
Plan of Training

WELDER



Government of Newfoundland and Labrador
Department of Education
Institutional and Industrial Education Division

September 2009

PLAN OF TRAINING

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Approved by:

A handwritten signature in black ink, appearing to read "Paula Good".

Chairperson, Provincial Apprenticeship and Certification Board

Date:

Sept 23/09

The Joint Planning Committee (JPC) recognizes this Interprovincial Program Guide as the national curriculum for the occupation of Welder.

Preface

This Apprenticeship Standard is based on the 2004 edition of the National Occupational Analysis for the Welder trade.

This document describes the curriculum content for the Welder apprenticeship training program and outlines each of the technical training units necessary for the completion of apprenticeship.

Acknowledgements

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this Apprenticeship Curriculum Standard. Without their dedication to quality apprenticeship training, this document could not have been produced.

We offer you a sincere thank you.

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A. Conditions Governing Apprenticeship Training

1.0 General

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act (1999)*. If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in certain Plan of Training.

2.0 Entrance Requirements

2.1 Entry into the occupation as an apprentice requires:

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in particular Plan of Training. Mature students, at the discretion of the Director of Institutional and Industrial Education, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Institutional and Industrial Education, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed.

3.0 Probationary Period

The probationary period for each Memorandum of Understanding will be six months. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

4.0 Termination of a Memorandum of Understanding

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB.

5.0 Apprenticeship Progression Schedule and Wage Rates

5.1 Progression Schedule

7200 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus relevant work experience totaling a minimum of 5400 hours	Fourth Year

Fourth Year Apprentice	Completion of advanced level (Block 4) courses and (Blocks 5 & 6) <i>if applicable</i> , plus sign-off of workplace skills required for certification totaling a minimum of 7200 hours**	Write Certification Examination
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5400 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus sign-off of workplace skills required for certification totaling a minimum of 5400 hours	Write Certification Examination

4800 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	Completion of entry level courses (Block 1) courses, plus relevant work experience totaling a minimum of 1600 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3200 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus sign-off of workplace skills required for certification totaling a minimum of 4800 hours	Write Certification Examination

* All direct entry apprentices must meet the **Requirements for Progression** either through Prior Learning Assessment and Recognition or course completion before advancing to the next year.

** Apprentices in a 7200 hour program which incorporates more than four blocks of training are considered fourth year apprentices pending completion of 100% course credits and workplace skills requirements.

5.2 For the duration of each Apprenticeship Training Period, the apprentice who is not covered by a collective agreement, shall be paid a progressively increased schedule of wages.

Program Duration	Wage Rates		Comments
7200 Hours	1 st Year	60%	These wage rates are percentages of the prevailing journey person's wage rate in the place of employment of the apprentice. No apprentice shall be paid less than the wage rate established by the Labour Standards Act (1988), as now in force or as hereafter amended, or by other Order, as amended from time to time replacing the first mentioned Order.
	2 nd Year	70%	
	3 rd Year	80%	
	4 th Year	90%	
5400 Hours and 4800 Hours	1 st Year	60%	
	2 nd Year	75%	
	3 rd Year	90%	
4000 Hours			(Hairstylist Program) - The apprentice shall be paid no less than the minimum wage for hours worked and a commission agreed upon between the apprentice and the employer.

6.0 Tools

Apprentices shall be required to obtain hand tools as and when specified by the PACB.

7.0 Periodic Examinations and Evaluation

- 7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Institutional and Industrial Education and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.
- 7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.
- 7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. At the discretion of the instructor, the summative mark may be for completion of a theory examination or a combination of the theory examination and an assigned practical project.

8.0 Granting of Certificates of Apprenticeship

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship

9.0 Hours of Work

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 Copies of the Registration for Apprenticeship

The Director of Institutional and Industrial Education shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 Ratio of Apprentices to Journeypersons

The ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed, with the condition that one of these be a final year apprentice.

12.0 Relationship to a Collective Bargaining Agreement

Collective agreements take precedence over the conditions outlined in the Plan of Training.

13.0 Amendments to a Plan of Apprenticeship Training

A plan of training may be amended at any time by the PACB.

14.0 Employment, Re-Employment and Training Requirements

14.1 The Plan of Training requires apprentices to regularly attend their place of employment.

14.2 The Plan of Training requires apprentices to regularly attend training programs for that occupation as prescribed by the PACB.

14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire

program as outlined in the General Conditions of Apprenticeship. An apprentice will be required to pay a reinstatement fee. Permanent cancellation in the said occupation is the result of non-compliance.

- 14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or registering as a Trade Qualifier.
- 14.5 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.
- 14.6 The employer will permit each apprentice to regularly attend training programs as prescribed by the PACB.
- 14.7 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a training institution and have sign-off done by instructors to meet the requirements for certification.

15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Education within 30 days of the decision.

B. Requirements for Red Seal Certification

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.
2. Successful completion of all required courses in program.
3. A combination of training from an approved training program and suitable work experience totalling 5400 hours.
4. Completion of a National Red Seal examination, to be set at a place and time determined by the Institutional and Industrial Education Division.
5. Payment of the appropriate examination fee.

C. Roles and Responsibilities of Stakeholders in the Apprenticeship Process

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

The Apprentice:

- completes all required technical training courses as approved by the PACB. finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyman.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

The Employer:

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Institutional and Industrial Education Division and apprentices in an effort to establish a process of continuous quality improvement.

- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ensures work experiences of the apprentice are documented.

The Training Institution:

- provides a high quality learning environment.
- provides the necessary student support services that will enhance an apprentice's ability to be successful.
- participates with other stakeholders in the continual updating of programs.

The Institutional and Industrial Education Division:

- establishes and maintains program advisory committees under the direction of the PACB.
- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.
- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ensures all apprentices are appropriately registered and records are maintained as required.
- schedules all necessary technical training periods for apprentices to complete

requirements for certification.

- administers provincial/interprovincial examinations.

The Provincial Apprenticeship and Certification Board:

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.
- ensures advisory and examination committees are established and maintained.
- accredits institutions to deliver apprenticeship training programs.
- designates occupations for apprenticeship training and/or certification.

D. Program Outcomes

Upon completion of the Welder Program, students will have demonstrated the knowledge and skills required to perform the following tasks:

- Task 1 Interprets blueprints and drawings.
- Task 2 Identifies materials.
- Task 3 Sources required information.
- Task 4 Prepares work area.
- Task 5 Lays out materials.
- Task 6 Prepares materials.
- Task 7 Fabricates components.
- Task 8 Maintains equipment.
- Task 9 Performs basic rigging operations.
- Task 10 Complies with codes, specifications and standards.
- Task 11 Verifies materials.
- Task 12 Performs inspections.
- Task 13 Cuts with mechanical and power tools.
- Task 14 Cuts using oxy-fuel gas cutting process (OFC).
- Task 15 Cuts using plasma arc cutting process (PAC).
- Task 16 Cuts using air carbon arc cutting process (CAC-A).
- Task 17 Cuts using electric arc cutting process.
- Task 18 Gouges using air carbon arc cutting process (CAC-A).
- Task 19 Gouges using plasma arc cutting process (PAC).
- Task 20 Gouges using oxy-fuel gas welding process (OFC).
- Task 21 Welds using oxy-fuel gas welding process (OFW).
- Task 22 Welds using shielded metal arc welding process (SMAW).
- Task 23 Welds using flux cored arc welding process (FCAW).
- Task 24 Welds using gas metal arc welding process (GMAW).
- Task 25 Welds using gas tungsten arc welding process (GTAW).
- Task 26 Welds using submerged arc welding process (SAW).
- Task 27 Joins using stud arc welding process (SAW).
- Task 28 Joins using resistance welding process (RW) (RSW – Spot and Seam).

E. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. At the discretion of the instructor, the summative mark may be for completion of a theory examination or a combination of the theory examination and an assigned practical project.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Entry Level Courses – Block 1			
NL Course No.	Course Name	Hours	Pre-Requisites
TS1510	Occupational Health and Safety	6	None
TS1520	WHMIS	6	None
TS1530	Standard First Aid	14	None
WD1165	Hand, Measuring and Layout Tools	15	None
WD1170	Hand and Power Cutting Tools	15	TS1510 WD1165
WD1175	Drilling and Threading Tools	15	WD1170
WD1180	Grinding and Finishing	12	WD1170
WD1185	Bending and Rolling	4	None
WD1601	Oxy-Fuel Cutting, Heating and Gouging	15	TS1530
WD1610	SMAW (Shielded Metal Arc Welding) 1 – Set-up, Strike and Maintain an Arc	30	WD1601
WD1620	SMAW (Shielded Metal Arc Welding) 2 – Fillet Weld All Positions	60	WD1610
WD1630	GMAW (Gas Metal Arc Welding) 1 – Set-up and Maintain Arc	15	WD1610
WD1640	GTAW (Gas Tungsten Arc Welding) 1 – Set-up	15	WD1610

Entry Level Courses – Block 1			
NL Course No.	Course Name	Hours	Pre-Requisites
WD1650	Plasma Arc Cutting & Gouging	10	WD1610
WD1661	Blueprint Reading 1 (Basic)	30	None
WD1730	Fabrication Fundamentals	15	WD1661
WD1670	Blueprint Reading 2 (Welding Symbols)	30	WD1661
WD1681	Metallurgy, Expansion and Contraction Control	30	WD1610
WD1690	Quality Control	30	WD1610
WD1700	Stationary Powered Shearing	6	None
WD1711	Iron Worker Operation	6	TS-1510 WD1165
WD1720	Jigs and Fixture Fabrication	15	WD1730
WD1740	FCAW (Flux-Cored Arc Welding) 1 – Set-up and Deposit a Weld	15	WD1630
WD1801	SMAW (Shielded Metal Arc Welding) 3– Groove Weld 1G, 2G, 1GF, 2GF, 3GF & 4GF	120	WD1610
WD1810	SMAW (Shielded Metal Arc Welding) 4 – Fillet & Groove Weld Medium & High Carbon Steel	4	WD1681
WD1820	GMAW 2 (Gas Metal Arc Welding) – Fillet Weld All Positions, Mild Steel	15	WD1630
WD1831	GMAW (Gas Metal Arc Welding) 3 – Groove Welds 1G, 2G, 3G Down, Mild Steel	20	WD1630
WD1840	GTAW (Gas Tungsten Arc Welding) 2 – Fillet Weld All Positions, Mild Steel	30	WD1640
WD1870	Build Up of Metal Parts	15	WD1610
WD1881	Fusion, Brazing and Braze Welding (Oxy-fuel)	45	WD1601

Entry Level Courses – Block 1			
NL Course No.	Course Name	Hours	Pre-Requisites
WD1891	FCAW (Flux-Core Arc Welding) 2 – Fillet and Groove Weld Plate 1G, 2G, 1GF, 2GF	45	WD1740
WD1900	Air Carbon Arc Cutting and Gouging	15	WD1601
WD1910	Layout and Template Development Fundamentals	40	WD1661
AP 1100	Introduction to Apprenticeship	15	None
*MA1060	Basic Math	60	None
OT1150	Workplace Exposure	80	All practical welding courses
CM2150	Workplace Communications	45	None
MR1220	Customer Service	30	None
SP2330	Quality Assurance/Quality Control	30	None
MC1050	Introduction to Computers	30	None
SD1700	Workplace Skills	30	None
SD1710	Job Search Techniques	15	None
SD1720	Entrepreneurial Awareness	15	None
Total Hours		1108	

