systems:
 - a) metal frames
 - b) metal frame rolling scaffold
 - c) tube and clamp
 - d) modular systems
 - e) scaffold/hoarding systems
 - f) swing stage

F. Skill Development Projects 30 Hours

Outcome: *Layout and construct selected projects for skill development.*

1. Match wood grains and apply edge veneers and plywood.
2. Work with a variety of joints and solid woods.
3. Use clamps and glues.
4. Use contact adhesives.
5. Construct and install drawers, doors and shelves and sliding components.
6. Use jigs, templates and other accessories to increase the efficiency of a variety of power tools.
7. Cut, fit and apply plastic laminates or other wood substitutes.
8. Develop obtuse, acute and compound angles and incorporate them into a project.

SECTION SIX:..... ESTIMATING AND PLANS 64 HOURS

A. Drawing Standards 12 Hours

Outcome: *Use basic drawing guidelines and interpretation skills to create the orthographic views, sectional views and details for a shop project.*

1. Describe line types used in orthographic drawings.
2. Demonstrate correct dimensioning methods and techniques.
3. Describe page layout and centring techniques.
4. Describe sections and details and the use of material symbols.

5. Describe orthographic and pictorial drawing basics.

B. Blueprint Reading Principles 9 Hours

Outcome: *Describe and interpret a set of working drawings.*

1. Describe and interpret the paper language used in reading a set of drawings.
2. Identify and interpret the information contained in the different views presented in a set of drawings.
3. Describe the steps used to navigate through a set of drawings.

C. Pole and Timber Frame Blueprint Reading..... 4 Hours

Outcome: *Develop the skills necessary to interpret blueprints to find information pertaining to the construction of pole and timber frame structures.*

1. Practice blueprint reading relating to pole buildings, timber frame structures and SIPS (structural insulated panels).

D. Reinforced Concrete Blueprint Reading 7 Hours

Outcome: *Develop the skills necessary to interpret structural drawings to find information pertaining to forming requirements and the placement of reinforcing steel.*

1. Practice blueprint reading relating to formwork, concrete joints and concrete reinforcement.

E. Trade Math Part A..... 4 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform and perform calculations based on basic math concepts and skills.
2. Perform and perform calculations for perimeter, centreline perimeter, areas and volumes.
3. Perform and perform calculations for ratio and proportion, mechanical advantage and percentage.
4. Perform and perform calculations for spacings.
5. Perform calculations pertinent to and in preparation for third-year math modules.

F. Trade Math Part B..... 4 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform calculations based on basic math concepts and skills.
2. Perform calculations for perimeter, centerline perimeter, areas and volumes.
3. Perform calculations for ratio and proportion, mechanical advantage and percentage.
4. Perform calculations for spacings.
5. Perform calculations pertinent to and in preparation for third-year math modules.

G. Commercial Concrete Formwork Calculations 4 Hours

Outcome: *Produce a material takeoff for commercial concrete formwork.*

1. Describe calculations using spacings.
2. Calculate wall form plywood.
3. Calculate dimensional lumber for formwork.
4. Calculate snap ties and wedges for formwork.

- 5. Produce a formwork material takeoff.
- 6. Describe a sample material takeoff for formwork.

H. Commercial Concrete Volume Calculations 6 Hours

Outcome: *Produce a material takeoff for concrete volumes of various components of a commercial building.*

- 1. Calculate concrete volumes for various construction components.
- 2. Calculate concrete volumes for commercial building components.
- 3. Describe a sample material takeoff for concrete.

I. Cut and Fill Calculations 4 Hours

Outcome: *Describe the calculations required to determine volumes for cut and fill and excavation requirements.*

- 1. Calculate the volume of excavation required to level or grade a site to a required slope.
- 2. Calculate the volume of mass excavation required for a building.
- 3. Calculate the volume of backfill and excess haul required for a building.

J. Concrete Stair Calculations 6 Hours

Outcome: *Describe and calculate design dimensions and material requirements for concrete stairs.*

- 1. Perform and practice calculations for concrete stair design.
- 2. Calculate quantities of concrete required for concrete stairs.
- 3. Estimate materials required for concrete stair forming.

K. Interior Systems Calculations 4 Hours

Outcome: *Produce a material takeoff for interior systems in a commercial setting.*

- 1. Describe calculations using spacings.
- 2. Calculate metal studs and plate material.
- 3. Calculate gypsum board and resilient channel required.
- 4. Calculate quantities of all components of a demountable partition system.
- 5. Calculate quantities of grid components and tiles for a suspended ceiling system.
- 6. Describe a sample material takeoff for interior systems.

**FOURTH PERIOD TECHNICAL TRAINING
CARPENTER TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... WORKPLACE ORGANIZATION AND SAFETY 10 HOURS

A. Construction Site Safety 2 Hours

Outcome: *Be aware of and apply Occupational Health and Safety Regulations and safe work practices in the workplace.*

1. Describe the safety roles and responsibilities of those involved in the construction industry.
2. Describe accident reporting requirements and first aid responses to common injuries.
3. Describe the requirements for personal protective equipment and power tool use.
4. Describe the requirements for work site safety and equipment.
5. Describe potential health hazards related to construction.

B. Job Roles and Coaching 3 Hours

Outcome: *Describe construction site roles and coaching apprentices.*

1. Describe the roles and responsibilities of participants in construction projects and the levels of reporting.
2. Prepare for the transition to journeyman status with an overview of the apprenticeship program.
3. Describe techniques for coaching and mentoring apprentices.

C. Job Scheduling 3 Hours

Outcome: *Describe and perform job scheduling.*

1. Describe the mechanics of bar charts.
2. Describe the mechanics of the Critical Path Method (CPM).
3. Describe the use of computer software for job scheduling.

D. Material Management 2 Hours

Outcome: *Describe the management and handling of materials related to construction projects.*

1. Describe procurement and delivery considerations.
2. Describe methods of construction material storage.
3. Describe methods of protecting completed projects from damage.

SECTION TWO:.....INTERIOR FINISHES 75 HOURS

A. Cabinet Installation 2 Hours

Outcome: *Describe the materials used and the installation procedures for cabinets and storage units.*

1. Describe the planning and preparation for kitchen installation.
2. Describe installation procedures for pre-made and site-built cabinets.
3. Identify and describe trim, accessories and hardware for cabinets.
4. Describe installation procedures for countertops.
5. Describe other cabinets and storage.

B. Trim Installation 2 Hours

Outcome: *Describe the installation of trim and finishing systems.*

1. Identify and describe common types of trim.
2. Describe planning, preparation for trim installation and the main joints used.
3. Describe installation procedures for trim and other interior components.

C. Walls and Storage..... 1 Hour

Outcome: *Describe and select commercial interior wall finishes, shelving and storage treatments, and describe the professional installation techniques required.*

1. Describe the materials and installation methods used in the finishing of interior walls in commercial buildings, including solid wood, ceramic tile, plaster, metal and vinyl.
2. Describe the materials, layout and installation methods used for architectural wood panelling.
3. Describe the methods and materials used in the construction of storage room shelving and related components.

D. Wood Finishing..... 1 Hour

Outcome: *Describe the wood finishing process from surface preparation to selection and application of a coating system.*

1. Describe surface preparation procedures for wood surfaces that will receive a finish.
2. Identify and describe common finish materials and products.
3. Describe the methods of applying a coating material.
4. Describe common finishing sequences and application procedures for wood finishes.

E. Flooring 2 Hours

Outcome: *Describe the preparation for, and installation of, common flooring materials and systems.*

1. Describe substrates and underlayments for floor coverings.
2. Describe storage, preparation requirements and basic installation steps for various floor coverings.
3. Describe the installation of wood strip and parquet flooring.

F. Interior Finish.....41 Hours

Outcome: *Layout and install interior finish.*

1. Install site built or modular cabinet units.
2. Develop sloping; irregular shapes:
 - a) displays for store interiors
 - b) architectural features on building exteriors
 - c) alcoves, arches
 - d) decorative louvered panels for window
3. Develop panel work for interiors: mouldings, battens, valances.
4. Prepare jigs, templates for specified operations and full scale layouts.
5. Install a range of hardware:
 - a) concealed hinges
 - b) door closers
 - c) sliding hardware

G. Practical Examination26 Hours

Outcome: *Construct a practical project approved by the Carpenter Provincial Apprenticeship Committee.*

Achieve a pass mark in a practical examination project under the following circumstances:

Every apprentice will be required to build an in-shop practical project. This project will be assessed by representatives from industry and the marks obtained will be a major consideration in awarding completion of apprenticeship and journeyman status.

SECTION THREE: EXTERIOR FINISHES..... 8 HOURS

A. Commercial Doors and Windows2 Hours

Outcome: *Identify and describe installation procedures for exterior commercial doors and windows.*

1. Describe residential window and door terminology and installation procedures.
2. Describe residential interior door terminology and installation procedures.
3. Describe installation procedures for commercial window units and associated hardware.
4. Describe installation procedures for light- and heavy-duty commercial doors and associated hardware.