Required Work Experience

Block 2			
NL Course No.	Course Name	Hours	Pre-Requisites
WD1850	GTAW (Gas Tungsten Arc Welding) 3 – Groove Weld All Positions, Mild Steel	30	WD1640
WD1860	GTAW (Gas Tungsten Arc Welding) 4 – Fillet & Groove Weld, Medium and High Carbon Steel	4	WD1681
WD2410	Stud Welding and Resistance Spot Welding	4	WD1610
WD2141	SMAW (Shielded Metal Arc Welding) 5 - Groove Welds 3G, 4G, 5G, 6G	25	WD1801
WD2500	SMAW (Shielded Metal Arc Welding) 6 – Alloy Steels	4	WD1681
WD2280	FCAW (Flux-Core Arc Welding) – 3 fillet and groove weld plate 3G, 4G, 3GF, and 4GF	30	WD1891
WD2570	Electric Arc Cutting (SMAW)	6	WD1610
WD2421	Blueprint Reading 3 (Advanced/CAD)	30	WD1670
WD2431	Material Handling, Rigging and Scaffolding	20	TS1510
WD2511	GMAW (Gas Metal Arc Welding) 4 – Fillet and Groove Weld, Medium and High Carbon Steel	4	WD1630; WD1820; WD1831
WD2520	GMAW (Gas Metal Arc Welding) 5 – Pipe and Tubing, All Positions Ferrous Metals	20	WD2511
Total Hours		177	

Required Work Experience

Block 3			
NL Course No.	Course Name	Hours	Pre-Requisites
WD2530	GMAW (Gas Metal Arc Welding) 6 – Aluminium and Stainless Steel	20	WD1630
WD2560	SAW (Submerged Arc Welding) Weld Plate	6	WD1610
WD2541	GTAW (Gas Tungsten Arc Welding) 6 – Alloy and Non-Ferrous Metals	35	WD1640; WD1840
WD2551	FCAW (Flux-Cored Arc Welding) 4 – Pipe and Tubing All Positions	35	WD1891
WD2440	Blueprint Reading 4 (Shop Drawings)	15	WD2421
WD2591	GTAW (Gas Tungsten Arc Welding) 5 – Pipe and Tubing, Mild Steel, All Positions	64	WD2541
Total Hours		175	

Required Work Experience

Block 4			
NL Course No.	Course Name	Hours	Pre-Requisites
WD2581	SMAW (Shielded Metal Arc Welding) 6 – Pipe All Positions	135	WD1801
WD2600	GTAW(Gas Tungsten Arc Welding) 6 – Pipe Mild Steel	75	WD2591
Total Hours		210	

Total Course Credit Hours	1670
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***A student who can meet the Mathematics requirement through an ACUPLACER® test may be exempted from Mathematics 1060. Please check with your training institution.**

Entry Level – Block 1

TS1510 Occupational Health and Safety

Description:

This course is designed to give participants the knowledge and skills necessary to interpret the Occupational Health and Safety Act, laws and regulations; understand the designated responsibilities within the laws and regulations; the right to refuse dangerous work; and the importance of reporting accidents.

Pre-Requisites: None

Course Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- prevent accidents and illnesses
- improve health and safety conditions in the workplace

Theory:

1. Interpret the Occupational Health and Safety Act laws and regulations.
 - i. explain the scope of the act
 - application of the act
 - Federal/Provincial jurisdictions
 - Canada Labour Code
 - rules and regulations
 - private home application
 - conformity of the Crown by the Act
2. Explain responsibilities under the Act & Regulations.
 - i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Explain the purpose of joint health and safety committees.
 - i. formation of committee
 - ii. functions of committee
 - iii. legislated rights
 - iv. health and safety representation
 - v. reporting endangerment to health
 - vi. appropriate remedial action
 - vii. investigation of endangerment
 - viii. committee recommendation
 - ix. employer's responsibility in taking remedial action

4. Examine right to refuse dangerous work.
 - i. reasonable grounds for refusal
 - ii. reporting endangerment to health
 - iii. appropriate remedial action
 - iv. investigation of endangerment
 - v. committee recommendation
 - vi. employer's responsibility to take appropriate remedial action
 - vii. action taken when employee does not have reasonable grounds for refusing dangerous work
 - viii. employee's rights
 - ix. assigning another employee to perform duties
 - x. temporary reassignment of employee to perform other duties
 - xi. collective agreement influences
 - xii. wages and benefits

5. State examples of work situations where one might refuse work.

6. Describe discriminatory action.
 - i. definition
 - ii. filing a complaint procedure
 - iii. allocated period of time a complaint can be filed with the Commission
 - iv. duties of an arbitrator under the Labour Relations Act
 - v. order in writing inclusion

- vi. report to commission Allocated period of time to request Arbitrator to deal with the matter of the request
 - vii. notice of application
 - viii. failure to comply with the terms of an order
 - ix. order filed in the court
7. Explain duties of commission officers.
- i. powers and duties of officers
 - ii. procedure for examinations and inspections
 - iii. orders given by officers orally or in writing
 - iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
 - v. service of an order
 - vi. prohibition of persons towards an officer in the exercise of his/her power or duties
 - vii. rescinding of an order
 - viii. posting a copy of the order
 - ix. illegal removal of an order
8. Interpret appeals of others.
- i. allocated period of time for appeal of an order
 - ii. person who may appeal order
 - iii. action taken by Commission when person involved does not comply with the order
 - iv. enforcement of the order
 - v. notice of application
 - vi. rules of court
9. Explain the process for reporting of accidents.
- i. application of act
 - ii. report procedure
 - iii. reporting notification of injury
 - iv. reporting accidental explosion or exposure
 - v. posting of act and regulations

Practical:

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.
2. Conduct a safety inspection of shop area.

TS1520 Workplace Hazardous Materials Information System (WHMIS)

Description:

This course is designed to give participants the knowledge and skills necessary to define WHMIS, examine hazard identification and ingredient disclosure, explain labeling and other forms of warning, and introduce material safety data sheets (MSDS).

Pre-Requisites: None

Course Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- interpret and apply the Workplace Hazardous Materials Information System (WHMIS) Regulation under the Occupational Health & Safety Act.

Required Knowledge and Skills:

1. Define WHMIS safety.
 - i. rational and key elements
 - ii. history and development of WHMIS
 - iii. WHMIS legislation
 - iv. WHMIS implementation
 - v. Definitions of legal and technical terms

2. Examine hazard identification and ingredient disclosure.
 - i. prohibited, restricted and controlled products
 - ii. classification and the application of WHMIS information requirements
 - iii. responsibilities for classification
 - the supplier
 - the employer
 - the worker-classification: rules and criteria

- information on classification
 - classes, divisions and subdivisions in WHMIS
 - general rules for classification
 - class A – compresses gases
 - class B – flammable and combustible materials
 - class C – oxidizing material
 - class D – poisonous and infectious material
 - class E – corrosive material
 - class F – dangerously reactive material
- iv. products excluded from the application of WHMIS legislation
- consumer products
 - explosives
 - cosmetics, drugs, foods and devices
 - pest control products
 - radioactive prescribed substances
 - wood or products made of wood
 - manufactured articles
 - tobacco or products of tobacco
 - hazardous wastes
 - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
- v. comparison of classification systems – WHMIS and TDG
- vi. general comparison of classification categories
- vii. detailed comparison of classified criteria
3. Explain labeling and other forms of warning.
- i. definition of WHMIS label
- supplier label
 - workplace label
 - other means of identification
- ii. responsibilities for labels
- supplier responsibility
 - employer responsibility
 - worker responsibility
- iii. introduce label content, design and location

- supplier labels
 - workplace labels
 - other means of identification
4. Introduce material safety data sheets (MSDS).
- i. definition of a material safety data sheet
 - ii. purpose of the data sheet
 - iii. responsibility for the production and availability of data sheets
 - supplier responsibility
 - employer responsibility
 - workers responsibility

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are mandatory in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Locate WHMIS label and interpret the information displayed.
2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.

SUGGESTED RESOURCES:

1. WHMIS Regulation.
2. Sample MSDS sheets.

TS1530 Standard First Aid

Description:

This course is designed to give the apprentice the ability to recognize situations requiring emergency action and to make appropriate decisions concerning first aid.

Complete a **St. John Ambulance or Canadian Red Cross** Standard First Aid Certificate course.

Pre-Requisites: None

WD1165 Hand, Measuring and Layout Tools

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of proper use of hand, measuring and layout tools.

Pre-Requisites: None

Objectives and Content:

1. Identify the types of hand tools and describe their applications, use, care and storage.
 - i. pliers
 - ii. chisels and punches
 - iii. wrenches
 - offset
 - sockets
 - adjustable
 - open end
 - combination
 - box end
 - allen
 - pipe
 - speed
 - iv. vices
 - pipe
 - soft jaw
 - swivel
 - v. straight edges
 - vi. screwdrivers
 - vii. files

- viii. bolt cutters
 - ix. hammers and mallets
 - ball peen
 - cross peen
 - sledge
 - x. torque wrenches
 - xi. reamers
 - xii. chain hoists
 - xiii. jacks
 - xiv. tubing cutting tools
 - xv. punches
 - center
 - prick
 - pin
 - xvi. line up bars (drift pins)
 - xvii. clamps
2. Describe the imperial and metric measuring systems and their use in the trade.
3. Identify measuring and layout tools and instruments and describe their parts, applications and procedures for use.
- i. squares
 - ii. tape
 - iii. compass
 - iv. protractors
 - v. levels
 - builders
 - laser
 - magnetic
 - water
 - spirit (torpedo)
 - vi. gauges
 - hi-lo
 - feeler
 - welding

- plate thickness
- wire
- vii. micrometer
- viii. plum bob
- ix. scribes
- x. straight edge
- xi. calipers
- xii. chalk line
 - trammel points
 - dividers

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Layout lines on flat bar.
2. Layout drill gauge.

WD1170 Hand And Power Cutting Tools

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of cutting tools, their applications, maintenance and procedures for use.

Pre-Requisites: TS1510; WD1165

Objectives and Content:

1. Describe hand shears, their applications, maintenance and procedures for use.
 - i. cutting techniques
 - sheet metal in a straight line
 - ii. circles
 - iii. angular shapes
2. Describe power shears and nibblers, their applications, maintenance and procedures for use.
 - i. cutting techniques
 - metal in a straight line
 - ii. circles
 - iii. angular shapes
3. Describe squaring shears, their applications, maintenance and procedures for use.
 - i. parts of the shear
 - ii. type of blade
4. Describe hand hacksaws, their applications, maintenance and procedures for use.
 - i. parts of the saw
 - ii. type of blade

5. Describe band and reciprocating saws, their applications, maintenance and procedures for use.
 - i. parts of the saw
 - ii. type of blade

6. Describe chop saws, their applications, maintenance and procedures for use.
 - i. parts of the saw
 - ii. types of blades and discs

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Use tools to cut outlines layed out on flat bar and cut out drill gauge.

WD1175 Drilling And Threading Tools

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of drilling, threading and fastening tools, their use and maintenance.

Pre-Requisites: WD1170

Objectives and Content:

1. Identify the types of drills and describe their applications, use and maintenance.
 - i. parts
 - ii. sharpening
2. Describe the use and maintenance of hand power drills, drill presses, and magnetic-based drills.
3. Describe taps and dies, their applications, use and maintenance.
 - i. external
 - ii. internal
4. Identify the types of clamps, and describe their applications, use and maintenance.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Layout and fabricate drilling and threading exercise as per assigned project.
2. Layout and fabricate circle cutting attachment.

WD1180 Grinding And Finishing

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of grinding and finishing tools and equipment.

Pre-Requisites: WD1170

Objectives and Content:

1. Identify types of portable grinders and describe their applications, maintenance and use.
 - i. wheels
 - abrasive
 - grit
 - ii. speed
 - iii. attachments
 - iv. accessories

2. Identify types of portable sanders and describe their applications, maintenance and use.
 - i. discs
 - abrasive
 - grit
 - ii. speed
 - iii. attachments
 - iv. accessories

3. Identify types of stationary grinders and describe their applications, maintenance and use.

- i. wheels
 - abrasive
 - grit
- ii. speed
- iii. attachments
- iv. accessories
 - tool rest adjustment
 - wheel dressers

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Install grinding wheels on stationary grinder.
2. Grind metals with stationary grinders.
3. Demonstrate use of wheel dresser.
4. Grind metals with a portable grinder.