B. Commercial Exteriors5 Hours

Outcome: *Describe the various materials used on the exteriors of commercial buildings and the layout and construction of arch support templates used for masonry exteriors.*

1. Identify common commercial exteriors.
2. Describe layout and construction procedures for masonry arch templates.

C. Commercial Roofs 1 Hour

Outcome: *Describe basic low slope roofing systems and how to prepare the roof for the roofing installers.*

1. Describe low slope roof systems.
2. Describe the carpenter's role in preparation for roofing application.

SECTION FOUR:ROOF FRAME AND STAIRS..... 55 HOURS

A. Advanced Roof Framing 4 Hours

Outcome: *Identify roof types and terminology and describe the procedures for the calculation, layout and assembly of unequal slope intersecting roofs, dormers, turrets and other roof framing features.*

1. Describe roof framing technology.
2. Describe roof framing calculations and layout.
3. Describe framing unequal slope, gable and interesting roofs.
4. Describe framing advanced roof features and intersections.

B. Housed Stairs..... 2 Hours

Outcome: *Describe housed stairs and balustrade construction.*

1. Describe the construction of a flight of housed stairs.
2. Describe the installation of balustrades.

C. Winder Stairs..... 2 Hours

Outcome: *Describe the requirements for winder stair systems and determine the rough opening and layout for their construction.*

1. Describe winder stair components and code requirements.
2. Make calculations involving winder stairs.
3. Describe the layout and construction of winder landings.
4. Describe tapered treads and code requirements.

D. Curved Stairs 2 Hours

Outcome: *Describe the building code requirements, calculations and construction techniques required to build a set of curved stairs.*

1. Describe curved stairs and code requirements.
2. Make calculations involving circular stairs.
3. Describe the construction of a circular stair.

E. Stairs.....27 Hours

Outcome: *Layout and construct stairs.*

1. Build housed stringers and stair balustrade.
2. Build winder stairs.
3. Build circular stairs and circular stair form.

F. Roof Framing 18 Hours

Outcome: *Layout cut and assemble advanced roof framing.*

1. Frame unequal slope gable and interesting roof.
2. Frame specialty roof systems (dormer, domed, vaulted, turrets etc.).

SECTION FIVE: BUILDING DESIGN AND RENOVATIONS 10 HOURS

A. Renovations 4 Hours

Outcome: *Describe contracting, planning and sequences in renovations.*

1. Identify the roles and responsibilities of a renovation contractor.
2. Describe a typical renovation sequence.
3. Describe residential renovations and typical situations that arise.
4. Describe commercial renovations and typical situations that arise.

B. Additions 2 Hours

Outcome: *Describe construction of additions.*

1. Describe preparation considerations for additions.
2. Describe the sequence and special concerns for adding to the footprint of a building.
3. Describe concerns when adding a storey to a building.

C. Architectural Design and Planning 2 Hours

Outcome: *Identify concepts of architectural design and the use of space.*

1. Identify and describe concepts of design in architecture.
2. Identify and describe the concept of function in architecture.

D. Barrier-Free Design & Ergonomics 2 Hours

Outcome: *Identify concepts of ergonomic and barrier-free design.*

1. Identify and describe standards of ergonomic design.
2. Identify and describe barrier-free design.

SECTION SIX:..... ENERGY EFFICIENCY AND BUILDING SCIENCE 18 HOURS

A. Energy Efficient Construction 2 Hours

Outcome: *Identify past and current changes in construction materials and methods that are making housing more energy-efficient.*

1. Describe the evolution of Canadian housing technology.
2. Describe how energy is lost or gained in houses.
3. Identify the economics of low-energy homes.

B. Energy Efficient Framing 2 Hours**Outcome: Identify energy-efficient floor, wall and roof framing systems.**

1. Identify different approaches to constructing insulated wall and floor systems with effective barriers to air and moisture flow.
2. Identify general design considerations for roof systems and ways to avoid common problems.

C. Energy Efficient Housing Design 2 Hours**Outcome: Describe energy efficient design principles and equipment.**

1. Identify factors you should consider during the design process.
2. Describe the principles of space conditioning.
3. Identify approaches and equipment that can be used to satisfy various ventilation requirements.

D. Insulation and Air Barriers 4 Hours**Outcome: Identify insulation and air barrier systems, materials and their application.**

1. Describe various insulation materials and their important characteristics.
2. Describe insulation techniques for foundations.
3. Describe the materials and assembly methods for various air barrier systems.