WD1185 Bending And Rolling

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of bending and rolling equipment.

Pre-Requisites: None

Objectives and Content:

1. Define terminology associated with bending and rolling requirements.
 - i. tonnage
 - ii. spacing
 - iii. clearance
 - iv. calculations
2. Identify the types of equipment used to bend and roll metal, and describe their applications, maintenance and procedures for use.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only.

WD1601 Oxy-Fuel Cutting, Heating and Gouging

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of oxy-fuel equipment.

Pre-Requisites: TS1530

Objectives and Content:

1. Describe the procedures used to set-up and shut down oxy-fuel equipment.
 - i. protective equipment
 - ii. cleaning
 - iii. equipment and accessories
 - cylinders (storage and handling)
 - regulators
 - lighter
 - radiograph (semi-automatic track cutter)
 - torches
 - flashback arrestors
 - check valve
 - hose
 - manifold
 - iv. assembling
 - v. tip selection
 - cutting
 - heating
 - gouging
 - thread identification
 - pressure adjustment
 - quality of cut
 - gas selection
 - types of flames

- testing
 - disassembling
2. Identify oxy-fuel cutting, heating and gouging applications and procedures.
 - i. sheet metal
 - ii. plate
 - iii. structural shapes
 - iv. pipe

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Cutting
 - i. straight cutting
 - ii. bevel cutting
2. Gouging
 - i. gouge groove in flat plate

WD1610 SMAW (Shielded Metal Arc Welding) 1

–Set-Up, Strike and Maintain an Arc

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- set-up and maintain an arc.
- deposit a weld bead.

Pre-Requisites: WD1601

Objectives and Content:

1. Define the terminology associated with arc welding.
 - i. mild steel and low alloy steel electrodes
 - ii. AC (Alternating Current)
 - iii. DC (Direct Current) (polarity)
 - iv. Arc Blow
 - v. duty cycle
 - vi. rated amperage

2. Describe the SMAW process.
 - i. general precautions
 - ii. equipment and accessories
 - personal protective equipment
 - ground clamps
 - terminal lugs
 - electrode holders
 - cable connectors
 - cables
 - iii. electrodes
 - iv. codes and standards

3. Describe the characteristics and applications of different power sources.
 - i. AC transformers
 - ii. AC/DC rectifiers
 - iii. DC generators
 - iv. engine drive (gasoline, diesel)
 - v. inverters
4. Describe the set-up and maintenance of welding equipment used in the SMAW process.
5. Describe the procedures used to strike and maintain an electric arc.
6. Describe the procedures and techniques used to deposit a weld bead.
 - i. stringer
 - ii. weave
 - iii. arc length
 - iv. travel speed
 - v. work and travel angles
 - vi. visual inspection

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Set-up welding equipment check the various external components.
2. Tack weld with (6011) 4311 and (7018) 4918 electrodes.
3. Deposit stringer beads with 4311 and 4918 electrodes.
4. Deposit weave beads with 4311 and 4918 electrodes.
5. Perform padding with 4311 and 4918 electrodes.

WD1620 SMAW (Shielded Metal Arc Welding) 2 – Fillet Weld All Positions

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of fillet weld mild steel in all positions using the SMAW process.
- perform visual inspection of welds.

Pre-Requisites: WD1610

Objectives and Content:

1. Identify types of joints and their characteristics.
 - i. tee
 - ii. lap
 - iii. corner

2. Identify types of fillet welds and describe their applications.
 - i. tack
 - ii. composite
 - iii. single-pass
 - iv. multi-pass
 - v. plug
 - vi. slot

3. Describe the procedures used to fillet weld on mild steel in all positions.
 - i. identify position
 - limitations
 - ii. identify material
 - iii. determine thickness of material
 - iv. determine fillet size
 - v. select electrode

- vi. select current
4. Describe the procedures used to test welds.
 - i. destructive
 - ii. non-destructive (visual inspection)
 5. Describe weld faults and their causes.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Perform welds on tee lap and corner joint, all positions.

WD1630 GMAW (Gas Metal Arc Welding) 1

–Set-Up and Maintain an Arc

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of the procedures to set-up GMAW equipment, strike and maintain an arc.
- disassemble and reassemble GMAW welding systems.
- perform visual inspection of weld.

Pre-Requisites: WD1610

Objectives and Content:

1. Define terminology associated with the GMAW process.
2. Describe the GMAW process.
 - i. general precautions
 - ii. equipment and accessories
 - shielding gas and regulators
 - electrode wire
 - gun
 - feeder
 - power source
 - nozzle
 - cable connections
 - cables
 - pulsed arc machines
 - iii. metal transfers
 - iv. polarity
 - v. arc voltage

- vi. slope and adjustment
 - vii. inductance
 - viii. travel speed
 - ix. wire feed speed
 - x. penetration
 - xi. travel and work angles
 - xii. manipulation
 - xiii. guide tubes
 - xiv. contact tips
 - xv. liners
3. Describe the assembly and disassembly of welding equipment used in the GMAW process.
4. Describe troubleshooting and maintenance procedures for GMAW equipment.
5. Describe the procedures used to establish and maintain an arc.
- i. starting and stopping the weld
 - finishing end of the joint
 - ii. filler metal
 - iii. adjustment
 - iv. shielding gases (pre and post weld)
 - v. drive rolls
 - vi. gun
 - vii. stick-out
 - viii. speed
6. Describe the procedures and techniques used to deposit a weld bead.
- i. stringer
 - ii. weave
 - iii. stick-out
 - iv. travel speed
 - v. work and travel angles
 - vi. visual inspection

7. Describe the various gases and gas mixtures and describe their applications.
8. Describe weld faults and their causes.
9. Describe the procedures used to test welds.
 - i. destructive
 - ii. non-destructive (visual inspection)

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Setup GMAW equipment.
2. Change electrode wire guide.
3. Adjust and check flow meter.
4. Deposit fillet welds on mild steel, various thickness.

WD1640 GTAW (Gas Tungsten Arc Welding) 1 –Set-Up

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate, set-up equipment, strike and maintain an arc.
- perform visual inspection of welds.

Pre-Requisites: WD1610

Objectives and Content:

1. Define terminology associated with the GTAW process.
2. Describe the GTAW process.
 - i. general precautions
 - ii. equipment and accessories
 - power sources
 - torches
 - flowmeters
 - iii. electrodes
 - iv. current requirement
 - v. shielding gases
 - vi. travel and work angles
 - vii. filler rods
 - viii. joint types and their preparation
 - ix. edge preparations
 - x. weld types
3. Describe the procedures to assemble and disassemble GTAW welding equipment.
4. Describe the procedures used to establish and maintain an arc.
 - i. conventional and pulse arc welding

5. Describe the procedures used to test welds.
 - i. destructive
 - ii. non-destructive (visual inspection)

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Setup GTAW equipment, strike and maintain arc.
2. Change electrode, collet and collet body.
3. Adjust and check flow meter.
4. Run beads on cold rolled steel plate.
5. Shut down equipment.

WD1650 Plasma Arc Cutting and Gouging

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- set-up and operate plasma arc equipment.
- cut and gouge ferrous and non ferrous metal.

Pre-Requisites: WD1610

Objectives and Content:

1. Define terminology associated with the plasma arc process.
2. Describe the plasma arc process.
 - i. general precautions
 - ii. equipment and accessories
 - types of torches
 - electrodes and tips
 - iii. types of arcs
 - iv. gases
 - v. power source
 - vi. procedures to set-up equipment and check its operation
3. Describe the procedures used to assemble and disassemble plasma arc equipment.
4. Describe the procedures used to maintain and troubleshoot plasma arc equipment.
5. Describe the procedures used to cut various thicknesses of ferrous and non-ferrous metals.
 - i. structural shapes
 - ii. plate

- iii. pipe
 - iv. sheet metal
6. Describe the process used to set-up and operate equipment for gouging ferrous and non-ferrous metals.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Setup equipment, check its operation for non-transfer arc and check torch.
2. Cut steel of various thicknesses.
3. Cut stainless steel of various thicknesses.
4. Cut aluminium.
5. Gouge mild steel.

WD1661 Blueprint Reading 1 (Basic)

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate a basic knowledge of blueprints and their purpose.

Pre-Requisites: None

Objectives and Content:

1. Identify the types of orthographic, oblique and isometric drawings and their purposes.
2. Identify the various types of lines used on blueprints and describe their applications.
 - i. centre
 - ii. hidden
 - iii. dimension
 - iv. extension
 - v. object
 - vi. break
 - vii. long
 - viii. short
3. Identify views and describe their purpose.
 - i. front
 - ii. right side
 - iii. left side
 - iv. top (plan)
 - v. bottom
 - vi. back
 - vii. section
 - viii. detailed

4. Identify notes and specifications and describe their purpose.
 - i. parts of objects
 - ii. title block
 - iii. revisions
 - iv. drawing numbers

5. Identify sectioning practices and describe their purpose.
 - i. enlarged
 - ii. isometric
 - iii. auxiliary
 - iv. rotation
 - v. developed view
 - vi. detail

6. Identify and interpret common abbreviations and symbols.
 - i. supplementary symbols
 - ii. outdated and preferred symbols
 - iii. references
 - iv. location of symbols on drawings

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Identify the basic lines.

2. Identify various elements (ie) views notes and specifications, sections, common symbols and abbreviations.

WD1670 Blueprint Reading 2 (Welding Symbols)

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- interpret welding abbreviations and symbols.

Pre-Requisites: WD1661

Objectives and Content:

1. Identify common welding symbols and abbreviations and describe their applications.
 - i. back gouging
 - ii. melt through
 - iii. finishing
 - iv. processes

2. Identify and interpret the symbols for fillet welds.
 - i. pitch
 - ii. dimension
 - iii. shape
 - iv. finishing

3. Identify and interpret the symbols for groove welds.
 - i. preparation
 - depth
 - angle
 - ii. root spacing

4. Identify and interpret the symbols for melt-through welds.
 - i. root spacing
 - ii. preparation angle

- iii. backing
 - iv. fusible inserts
5. Identify and interpret the symbols for plug welds.
- i. dimensions
 - ii. bevel angle
 - iii. filler thickness
 - iv. number
 - v. pitch
 - vi. shape
6. Identify and interpret weld finishing symbols.
- i. grinding
 - ii. machining
 - iii. chipping
 - iv. hammering
 - v. rolling
 - vi. unspecified
7. Identify and interpret pipe welding symbols.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Locate and interpret abbreviations and symbols relevant to the trade
- i. fillet welds
 - ii. groove welds
 - iii. melt through
 - iv. weld finishing
 - v. plug welds

WD1681 Metallurgy, Expansion and Contraction Control

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate understanding of the practices and principles to control expansion, contraction and distortion.

Pre-Requisites: WD1610

Objectives and Content:

1. Define terminology associated with metallurgy.
2. Describe the types and characteristics of metals.
 - i. ferrous
 - ii. low carbon
 - iii. medium carbon
 - iv. high carbon
 - v. alloy steel
 - vi. non-ferrous
3. Describe mechanical and physical properties of metals.
 - i. tensile strength
 - ii. yield strength
 - iii. elasticity
 - iv. ductility
 - v. hardness
 - vi. compressive strength
 - vii. fatigue strength
 - viii. impact strength
 - ix. toughness
 - x. density

- x. melting point
 - xi. thermal conductivity
 - xii. thermal expansion
 - xiii. electrical conductivity and resistance
 - xiv. corrosion resistance
 - xv. brittleness
 - xvi. malleability
 - xvii. plasticity
 - xviii. reaction to heat
 - specific heat
 - heat of fusion
4. Describe the effects on properties of metals when:
- i. forming
 - ii. shearing
 - iii. punching
 - iv. drilling
 - v. cutting
 - vi. welding
5. Describe the effects of stresses and shrinkage on materials.
- i. hard
 - ii. brittle
 - iii. tough
 - iv. ductile
6. Describe common methods to determine the type of material and/or weldability.
- i. spark
 - ii. flame
 - iii. visual
 - iv. chip
 - v. weight
 - vi. magnet

7. Identify pre-heat and post-heat processes and describe their purpose and applications.
 - i. temperature

8. Describe various classification systems used for ferrous metals.
 - i. numbering systems
 - SAE (Society Automotive Engineers)
 - AISI (American Iron and Steel Institute)
 - ASTM (American Society of Testing and Materials)
 - CSA (Canadian Standards Association)
 - ii. colour coding of materials

9. Describe common problems in welding medium and high carbon steel.

10. Describe expansion and contraction of metals.
 - i. heating compared with cooling

11. Describe stresses resulting from.
 - i. welding
 - ii. flame cutting
 - iii. shearing
 - iv. unsatisfactory preparation for welding
 - v. forming
 - vi. rivetting

12. Describe control of shrinkage in weldments.
 - i. welding sequence
 - back step
 - staggered intermittent
 - chain intermittent
 - ii. weld size and number of passes
 - iii. balancing of shrinkage and other forces
 - iv. pre-heat and post-heat requirements

13. Describe stress relief.

- i. purpose
- ii. methods
 - heating
 - peening
 - aging
- iii. requirements

14. Describe controlled shrinkage for:

- i. straightening of bent or distorted members
- ii. alignment of sub-assemblies
- iii. pre-bending
- iv. removal of corroded or seized parts

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Identify metals using the spark test.
2. Shape, grind and heat treat chisels.
3. Observe tensile, ductility, hardness, tests.
4. Demonstrate expansion and contraction.
5. Pre-set heated metal.
6. Use presetting to straighten bent members.
7. Perform pre-bending.

WD1690 Quality Control

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of quality control.
- demonstrate knowledge of non-destructive tests.

Pre-Requisites: WD1610

Objectives and Content:

1. Explain the purpose and scope of quality control.
2. Describe the methods used to identify and verify materials.
 - i. standards and specifications
 - ii. mill certificates
3. Describe standards and specifications applicable in the trade.
 - i. templates and/or gauges
 - ii. drawing (compliance with)
4. Describe the procedures used to ascertain compliance with design and code specifications.
5. Describe the methods of inspection and testing of structural materials and welds and their associated procedures.
 - i. non-destructive
 - visual
 - radiography
 - magnetic particle
 - ultrasonic
 - dye penetrant test

- leak test
 - pneumatic test (air and soap, inert gas)
 - hydrostatic test (water pressure)
- ii. paint thickness

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Perform visual inspection of welds.
2. Inspect and test structural material and weld.
 - i. inspect items and note irregularities (visual inspection)
 - ii. bend specimen and determine ductility and soundness
 - iii. perform etch test
 - iv. visual inspect radiographic film for irregularities
 - v. use magnetic particle test
 - vi. perform dye penetrant test
 - vii. perform leak test on small vessels
 - air and soap (pneumatic)
 - water pressure (hydrostatic)
3. Identify inspection and test methods for paint thickness.

WD1700 Stationary Powered Shearing

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of powered shearing equipment and its applications.

Pre-Requisites: None

Objectives and Content:

1. Identify types of powered shearing equipment and describe their characteristics and applications.
2. Describe the operation of shearing equipment.
 - i. capacity
 - ii. rake angle
 - iii. blade clearance
 - iv. back gauge calibration
 - v. lateral guide squaring
 - vi. operating procedures
 - vii. preventative maintenance

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Determine capacity of shears.
2. Setup and operate guillotine plate shears.

WD1711 Iron Worker Operation

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- operate iron worker equipment for punching and shearing of structural shapes, plate and sheet sections.
- perform preventative maintenance.

Pre-Requisites: TS1510; WD1165

Objectives and Content:

1. Describe the purpose of the iron worker and its accessories.
 - i. punching
 - ii. shearing
 - iii. notching
 - iv. coping
 - v. bending
2. Describe coping and notching.
 - i. blade clearance
 - ii. capacity
3. Describe shearing.
 - i. blades
 - ii. blade clearance
 - iii. capacity
4. Describe angular and square cuts of angle stock.
 - i. capacity
 - ii. back gauge clearance

5. Describe punching.
 - i. die clearance
 - ii. round
 - iii. oblong
 - iv. square

6. Describe bending.
 - i. die selection
 - ii. capacity

7. Describe preventative maintenance procedures.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Demonstrate notching.
2. Demonstrate punching.
3. Demonstrate shearing.

WD1720 Jigs And Fixture Fabrication

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of jig and fixture fabrication and applications.

Pre-Requisites: WD1730

Objectives and Content:

1. Identify common types of jigs and fixtures and describe their purpose and applications.
2. Describe common methods used to fabricate jigs and fixtures.
 - i. design considerations
 - ii. fabrication practices

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Fabricate jigs and fixtures.
 - i. setup multi-punch operation
 - ii. fabricate jig to allow multi-drilling
 - iii. setup jig to allow for shearing
 - iv. fabricate jig to accommodate truss assembly for welding
 - v. fabricate jig to accommodate ladder assembly

WD1730 Fabrication Fundamentals

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- prepare joints on structural shapes to industry standards.
- fabricate using various structural shapes.

Pre-Requisites: WD1661

Objectives and Content:

1. Identify the various types of structural steel shapes and describe the procedures used to determine their dimensions.
 - i. S-beam (standard)
 - ii. WF-beam (wide flanged beam)
 - iii. angle iron
 - iv. channel
 - v. I-beam
 - vi. pipe and tubing
2. Identify the methods used to prepare joints on structural steel shapes to industry standards.
3. Describe the procedures used to work accurately from shop drawings or sketches.
 - i. read shop drawings
 - ii. verify dimensions
 - iii. cut parts as per shop drawings
4. Describe the procedures used to fabricate using various structural shapes.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only

WD1740 FCAW (Flux-Cored Arc Welding) 1

– Set-Up and Deposit AWeld

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- set-up and adjust FCAW equipment.

Pre-Requisites: WD1630

Objectives and Content:

1. Define terminology associated with the FCAW process.
2. Describe the FCAW process.
 - i. general precautions
 - ii. equipment and accessories
 - shielding gas and regulators
 - electrode wire
 - flux cored
 - metal cored
 - gun
 - feeder
 - power source
 - nozzle
 - cable connections
 - cables
 - iii. metal transfers
 - iv. polarity
 - v. arc voltage
 - vi. slope and adjustment
 - vii. inductance
 - viii. travel speed

- ix. wire feed speed
 - x. penetration
 - xi. travel and work angles
 - xii. manipulation
 - xiii. guide tubes
 - xiv. contact tips
 - xv. liners
3. Describe the assembly and disassembly of welding equipment used in the FCAW process.
 4. Describe troubleshooting and maintenance procedures for FCAW equipment.
 5. Describe the procedures used to deposit a satisfactory weld.
 - i. starting and stopping the weld
 - ii. filler metal
 - iii. adjustment
 - iv. shielded gases (pre and post weld)
 - v. drive rolls
 - vi. gun
 - vii. stick-out
 - viii. speed

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Set-up FCAW equipment and adjust flow meter, if necessary.

Identify electrode wire and equipment components.

WD1801 SMAW (Shielded Metal Arc Welding) 3 – Groove Weld 1G, 2G, 1GF, 2GF, 3GF and 4GF

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- groove weld on mild steel using the SMAW process with F-3 and F-4 electrodes.
- perform weld tests.

Pre-Requisites: WD1610

Objectives and Content:

1. Identify and describe the weld positions.
 - i. 1-G
 - ii. 2-G
 - iii. 1GF
 - iv. 2GF
 - v. 3GF
 - vi. 4GF

2. Describe the procedures used to perform groove welds in the 1G, 2G, 1GF, 2GF, 3GF, and 4GF positions.
 - i. joint design
 - ii. inspection and testing
 - iii. electrode angles
 - iv. electrode manipulation
 - v. amperage adjustment
 - vi. identify position and limitations
 - vii. identify material
 - viii. determine thickness of material
 - ix. select electrode

- x. select current
 - xi. penetration
3. Describe the procedures used to test welds.
 - i. codes and standards
 4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld groove butt joints on 3/8" mild steel plate in 1G, 2G, 1GF, 2GF, 3GF, and 4GF positions using F3 and F4 electrodes.
2. Perform weld tests.

WD1810 SMAW (Shielded Metal Arc Welding) 4

–Fillet and Groove Weld Medium and High Carbon Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- Describe the process to weld on medium and high-carbon steel in all positions using the SMAW process.

Pre-Requisites: WD1681

Objectives and Content:

1. Describe the SMAW process as it applies to welding medium and high-carbon steel.
 - i. general precautions
 - ii. characteristics of materials
 - iii. weldability of materials
 - iv. welding procedures
2. Describe the procedures used to test welds.
3. Describe weld faults with medium and high carbon steel.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

Theory only.

WD1820 GMAW (Gas Metal Arc Welding) 2 – Fillet Weld All Positions, Mild Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- fillet weld on mild steel in all positions using the GMAW process.

Pre-Requisites: WD1630

Objectives and Content:

1. Describe the purpose, applications and advantages of GMAW.
2. Describe the GMAW process used to fillet weld in all positions.
 - i. conventional and pulse
 - ii. identification of position
 - iii. modes of transfer
 - short circuiting
 - globular
 - spray
 - pulse spray
 - iv. shielding gas selection
 - v. filler metals
 - vi. troubleshooting
 - vii. work and travel angles
 - viii. gun manipulation
3. Describe the procedures used to test welds.
4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Perform fillet welds on mild steel plate using the GMAW process.

WD1831 GMAW (Gas Metal Arc Welding) 3
– Groove Welds 1G, 2G, and 3G Down, Mild Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- groove weld on mild steel in all positions using the GMAW process.

Pre-Requisites: WD1630

Objectives and Content:

1. Describe the GMAW process used to groove weld mild steel in flat, horizontal, and vertical downs.
 - i. conventional and pulse
 - ii. identification of position
 - iii. modes of transfer
 - iv. welding variables and characteristics
 - v. shielding gas selection
 - vi. filler metals
 - vii. troubleshooting
 - viii. work and travel angles
 - ix. gun manipulation
 - x. joint design and fit-up
2. Describe the procedures used to test welds.
3. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Perform groove welds in flat, horizontal, and vertical down positions on mild steel plate using the GMAW process.

WD1840 GTAW (Gas Tungsten Arc Welding) 2

– Fillet Weld All Positions, Mild Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- fillet weld on mild steel in all positions using the GTAW process.

Pre-Requisites: WD1640

Objectives and Content:

1. Describe the purpose, applications and advantages of GTAW.
2. Describe the process used to fillet weld in all positions.
 - i. preparation
 - current requirements
 - ii. electrode selection
 - type
 - size and preparation
 - iii. cup sizes
 - iv. gas lens (diffusers)
 - v. shielding gas
 - vi. filler metal
 - vii. manipulation
 - filler metal
 - torch
3. Describe the procedures used to test welds.
4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Perform fillet welds on mild steel in all positions using the GTAW process.

WD1870 Build Up of Metal Parts

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- build up metal parts of various shapes.
- apply hard surfacing treatments to protect against wear and impact.

Pre-Requisites: WD1610

Objectives and Content:

1. Identify applications and purpose for building up metal parts.
 - i. shafts
 - ii. buckets

2. Describe the procedures used to build up metal parts.
 - i. determine type of metal wear
 - ii. determine effects of heating and cooling
 - iii. select process
 - SMAW
 - GMAW
 - FCAW
 - SAW
 - iv. select filler metals
 - v. welding procedures
 - sequence

3. Describe the principles of hard surfacing and describe their applications and procedures for use.
 - i. processes used
 - FCAW

- SMAW
- OFW (Oxy Fuel Welding)
- GMAW
- SAW
- ii. types of wear
 - abrasion
 - impact
 - corrosion
- iii. surfacing materials
- iv. welding procedures
 - set-up equipment and prepare project
 - select surfacing material
 - apply surfacing

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Build up a shaft ready for reconditioning.
2. Build up a part with a piece missing to its original shape.
3. Build up a component with an abrasion and resistant hard surfacing.