E. Energy Efficient Construction 8 Hours

NOTE: Due to extensive course material and time lines to Energy Efficient Construction it may be necessary to provide exposure to existing models as opposed to actual construction and personal hand skill involvement of apprentices. Methods and procedures may be provided in the form of demonstrations.

1. Identify and describe an air/vapour barrier as per energy efficient standards.
2. Apply:
 - a) film, foil, paints
 - b) sealants
 - c) polypanes, vapour hats, beam bags
3. Prepare beams set in concrete.
4. Seal air leakage at floor joists.
5. Install vapour barrier at top plates.
6. Install door and window units.
7. Construct an attic hatch.
8. Prepare cantilever treatment for air tightness.
9. Install (or make provision for) mechanical ventilation from an airtight structure.
10. Erect a high heeled truss.
11. Erect a scissors truss.

SECTION SEVEN: ESTIMATING AND PLANS 64 HOURS**A. Drawing Standards 6 Hours**

Outcome: *Use basic drawing guidelines and interpretation skills to create the orthographic views, sectional views and details for a shop project.*

1. Describe line types used in orthographic drawings.
2. Demonstrate correct dimensioning methods and techniques.
3. Describe page layout and centring techniques.
4. Describe sections and details and the use of material symbols.
5. Describe orthographic and pictorial drawing basics.

B. Practical Project - Computer Desk..... 9 Hours

Outcome: *Using the drawing and shop skills acquired during your trades training, draw and build a computer desk as specified.*

1. Describe the Practical Project supplied plans.
2. Describe the Practical Project materials, hardware and specifications.
3. Describe the Practical Project evaluation procedure.
4. Produce shop drawings and a material cutting list for the Practical Project.

C. Blueprint Reading Principles 10 Hours

Outcome: *Describe and interpret a set of working drawings.*

1. Describe and interpret the paper language used in reading a set of drawings.
2. Identify and interpret the information contained in the different views presented in a set of drawings.
3. Describe the steps used to navigate through a set of drawings.

D. Advanced Commercial Blueprint Reading..... 15 Hours

Outcome: *Read and interpret complex commercial blueprints that use alternative or less common drawing and referencing practices.*

1. Practice blueprint reading skills relating to a complex set of commercial drawings including some alternative drawing conventions.

E. Trade Math – Part A..... 3 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform and perform calculations based on basic math concepts and skills.
2. Perform and perform calculations for perimeter, centreline perimeter, areas and volumes.
3. Perform and perform calculations for ratio and proportion, mechanical advantage and percentage.
4. Perform and perform calculations for spacings.
5. Perform calculations pertinent to and in preparation for fourth-year math modules.
6. Perform calculations for beam/column reactions.

F. Trade Math – Part B 3 Hours

Outcome: *Perform pure math calculations related to trade-based problems.*

1. Perform calculations based on basic math concepts and skills.
2. Perform calculations for perimeter, centreline perimeter, areas and volumes.
3. Perform calculations for ratio and proportion, mechanical advantage and percentage.
4. Perform calculations for spacing.
5. Perform calculations pertinent to and in preparation for fourth period math modules.
6. Perform calculations for beam/column reactions.

G. Interior Finish Calculations 4 Hours

Outcome: *Perform calculations related to interior finishes.*

1. Describe calculations using set spacings.
2. Perform calculations related to floor, ceiling and wall finishes.
3. Calculate lineal lengths of mouldings and trim.
4. Calculate material quantities for cabinets, countertops and hardware.
5. Produce cutting lists for storage units, built-in cabinets and storage room shelving.
6. Describe a material takeoff list for interior finish components.

H. Project Costing 3 Hours

Outcome: *Demonstrate filling in the components of an estimate.*

1. Describe various methods of preliminary pricing.
2. Describe a detailed estimate.
3. Estimate material costs and describe waste factors.
4. Estimate labour costs.
5. Estimate general expenses.
6. Produce a summary sheet.

I. Roof Calculations 6 Hours

Outcome: *Perform calculations for framing equal and unequal slope roofs.*

1. Describe material quantities using spacings, slope gain factors and comparison of triangles.
2. Calculate line lengths of rafters for equal slope gable, hip and intersecting roofs.
3. Calculate line lengths of rafters for unequal slope gable, hip and intersecting roofs.

J. **Advanced Stair Calculations** 5 Hours

Outcome: ***Calculate the required dimensions for openings and stairs working within the limits imposed by building codes, existing openings, limited headroom and floor space.***

1. Perform and practice calculations for straight-flight stairs.
2. Perform and practice calculations for multi-flight stairs.
3. Perform calculations related to winder stairs.
4. Perform calculations related to curved stairs.
5. Perform calculations related to balusters and balustrades.



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