WD1881 Fusion, Brazing and Braze Welding (Oxy- Fuel)

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- silver brazing (copper pipe in all positions.
- fusion weld steel in the flat and horizontal positions.
- braze weld.

Pre-Requisites: WD1601

Objectives and Content:

1. Describe the purpose, applications and advantages of fusion, brazing and braze welding.
2. Describe the procedures necessary to fusion weld in flat and horizontal positions.
3. Describe the procedures used to braze (silver solder).
 - i. copper pipe
 - ii. cold roll (mild steel)
 - iii. stainless steel
 - iv. ferrous to non-ferrous metal
4. Describe the procedures necessary to braze with sil-fos and easyflow.
5. Describe the procedures used to braze weld.
 - i. steel
 - ii. cast iron

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Fusion welding.

- i. closed corner
- ii. open corner
- iii. horizontal lap joint
- iv. square butt joint

2. Bronze welding.

- i. tinning
- ii. horizontal lap joint
- iii. square butt joint

3. Silver brazing.

- i. copper/steel tee joint
- ii. copper tee and tubing
- iii. braze copper to copper (silfos).
- iv. braze stainless steel to stainless steel (easy flow).

4. Braze weld cast iron and mild steel.

WD1891 FCAW (Flux-Cored Arc Welding) 2 – Fillet and Groove Weld Plate 1G, 2G, 1GF, and 2GF

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- deposit a weld in 1G, 2G, 1GF, and 2GF positions using flux cored wire.
- identify various gases and gas mixtures.

Pre-Requisites: WD1740

Objectives and Content:

1. Describe the procedures and techniques used to deposit a weld bead.
 - i. stringer
 - ii. weave
 - iii. stick-out
 - iv. travel speed
 - v. work and travel angles
 - vi. visual inspection
2. Describe the procedures used to weld plate in 1G, 2G, 1GF, and 2GF positions using flux cored wire.
 - i. quality of welds
 - ii. faults
 - iii. travel angles
 - iv. manipulation
3. Describe the various gases and gas mixtures and describe their applications.
4. Describe weld faults and their causes.

5. Describe the procedures used to test welds.
 - i. destructive
 - ii. non-destructive (visual inspection)

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Deposit fillet welds in 1G, 2G, 1GF, and 2GF positions.
2. Deposit groove welds in 1G, 2G, 1GF, and 2GF positions.

WD1900 Air Carbon Arc Cutting and Gouging

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- remove a weld from a joint using the air carbon arc (CAC-A) process.
- prepare joints using the air carbon arc (CAC-A) process.

Pre-Requisites: WD1601

Objectives and Content:

1. Describe the purposes and applications of air carbon arc cutting and gouging.
2. Describe the procedures used to remove a weld from a joint using the CAC-A (Air Carbon Arc) process.
 - i. types of carbon electrodes
 - ii. air pressure
 - iii. electrode angles
 - iv. polarity
 - v. constant current power source
3. Describe groove preparation using the CAC-A process.
 - i. U-joint
 - ii. J-joint
 - iii. single-vee
 - iv. single-bevel joints
4. Describe the procedures used to back gouge a welded joint.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Setup equipment for gouging, select the correct air pressure, carbon electrode and polarity.
2. Back gouge to sound metal a single vee groove butt joint.

WD1910 Layout and Template Development Fundamentals

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- develop templates for structural fabrications.
- develop wrap around templates for use in welded fabrication of joints in pipe and tubing.

Pre-Requisites: WD1661

Objectives and Content:

1. Describe the purpose and applications of templates.
2. Define terminology associated with layout and template development.
3. Describe methods used to establish line of cut using template.
4. Describe layout tools and procedures.
5. Describe procedures used in shape development with appropriate bending and joining allowances.
6. Describe template development using triangular, radial lines, and parallel lines.
7. Describe layout operations used to develop templates for structural fabrications for:
 - i. compound beams
 - ii. plate girders
 - iii. tubular hollow sections
 - iv. box section members

- v. beam selections
 - vi. stairs and handrails
8. Describe layout operations as required to develop wrap around templates for use in welded fabrication of joints in pipe and tubing for:
- i. a single cut elbow
 - ii. a 90° double cut elbow
 - iii. a tee
 - iv. a 30° lateral
 - v. a true "Y"
 - vi. a concentric reducer
 - vii. an eccentric reducer

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Develop shapes with appropriate bending and joining allowances.
2. Develop templates using triangular, radial lines and parallel line development.
3. Complete layout operations to develop templates for structural fabrication.
4. Complete layout operations required to develop wrap around templates, for use in welded fabrication of joints in pipe and tubing.

AP1100 Introduction to Apprenticeship

Description:

This course is designed to give participants the knowledge base and skills necessary to understand and successfully navigate the apprenticeship/red seal program.

Pre-Requisites: None

Course Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- Identify the requirements for registering in an Apprenticeship Program.
- Describe the registration process.
- Explain the steps to complete the Apprenticeship Program.
- Articulate the roles of the Apprentice, Journeyperson, Training Institutions, Industry and Governing Bodies in the Apprentice Program.
- Explain the significance of the Red Seal Program.

Objective and Content:

1. Define Apprenticeship.
 - i. define Apprenticeship and Red Seal Certification
 - ii. discuss the definition of Apprenticeship and Red Seal Certification
 - iii. distinguish between Red Seal and Provincial Certification
2. Explore how Apprenticeship is governed and administered
 - i. explain who is responsible for administrating apprenticeship
 - Department of Education
 - Provincial Apprenticeship and Certification Board
3. Explore the roles and responsibilities of those involved in the apprenticeship process.

- i. Apprentice
 - ii. Employer/Journey person
 - iii. Industrial Training Division
 - explain when and where to take the in-class portion of advance training
 - discuss Class Calls
 - iv. Training Institutions
 - Various Delivery Methods
 - v. Provincial Apprenticeship and Certification Board
4. List and explain the steps in the apprenticeship process.
- i. explain the Registration Process
 - ii. describe apprenticeship as an agreement between employee, employer and Provincial Government
 - iii. review a Memorandum of Understanding
 - iv. legal document
 - v. review an Application of Apprenticeship
 - original High School Certificate or equivalent
 - original transcript from the applicants Training Institution
 - vi. describe the roles of Institutional and Industrial Education Division of the Department of Education in Apprenticeship
 - vii. explain the role of the Program Development Officer
 - define probation period
 - discusses what constitutes a cancellation of apprenticeship
 - explain the consequences of an Apprenticeship cancellation
 - discuss the purpose of the Record of Occupational Progress (Log Book)
 - explore how to maintain your log book
 - discuss who is responsible for tracking and signing-off on trade skills
 - explain how and where to record hours worked
 - identify the importance of updating your file with your Program Development Officer
 - viii. differentiate between Provincial and Interprovincial exams

5. Describe the training and education requirements.
 - i. discuss the factors affecting on-the-job and in class portions of your training
 - ii. define in school and on the job training
 - review a Plan of Training
 - identify the percentage of on-the-job and in class training time
 - current labour market implications on completing an apprenticeship program

6. Explain Plans of Training.
 - i. identify what is included in the Plan of Training
 - entrance requirements
 - duration of in-school and on-the-job training
 - course content
 - entry level or advanced level
 - ii. explain how a Journeyperson Certificate is achieved
 - discuss Certificate of Qualification
 - discuss Certificate of Apprenticeship
 - discuss Red Seal endorsement

7. Discuss the Red Seal Program.
 - i. define designated trade
 - ii. explore the National Occupational Analysis for your trade
 - iii. explain Interprovincial Standards Red Seal Program and how it works
 - labor mobility
 - qualification recognition
 - iv. discuss the range of careers possible in your chosen trade

8. Explain apprenticeship progression schedule and wage rates.
 - i. review a Record of Occupational Progress (Log Book)
 - ii. hours per program
 - iii. requirements for progression
 - iv. wage rates per year of apprenticeship

9. Identify the examinations and evaluation process used in Apprenticeship.
 - i. discuss occupational tests and examinations as directed by the Provincial Apprenticeship and Certification Board
 - Theory
 - Practical
 - ii. explain formal assessment and the pass mark of 70%

10. Examine some of the financial incentives available to apprentices.
 - i. employment insurance (E.I.) Benefits
 - ii. government sponsored student loans
 - iii. apprenticeship incentive Federal and Provincial scholarships

11. Continuing Training outside the Province of Newfoundland and Labrador.
 - i. training in other provinces and territories
 - procedure for registration and recognition of hours and skills in other provinces
 - ii. options for Dual Certification
 - transfer of credits

12. Review and define the following terms:
 - i. Apprenticeship Program Accreditation
 - ii. Cancellation of Apprenticeship
 - iii. Certificate of Apprenticeship
 - iv. Certificate of Qualification
 - v. Certification Renewal
 - vi. Criteria for Eligibility
 - vii. Journeyperson
 - viii. Practical Examination
 - ix. Prior Learning
 - x. Record of Occupational Progress (Logbook)
 - xi. Red Seal Certification
 - xii. Registered Apprentice
 - xiii. Theoretical Examination
 - xiv. National Occupational Analysis (NOA)

- xv. Class Call
- xvi. Dual certification

Practical:

1. Review the Provincial Apprenticeship web site: www.gov.nl.ca/app
 - i. identify the requirements for registering as an apprentice and the registration process
 - ii. explain the steps to complete an apprenticeship program
 - iii. identify who is responsible for tracking and signing-off on trade skills
 - iv. identify the nearest Industrial Training Office to your community
 - v. identify the current incentives available to apprentices
2. Review a plan of training on the Provincial Apprenticeship web site.
 - i. identify the hours for your trade (in-school and on-the-job)
 - ii. explain the roles and responsibilities of the following stakeholders in the apprenticeship process: employer, apprentice, training institution and the Industrial Training Division
3. Visit the Red Seal Web site <http://www.red-seal.ca>, review the National Occupational Analyses for your trade.
 - i. review the scope of work for your occupation and identify the industry sectors and job types requiring your trade
 - ii. identify the trends of your trade
 - iii. provide a list of Personal Protective Equipment required for your trade

MA1060 Basic Math

Description:

This course in Basic Math requires knowledge of general mathematical concepts and processes to enable trades persons to function in the institutional setting by developing numeracy skills required for technical courses. This math course should also provide a foundation for experiential learning through knowledge of math relating to on-the-job skills and practices. A detailed course outline is available from Institutional and Industrial Education, Standards and Curriculum Division to training institutions upon request.

Course Outcomes:

- To develop numeracy skills and knowledge required for institutional and on-the-job learning.
- To develop the capability to apply mathematical concepts in the performance of trade practices.
- To develop an appreciation for mathematics as a critical element of the learning environment.
- To use mathematical principles accurately for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

Pre-Requisites: None

Course Objectives (Knowledge):

1. Define and calculate using whole number operations.
2. Define and demonstrate use of correct orders of operations.

3. Demonstrate examples of operations with fractions and mixed numbers.
4. Demonstrate examples of operations with decimals.
5. Demonstrate examples of operations with percentages.
6. Employ percent/decimal/fraction conversion and comparison.
7. Define and calculate with ratios and proportions.
8. Use the Imperial Measurement system in relevant trade applications.
9. Use the Metric Measurement system in relevant trade applications.
10. Perform Imperial/Metric conversions.
11. Define and demonstrate the formulation of variables.
12. Demonstrate and define the various properties of angles and make relevant calculations.

Major Tasks/Sub-tasks (Skills):

Note: To emphasize or further develop specific knowledge objectives, students may be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

CM2150 Workplace Communications

Description:

This course is designed to introduce students to the principles of effective communication including letters, memos, short report writing, oral presentations and interpersonal communications.

Course Outcomes:

Upon completion of the course, students will be able to:

- Understand and apply communication skills as outlined in the Employability Skills 2000, Conference Board of Canada.
- Understand the importance of well-developed writing skills in business and in career development.
- Understand the purpose of the various types of business correspondence.
- Examine the principles of effective business writing.
- Examine the standard formats for letters and memos.
- Write effective letters and memos.
- Examine the fundamentals of informal reports and the report writing procedure.
- Produce and orally present an informal report.
- Examine effective listening skills and body language in communication.

Pre-Requisites: None

Objectives and Content:

1. Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.
2. Explain the rules of subject-verb agreement.

3. Define and describe the major characteristics of an effective paragraph.
4. Examine the value of Business Writing Skills.
 - i. describe the importance of effective writing skills in business
 - ii. describe the value of well-developed writing skills to career success as referenced in the Employability Skills
5. Examine principles of Effective Business Writing.
 - i. discuss the rationale and techniques for fostering goodwill in business communication, regardless of the circumstances
 - ii. review the importance of revising and proofreading
 - iii. differentiate between letter and memo applications in the workplace & review samples
 - iv. identify the parts of a business letter and memo
 - v. review the standard formats for business letters and memos
 - vi. examine samples of well-written and poorly written letters and memos
 - vii. examine guidelines for writing sample letters and memos which convey: acknowledgment, routine request, routine response, complaint, refusal persuasive request and letters of appeal
6. Examine the fundamentals of Informal Business Reports.
 - i. identify the purpose of the informal report
 - ii. identify the parts and formats of an informal report
 - iii. identify methods of information gathering
 - iv. describe the methods of referencing documents
 - v. review the importance of proof reading and editing
7. Examine types of presentations.
 - i. review & discuss components of an effective presentation
 - ii. review & discuss delivery techniques
 - iii. review & discuss preparation & use of audio/visual aids
 - iv. discuss & participate in confidence building exercises used to prepare for giving presentations

8. Interpersonal Communications.
 - i. Examine and apply listening techniques
 - ii. Discuss the importance of body language

Practical:

1. Write well-developed, coherent, unified paragraphs which illustrate the following: a variety of sentence arrangements; conciseness and clarity; and adherence to correct and appropriate sentence structure, grammar, punctuation, and mechanics.
2. Write sample letters and memos which convey: acknowledgment, routine request, routine response, complaint, refusal, persuasive request and letters of appeal.
3. Gather pertinent information, organize information into an appropriate outline & write an informal report with documented resources.
 - i. edit, proofread, and revise the draft to create an effective informal report and present orally using visual aids
 - ii. participate in confidence building exercises
4. Present an effective presentation.
5. Evaluate presentations.

MR1220 Customer Service

Description:

This course focuses on the role of providing quality customer service. It is important to have a positive attitude and the necessary skills to effectively listen and interpret customer concerns about a product, resolve customer problems, and determine customer wants and needs. Students will be able to use the skills and knowledge gained in this course to effectively provide a consistently high level of service to the customer.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Define customer service.
- Explain why service is important.
- Describe the relationship between “service” and “sales.”
- Demonstrate an understanding of the importance of a positive attitude.
- Demonstrate methods of resolving customer complaints.

Pre-Requisites: None

Objectives and Content:

1. Define quality service.
 - i. identify and discuss elements of customer service.
 - ii. explain the difference between service vs. sales or selling
 - iii. explain why quality service is important
 - iv. identify the various types of customers & challenges they may present
 - v. describe customer loyalty
 - vi. examine barriers to quality customer service

2. Explain how to determine customer wants and needs.
 - i. identify customer needs
 - ii. explain the difference between customer wants and needs
 - iii. identify ways to ensure repeat business

3. Demonstrate an understanding of the importance of having a positive attitude.
 - i. identify & discuss the characteristics of a positive attitude
 - ii. explain why it is important to have a positive attitude
 - iii. explain how a positive attitude can improve a customer's satisfaction
 - iv. define perception and explain how perception can alter us and customers
 - v. describe methods of dealing with perception

4. Communicating effectively with customers.
 - i. describe the main elements in the communication process
 - ii. identify some barriers to effective communication
 - iii. explain why body language is important
 - iv. define active listening and state why it is important
 - v. identify and discuss the steps of the listening process
 - vi. identify and discuss questioning techniques

5. Demonstrate using the telephone effectively.
 - i. explain why telephone skills are important
 - ii. describe the qualities of a professional telephone interaction

6. Demonstrate an understanding of the importance of asserting oneself.
 - i. define assertiveness
 - ii. discuss assertive techniques
 - iii. explain the use of assertiveness when dealing with multiple customers

7. Demonstrate techniques for interacting with challenging customers in addressing complaints & resolving conflict.
 - i. examine & discuss ways to control feelings
 - ii. examine & discuss ways to interact with an upset customer
 - iii. examine & discuss ways to resolve conflict/customer criticism
 - iv. examine & discuss ways to prevent unnecessary conflict with customers

Practical:

1. Participate in activities to demonstrate knowledge of the course objectives.

SP2330 Quality Assurance/Quality Control

Description:

This course is designed to give students an understanding of the concepts and requirements of QA/QC such as, interpreting standards, controlling the acceptance of raw materials, controlling quality variables and documenting the process. It includes information on quality concepts, codes and standards, documentation, communications, human resources, company structure and policy, teamwork and responsibilities.

Course Outcomes:

Upon completion of this course, students will be able to:

- Develop the skills and knowledge required to apply quality assurance/quality control procedures as related to the trade.
- Develop an awareness of quality principles and processes.
- Apply quality assurance/quality control procedures in a shop project.

Pre-Requisites: None

Objectives & Content:

1. Describe the reasons for quality assurance and quality plans.
2. Explain the relationship between quality assurance and quality control.
3. Describe quality control procedures as applied to the production and checking of specifications and processes in applicable occupations.
4. Describe quality control procedures as applied to the acceptance and checking of raw materials.

5. Explain the role of communications in a quality environment.
6. Explain why it is important for all employees to understand the structure of the company and its production processes. Explain how human resource effectiveness is maximized in a quality managed organization.
7. Explain the role of company policy in quality management.
8. Explain the purpose of codes and standards in various occupations.
9. Explain the concepts of quality.
 - i. cost of quality
 - ii. measurement of quality
 - iii. elements of quality
 - iv. elements of the quality audit
 - v. quality standards
 - vi. role expectations and responsibilities
10. Explain the structure of quality assurance and quality control.
 - i. describe organizational charts
 - ii. identify the elements of quality assurance system such as ISO, CSA,
 - iii. WHMIS, Sanitation Safety Code (SSC)
 - iv. explain the purpose of the quality assurance manual
 - v. describe quality assurance procedures
11. Examine quality assurance/quality control documentation.
 - i. describe methods of recording reports in industry
 - ii. describe procedures of traceability (manual and computer-based recording)
 - iii. identify needs for quality control procedures

Practical:

1. Apply quality control to a project.
 - i. follow QA/QC procedures for drawings, plans and specifications in applicable occupations
 - ii. calibrate measuring instruments and devices in applicable occupations

- iii. interpret required standards
- iv. follow QA/QC procedures for accepting raw materials
- v. carry out the project
- vi. control the quality elements (variables)
- vii. complete QA/QC reports

MC1050 Introduction to Computers

Description:

This course is designed to give the student an introduction to computer systems. Particular emphasis is given to word processing, spreadsheet, e-mail and the Internet and security issues.

Course Outcomes:

Upon completion of this course, students will have a basic understanding of:

- Computer systems and their operation.
- Popular software packages, their applications.
- Security issues of computers.

Pre-Requisites: None

Objectives & Content:

1. Identify the major components of microcomputer system hardware and software system.
2. Describe the functions of the microprocessor.
 - i. describe and give examples of I/O devices
 - ii. describe primary storage (RAM, ROM, Cache)
 - iii. define bit, byte, code and the prefixes k.m. and g
 - iv. describe secondary storage (diskettes and hard disks, CD ROMS, Zip drives, etc)
 - v. describe how to care for a computer and its accessories
3. Describe microcomputer software.
 - i. define software
 - ii. describe types of operational and application software
 - iii. define file and give the rules for filenames and file extensions

4. Describe windows software.
 - i. start and quit a program
 - ii. demonstrate how to use the help function
 - iii. locate a specific file using the find function
 - iv. identify system settings: wall paper, screen saver, screen resolution, background
 - v. start a program by using the Run Command
 - vi. shutting down your computer

5. Identify File Management commands.
 - i. create folders
 - ii. maximize and minimize a window
 - iii. describe windows task bar

6. Describe Keyboards.
 - i. identify and locate alphabetic and numeric keys
 - ii. identify and locate function key & special keys

7. Describe Word Processing.
 - i. describe Windows components
 - ii. menu bar
 - iii. menu indicators
 - iv. document window
 - v. the Status bar
 - vi. the Help feature
 - vii. insertion point movements

8. Describe the procedure used to development of a document.
 - i. enter text
 - ii. change the display

9. Describe the procedure for opening, saving and exiting documents.
 - i. saving a document
 - ii. closing a document.
 - iii. starting a new document Window
 - iv. opening a document
 - v. exiting word processor

10. Describe the procedure for editing a Document.
 - i. adding new text
 - ii. deleting text
 - iii. using basic format enhancement (split and join paragraphs, insert text)

11. Describe the main Select Features.
 - i. identify a selection
 - ii. moving a selection
 - iii. copying a selection
 - iv. deleting a selection
 - v. saving a selection

12. Explain how to change Layout Format.
 - i. changing layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)

13. Explain how to change Text Attributes.
 - i. changing text attributes: (bold, underline, font, etc.)

14. Describe the Auxiliary Tools.
 - i. using Spell Check & Thesaurus

15. Describe Print features.
 - i. selecting the Print Feature: (i.e; number of copies and current document)
 - ii. identifying various options in print screen dialogue box

16. Examine & Discuss Electronic Spreadsheet.
 - i. spreadsheet basics
 - ii. the worksheet window

17. Describe Menus.
 - i. menu bar
 - ii. control menu
 - iii. shortcut menu
 - iv. save, retrieve form menus

18. Describe the components of a worksheet.
 - i. entering constant values and formulas
 - ii. using the Recalculation feature

19. Describe Use ranges. .
 - i. typing a range for a function
 - ii. pointing to a range for a function
 - iii. selecting a range for toolbar and menu commands

20. Describe how to print a worksheet.
 - i. printing to the Screen
 - ii. printing to the Printer
 - iii. printing a selected Range

21. Describe how to edit a worksheet.
 - i. replacing cell contents
 - ii. inserting & deleting rows and columns
 - iii. changing cell formats
 - iv. changing cell alignments
 - v. changing column width
 - vi. copying and moving cells

22. State major security issues in using computers.
 - i. passwords
 - ii. accessing accounts
 - iii. viruses and how they can be avoided
 - iv. identity theft and ways to protect personal information

 - v. demonstrate how to view directory structure and folder content
 - vi. organize files and folders
 - vii. copy, delete, and move files and folders

23. Describe how to use Electronic Mail.
 - i. e-mail etiquette
 - ii. e-mail accounts
 - iii. e-mail messages
 - iv. e-mail message with attachments

- v. e-mail attachments
 - vi. print e-mail messages
 - vii. deleting e-mail messages
24. Explain the Internet and its uses.
- i. the World Wide Web(www)
 - ii. accessing Web sites
 - iii. internet Web Browsers
 - iv. internet Search Engines
 - v. searching Techniques
 - vi. posting documents on-line

Practical:

1. Create a document using Word Processing.
2. Complete word processing exercises to demonstrate proficiency in word processing.
3. Prepare and send e-mails with attachments.
4. Retrieve documents and e-mail attachments and print copies.
5. Develop & print a spread sheet.
6. Post a document on-line.

SD1700 Workplace Skills

Description:

This course involves participating in meetings, information on formal meetings, unions, workers' compensation, employment insurance regulations, workers' rights and human rights.

Course Outcomes:

Upon completion of this course, students will be able to:

- Participate in meetings.
- Define and discuss basic concepts of:
 - unions
 - workers' compensation
 - employment insurance
 - workers' rights
 - human rights
 - workplace diversity
 - gender sensitivity

Pre-Requisites: None

Objectives & Content:

1. Meetings.
 - i. identify & discuss meeting format and preparation required for a meeting
 - ii. explain the purpose of an agenda
 - iii. explain the roles and responsibilities of meeting participants
 - iv. explain the purpose of motions and amendments and withdrawals
 - v. explain the procedure to delay discussion of motions
 - vi. explain the voting process

2. Unions.

- i. state why unions exist
- ii. give a concise description of the history of Canadian labour
- iii. explain how unions function
- iv. explain labour's structure
- v. describe labour's social objectives
- vi. describe the relationship between Canadian labour and the workers
- vii. describe the involvement of women in unions

3. Worker's Compensation.

- i. describe the aims, objectives, benefits and regulations of the Workplace Health, Safety and Compensation Commission
- ii. explain the internal review process

4. Employment Insurance.

- i. explain employment insurance regulations
- ii. describe how to apply for employment insurance
- iii. explain the appeal process identify the components of a letter of appeal

5. Worker's Rights.

- i. define labour standards
- ii. explain the purpose of the Labour Standards Act
- iii. identify regulations pertaining to:
 - hours of work
 - minimum wages
 - employment of children vacation pay
- iv. explain the purpose of the Occupational Health & Safety Act as it refers to workers' rights

6. Human Rights.

- i. describe what information cannot be included on an employment application
- ii. describe what information cannot be included in an interview
- iii. examine the Human Rights Code and explain the role of the Human Rights Commission
- iv. define harassment in various forms and identify strategies for prevention

7. Workplace Diversity.

- i. define and explore basic concepts and terms related to workplace inclusively including age, race, culture, religion, socio-economic, sexual orientation with an emphasis on gender issues and gender stereotyping

8. Gender Sensitivity.

- i. explore gender and stereotyping issues in the workplace by identifying strategies for eliminating gender bias

Practical:

1. Prepare an agenda.
2. Participate in a meeting.
3. Analyze a documented case of a human rights complaint with special emphasis on the application, time frame, documentation needed, and legal advice available.

SD1710 Job Search Techniques

Description:

This course is designed to give students an introduction to the critical elements of effective job search techniques.

Course Outcomes:

Upon completion of this course, students will be able to:

- Demonstrate effective use of job search techniques.

Pre-Requisites: None

Objectives & Content:

1. Identify and examine employment trends and opportunities.
2. Identify sources that can lead to employment.
3. Access and review information on the Newfoundland and Labrador Apprenticeship and Certification Web site and the Apprenticeship Employment Gateway.
4. Analyze job ads and discuss the importance of fitting qualifications to job requirements.
5. Identify and discuss employability skills as outlined by the Conference Board of Canada.
6. Discuss the necessity of fully completing application forms.
7. Establish the aim/purpose of a resume.

8. Explore characteristics of effective resumes, types of resumes, and principles of resume format.
9. Explore characteristics of an effective cover letter.
10. Identify commonly asked questions in an interview.
11. Explore other employment related correspondence.
12. Explore the job market to identify employability skills expected by an employer.
13. Conduct a self-analysis and compare with general employer expectations.
14. Discuss the value of establishing and maintaining a portfolio.

Practical:

1. Complete sample application forms.
2. Write a resume.
3. Write an effective cover letter.
4. Establish a portfolio.
5. Write out answers to commonly asked questions asked during interviews.
6. Identify three potential employers from the Apprenticeship Employment gateway, Apprenticeship and Certification website.

SD1720 Entrepreneurial Awareness

Description:

This course is designed to introduce the student to the field of entrepreneurship, including the characteristics of the entrepreneur, the pros and cons of self-employment, and some of the steps involved in starting your own business.

Course Outcomes:

Upon completion of this course, the student will be able to:

- Identify the various types of business ownership, the advantages and disadvantages of self-employment and identify the characteristics of an entrepreneur.
- State the purpose and identify the main elements of a business plan.

Pre-Requisites: None

Objectives and Content:

1. Explore Self-Employment: An alternative to employment.
 - i. identify the advantages and disadvantages of a self-employment vs. regular employment
 - ii. differentiate between an entrepreneur and a small business owner
 - iii. evaluate present ideas about business people
2. Identify and discuss various types of business ownership.
 - i. explore the characteristics of entrepreneurs
 - ii. identify characteristics common to entrepreneurs
 - iii. compare one's own personal characteristics with those of entrepreneurs
 - iv. examine one's present ideas about business people

3. Identify business opportunities.
 - i. distinguish between an opportunity and an idea
 - ii. examine existing traditional and innovative business ventures
 - iii. identify and summarize the role of various agencies that support business development

4. Review the Entrepreneurial Process.
 - i. explain the entrepreneurial process
 - ii. describe the purpose of a business plan

Block 2

WD1850 GTAW (Gas Tungsten Arc Welding) 3 – Groove Weld All Positions, Mild Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- groove weld on mild steel in all positions using the GTAW process.

Pre-Requisites: WD1640

Objectives and Content:

1. Describe the process used to groove weld in all positions.
 - i. preparation
 - current requirements
 - material
 - ii. electrode selection
 - type
 - size and preparation
 - iii. cup sizes
 - iv. gas lens (diffusers)
 - v. shielding gas
 - vi. filler metal
 - vii. manipulation
 - filler metal
 - torch
2. Describe the procedures used to test welds.
3. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

Perform groove welds on mild steel in all positions using the GTAW process.

WD1860 GTAW (Gas Tungsten Arc Welding) 4 – Fillet And Groove Weld, Medium And High Carbon Steel

Outcomes:

Upon successful completion of this course, the apprentice will have knowledge of:

- fillet and groove welding on medium and high-carbon steel in all positions using the GTAW process.

Pre-Requisites: WD1681

Objectives and Content:

1. Describe the set-up and preparation used to weld medium and high-carbon steels.
 - i. characteristics of material
 - ii. weldability
2. Describe the procedures used to weld medium and high-carbon steels.
3. Describe the procedures used to test weld.
4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only.

WD2410 Stud Welding and Resistance Spot Welding

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of stud welding and resistance spot welding.

Pre-Requisites: WD1610

Objectives and Content:

1. Define terminology associated with the stud weld and resistance spot weld process.
2. Describe the stud weld process.
 - i. general precautions
 - ii. principles of operation
 - equipment
 - weld quality
 - variables
 - stud size
 - current
 - time
3. Describe the procedures used to stud weld.
4. Describe the resistance spot weld process.
 - i. general precautions
 - ii. principles of operation
 - equipment
 - weld quality
 - types of joints
 - variables

- current
- time
- material (type and thickness)

5. Describe the procedures used to perform resistance spot weld.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only.

WD2421 Blueprint Reading 3 (Advanced/CAD)

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- interpret dual dimensions.
- interpret international symbols.
- interpret test and inspection symbols.
- describe computer-aided drafting (CAD).

Pre-Requisites: WD1670

Objectives and Content:

1. Describe dual dimensions and their use in the trade.
 - i. variation
 - ii. flexibility
 - iii. accuracy
 - iv. disadvantages
2. Identify and interpret international symbols.
3. Identify and interpret test and inspection symbols.
 - i. visual inspection
 - ii. ultrasonic
 - iii. X-rays
 - iv. dye penetrates
 - v. dimensioning
 - vi. eddy current
 - vii. magnetic particle
 - viii. acoustic emissions
 - ix. leak test

4. Describe computer-aided drafting (CAD) and its use in the trade.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Interpret dual dimensioning.
2. Locate and interpret test and inspection symbols.
3. Locate and interpret international symbols.

WD2431 Material Handling, Rigging and Scaffolding

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- demonstrate knowledge of rigging, hoisting, lifting equipment, scaffolding, accessories and practices.

Pre-Requisites: TS1510

Objectives and Content:

1. Identify Provincial regulations applicable to material handling, rigging and scaffolding.
2. Describe the procedures for manual lifting.
3. Describe responsibilities and liabilities in the use of equipment for rigging, lifting and hoisting.
4. Describe the variables to consider when hoisting.
 - i. weight of objects
 - ii. object of configuration
 - iii. materials
 - iv. materials for blocking
5. Describe the methods of hoisting, their applications and procedures for use.
6. Describe the various types of wire ropes, chains, cables, cable clamps and their accessories.
 - i. characteristics
 - ii. applications
 - iii. precautions

- iv. procedures for use
 - v. inspection
7. Identify and describe the various types of lifting clamps.
- i. characteristics
 - ii. applications
 - iii. precautions
 - iv. inspection
 - v. procedures for use
8. Identify types of come alongs, rope and chain falls, and describe their applications and procedures for use.
9. Identify types of jacks and describe their applications and procedures for use.
- i. hydraulic
 - ii. screw
 - iii. ratchet
10. Describe stacking and blocking.
- i. structural shapes
 - ii. plate and sheet
 - iii. weldments and components
11. Describe the methods of securing chains to provide for manipulation of structural shapes
12. Identify types of slings and describe their applications and procedures for use.
- i. wire rope slings
 - ii. nylon slings
13. Describe use of hooks and shackles.
14. Describe rope and its use.
- i. sizes
 - ii. care and inspection

- iii. knots
 - bowline
 - square or reef
 - round turn and two half hitches
 - scaffold hitch
 - whipped ends and eyes
15. Describe use of chokers, slings and tag lines.
16. Describe spooling of line on drums.
- i. over wind
 - ii. under wind
 - iii. left and right hand lay lines
17. Describe practices for use of tackle.
- i. safety factors
 - ii. reeving practices
18. Identify mechanical types of hoisting methods and describe their applications.
- overhead crane
- i. jib crane
 - ii. boom crane
 - iii. mobile crane
 - iv. fork lifts
19. Describe standard hand signals.
20. Identify the different types of scaffolds, and describe their applications and procedures for use.
- i. tube and clamp
 - ii. manufactured platforms and scaffolding
 - iii. rolling scaffolding
 - iv. suspended scaffolding

21. Describe safety requirements for erecting and working on scaffolding.
 - i. kick plates
 - ii. braces
 - iii. ties
 - iv. planking
 - v. permits
 - vi. tagging
 - vii. fall arrest
 - viii. railings

22. Describe special problems of rolling and suspended scaffolding and guidelines for their use.

23. Identify types of ladders and describe their applications and use.

24. Identify powerline hazards when using lifting equipment.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Make up spreader bar.

2. Tie knots using fiber rope.
 - i. reef knot
 - ii. bowline knot
 - iii. round turn and hitch
 - iv. scaffold hitch
 - v. demonstrate hand signals

WD2500 SMAW (Shielded Metal Arc Welding) 6 – Alloy Steels

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- describe the process to weld alloy steels using the SMAW process.
- describe the process to weld stainless steels using the SMAW process.
- describe the process to weld nickel alloy steels using the SMAW process.

Pre-Requisites: WD1681

Objectives and Content:

1. Describe the SMAW process for welding alloy steels.
 - i. identification of materials
 - alloying elements
 - ii. weldability
 - techniques
 - problems
 - probable causes
 - iii. welding procedures

2. Describe the SMAW process for welding stainless steels.
 - i. identification of materials
 - ii. thermal conductivity
 - iii. expansion
 - iv. weldability
 - techniques
 - problems

- probable causes
 - v. welding procedures
- 3. Describe the SMAW process for welding nickel alloy steel.
 - i. identification of materials
 - nickel content
 - alloys
 - ii. weldability
 - techniques
 - problems
 - probable causes
 - iii. welding procedures
- 4. Describe the procedures used to test welds.
- 5. Describe weld faults when using alloys.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only.

WD2511 GMAW (Gas Metal Arc Welding) 4 **– Fillet and Groove Weld, Medium and High Carbon Steel**

Outcomes:

Upon successful completion of this course, the apprentice will have a knowledge of:

- describe the process to fillet and groove weld in all positions using the GMAW process.

Pre-Requisites: WD1630; WD1820; WD1831

Objectives and Content:

1. Describe medium and high-carbon steels and their use in the GMAW process.
 - i. weldability
 - ii. characteristics
2. Describe the GMAW process used to weld medium and high-carbon steels in all positions.
3. Describe the procedures used to test welds.
4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Theory only

WD2520 GMAW (Gas Metal Arc Welding) 5 –Pipe And Tubing, All Positions Ferrous Metals

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- weld pipe and tubing in all positions using the GMAW process.

Pre-Requisites: WD2511

Objectives and Content:

1. Describe the GMAW process for welding ferrous pipe and tubing in all positions.
 - i. joint preparation
 - ii. root face and gap
 - iii. backing rings
 - iv. welding pre-fabricated fittings
 - v. tack welds
 - vi. common defects
 - vii. work and travel angles
 - viii. gun manipulation
 - ix. welding variables

2. Describe the procedures to weld pipes mounted on a rotating positioner.
 - i. rotating positioners
 - types
 - speed
 - uses

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

Perform groove welds on mild steel pipe and tubing in all positions using the GMAW process.

WD2280 FCAW (Flux-Cored Arc Welding) 3 - Fillet and Groove Weld Plate 3G, 4G, 3GF, 4GF

Pre-requisite: WD1891

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- deposit a weld in 3G, 4G, 3GF, and 4GF positions using flux cored wire.
- identify various gases and gas mixtures.

Objectives and Content:

1. Describe the procedures and techniques used to deposit a weld bead.
 - i. stringer
 - ii. weave
 - iii. stick-out
 - iv. travel speed
 - v. work and travel angles
 - vi. visual inspection
2. Describe the procedures used to weld plate in 3G, 4G, 3GF, and 4GF positions using flux cored wire.
 - i. quality of welds
 - ii. faults
 - iii. travel angles
 - iv. manipulation
3. Describe the various gases and gas mixtures and describe their applications.
4. Describe weld faults and their causes.

5. Describe the procedures used to test welds.
 - i. destructive
 - ii. non-destructive (visual inspection)

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are mandatory in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Deposit fillet welds in 3G, 4G, 3GF, and 4GF positions.
2. Deposit groove welds in 3G, 4G, 3GF, and 4GF positions.

WD2570 Electric Arc Cutting (SMAW)

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- cut using the metal arc cutting process.

Pre-Requisites: WD1610

Objectives and Content:

1. Describe the purpose and applications of Metal Arc Cutting.
2. Describe the metal arc cutting process.
 - i. general precautions
 - ii. equipment and accessories
 - electrodes for cutting
 - power source
 - iii. current requirements
 - iv. cutting procedures
 - technique
 - electrode angles

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Cut metal with chamfertrode and cuttrode electrode, using the SMAW process.

WD2141 SMAW (Shielded Metal Arc Welding) 5 - Groove Welds 3G, 4G, 5G, 6G

Pre-requisite: WD1801

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- groove weld on mild steel using the SMAW process with F-3 and F-4 electrodes.
- perform weld tests.

Objectives and Content:

1. Identify and describe the weld position.
 - i. 3-G
 - ii. 4-G
 - iii. 5-G
 - iv. 6-G

2. Describe the procedures used to perform a groove weld in an open root butt joint on mild steel in 3G, 4G, 5G, and 6G positions.
 - i. joint design
 - ii. inspection and testing
 - iii. electrode angles
 - iv. electrode manipulation
 - v. amperage adjustment
 - vi. identify position and limitations
 - vii. identify material
 - viii. determine thickness of material
 - ix. select electrode
 - x. select current
 - xi. penetration

3. Describe the procedures used to test welds.
 - i. codes and standards
4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld single vee groove butt joints on 3/8" mild steel plate in 3G, 4G, 5G and 6G positions using F3 and F4 electrodes.
2. Perform weld tests.

Block 3

WD2530 GMAW (Gas Metal Arc Welding) 6 – Aluminum and Stainless Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- describe the process to weld aluminium sheet and plate in all positions using the GMAW process.
- describe the process to weld stainless steels in all positions using the GMAW process.

Pre-Requisites: WD1630

Objectives and Content:

1. Describe the GMAW process used to weld aluminium sheet and plate in all positions.
 - i. determine material characteristics
 - identification numbers
 - alloys
 - weldability
 - ii. select filler wire
 - iii. identify parameters
 - iv. identify variables
 - v. identify shielding gases

2. Describe the procedures used to fillet and groove weld aluminium sheet and plate.

3. Describe the GMAW process used to weld stainless steel in all positions.
 - i. determine material characteristics
 - identification numbers
 - alloys
 - thermal conductivity
 - expansion
 - weldability
4. Describe the procedures used to fillet and groove weld stainless steel.
5. Describe the procedures used to test welds.
6. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Deposit fillet welds on aluminium plate of various thicknesses.
2. Deposit groove welds on aluminium plate of various thicknesses.
3. Deposit fillet welds on stainless steel.

WD2560 SAW (Submerged Arc Welding) Weld Plate

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- describe the process to weld carbon steel plate of various thicknesses using the submerged arc welding (SAW) process.

Pre-Requisites: WD1610

Objectives and Content:

1. Describe the purpose and applications of the SAW process.
2. Identify the equipment used in the SAW process and describe its components and applications.
 - i. semi-automatic
 - ii. automatic
3. Describe the procedures used to set-up and weld carbon steel plate of various thicknesses using the SAW process.
 - i. deposition rates
 - ii. travel speeds
 - iii. penetration
 - iv. welding position
 - v. fluxes
 - vi. filler metals
 - vii. starting methods
 - viii. finishing methods
 - ix. faults encountered
 - x. troubleshooting

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld stringer beads flat position.
2. Weld butt joint, mild steel plate.
3. Weld tee joint in horizontal position.

WD2541 GTAW (Gas Tungsten Arc Welding) 6 – Alloy and Non-Ferrous Metals

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- describe the process to weld alloy and non-ferrous metals using the GTAW process.

Pre-Requisites: WD1640; WD1840

Objectives and Content:

1. Describe the GTAW process used to weld alloy steels.
 - i. identification of materials
 - alloying of elements
 - ii. weldability
 - techniques
 - problems
 - probable causes
 - iii. welding procedures

2. Describe the GTAW process used to weld stainless steel.
 - i. determine material characteristics
 - identification numbers
 - alloys
 - thermal conductivity
 - expansion
 - weldability
 - ii. welding procedures

3. Describe the process used to weld titanium.

- i. thermal conductivity
 - expansion
 - ii. identification
 - iii. weldability
 - iv. inert shielding gases
 - trailing gas
 - purging
 - v. welding procedures
4. Describe the GTAW process used to weld aluminium in all positions.
- i. preparation
 - ii. characteristics of materials
 - identification numbers
 - alloys
 - weldability
 - iii. non-consumable electrode selection
 - iv. current requirements
 - v. high frequency
 - vi. inert shielding gases
 - vii. welding procedures
5. Describe the process used to weld magnesium alloys.
- i. preparation
 - ii. characteristics of materials
 - weldability
 - identification
 - iii. types of joints
 - joint preparation
 - iv. inert shielding gases
 - v. welding procedures
6. Describe the process used to weld copper alloys.
- i. preparation
 - ii. types of copper
 - alloys

- iii. characteristics of materials
 - weldability
 - distortion
 - thermal conductivity
 - iv. inert shielding gases
 - v. types of joints
 - vi. filler metals
 - vii. welding procedures
7. Describe the process used to weld monel/inconel.
- i. preparation
 - ii. characteristics of materials
 - weldability
 - identification
 - thermal conductivity
 - iii. inert shielding gases
 - iv. types of joints
 - v. filler materials
 - vi. welding procedures
8. Describe the procedures used to test welds.
9. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld stainless steel using GTAW process.
2. Deposit fillet welds on aluminum plate using a GTAW process.
3. Deposit groove welds on aluminum plate using the GTAW process.

WD2551 FCAW (Flux-Cored Arc Welding) 4– Pipe And Tubing All Positions

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- weld pipe and tubing in all positions using the FCAW process.
- weld pipe and tubing using a rotating positioner.

Pre-Requisites: WD1891

Objectives and Content:

1. Describe the procedures used to weld pipe and tubing in all positions.
 - i. types of electrode wire
 - ii. gun manipulation
 - gun angle
 - iii. joint design
 - pipe position
 - iv. travel angle
 - v. root opening
 - backing
 - root face
2. Identify types of rotating positioners and describe their applications and procedures for use.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld pipe in all positions.

WD2440 Blueprint Reading 4 (Shop Drawings)

Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- identify structural components from shop drawings.
- draw templates for structural parts.

Pre-Requisites: WD2421

Objectives and Content:

1. Identify and interpret abbreviations used on shop drawings.
2. Identify and interpret various structural components found on shop drawings.
 - i. column
 - ii. beam
 - iii. truss
 - iv. purlin
 - v. joists
3. Identify and interpret shop drawings.
 - i. beams
 - ii. columns
 - iii. stairs
 - iv. brace
4. Identify and interpret information used to cut beams to desired dimensions from shop drawings.

- i. notch
- ii. cut
- iii. cope

5. Describe the procedures used to draw templates for structural parts.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

- 1. Interpret instructions and symbols found on working drawings.
- 2. Draw templates for structural parts.

WD2591 GTAW (Gas Tungsten Arc Welding) 5 – Pipe And Tubing, Mild Steel, All Positions

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- weld pipe and tubing in all positions using the GTAW process.
- demonstrate knowledge of orbital welding equipment.

Pre-Requisites: WD2541

Objectives and Content:

1. Describe the process of welding pipe and tubing in all positions.

- i. joint preparation
- ii. root face and gap
- iii. backing rings
- iv. consumable insert
- v. purging
 - dams
- vi. gases
 - shielding
 - purging (special applications)
- vii. welding and fabricated fittings
- viii. tack weld
- ix. work and travel angles
- x. torch manipulation
- xi. welding variables

1. Describe the procedures used to weld pipes and tubing in all positions.

2. Identify types of rotating positioners and describe their applications and

procedures for use in welding.

3. Identify orbital welding equipment and describe its components and applications.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld pipe and tubing in all positions using the GTAW process.

Block 4

WD2581 SMAW (Shielded Metal Arc Welding) 6 – Pipe All Positions

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- weld pipe and tubing in all positions using the SMAW process with F-3 and F-4 class electrodes.

Pre-Requisites: WD1801

Objectives and Content:

1. Describe the procedures used to weld pipe and tubing in all positions.
 - i. types of pipe and tubing
 - ii. root gap
 - iii. root face
 - iv. tacking
 - v. back-up rings
 - vi. electrode angle
 - vii. angle of cut
 - operation of contour marker
 - wall thickness

1. Describe tack welding of pipe sections.

2. Describe the procedures used to prepare test coupons.
 - ii. cutting and grinding

3. Describe the procedures used to test welds.

4. Describe weld faults.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Prepare and weld 6" sch 80 pipe in all positions with F3 and F4 electrodes.
2. Prepare and weld 6" sch 80 pipe in all positions using F4 electrodes.

WD2600 GTAW (Gas Tungsten Arc Welding) 6 – Pipe Mild Steel

Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- weld pipe in all positions using the GTAW process.
- demonstrate knowledge of orbital welding equipment.

Pre-Requisites: WD2591

Objectives and Content:

1. Describe the process of welding pipe in all positions.
 - i. joint preparation
 - ii. root face and gap
 - iii. backing rings
 - iv. consumable insert
 - v. purging
 - dams
 - vi. gases
 - shielding
 - purging (special applications)
 - vii. welding and fabricated fittings
 - viii. tack weld
 - ix. work and travel angles
 - x. torch manipulation
 - xi. welding variables

2. Describe the procedures used to weld pipes in all positions.

3. Identify types of rotating positioners and describe their applications and procedures for use in welding.
4. Identify orbital welding equipment and describe its components and applications.

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are **mandatory** in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Weld pipe and in all positions using the GTAW process.