

**A PLAN OF TRAINING**  
**FOR**  
**WELDER**  
**OCCUPATION**

**Approved by**  
**Provincial Apprenticeship Board**  
**April, 1997**  
**Revised June, 2000**

## Foreword

Apprenticeship training in the Province of Newfoundland and Labrador is undergoing considerable change. This change is prompted by the need to keep pace with technological changes in industry, the need to be competitive, and the desire to be efficient and effective in meeting the needs of the apprentice. We feel that this training plan will lay the groundwork to meet both the demands of industry and the needs of the apprentice.

The plan that follows is a comprehensive one. It recognizes that apprenticeship training begins when a student first registers at a training institution, or signs a Contract of Apprenticeship with an employer, and continues until such time as the apprentice has completed all of the required technical training and has received the required industry experiences necessary to write an interprovincial examination. Passing this examination will result in the apprentice receiving Red Seal Certification which gives the journey person national mobility of qualifications. This plan also recognizes the need to provide flexible access to training based on the needs of the employer and the apprentice while at the same time recognizing the end goal is to complete the requirements for Red Seal Certification.

It is realized that change in all facets of education and industry is continuous and sometimes rapid. This change will necessitate the review of this document on a continuous basis to ensure that current needs of industry and apprentices are being satisfied. Through a process of accreditation, regular input from industry advisory committees, as well as input from those involved in the administration and delivery of the training, we are confident that residents of our province who elect to pursue an apprenticeable occupation as a career choice will receive high quality training and thus will be prepared to compete for jobs worldwide.

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Chair, Provincial Apprenticeship Board

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Minister of Education

# Table of Contents

Conditions Governing Apprenticeship Training .....	1
Requirements for Red Seal Certification in the Welder Occupation .....	6
Roles and Responsibilities of Stakeholders in the Apprenticeship Process .....	7
Suggested Course Layout for the Welder Occupation .....	9
Required Related Courses	
CM2150-Workplace Correspondence .....	62
MR1210-Customer Service .....	66
SP2330-Quality Assurance / Quality Control .....	69
MC1050-Introduction to Computers .....	72
SD1700-Workplace Skills .....	79
SD1710-Job Search Techniques .....	82
SD1720-Entrepreneurial Awareness .....	83
Required Work Experiences .....	85

## CONDITIONS GOVERNING APPRENTICESHIP TRAINING

### 1.0 GENERAL

The following general conditions will apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board in accordance with the Apprenticeship Act. Where an occupation requires additional conditions, these will be noted in the specific plan of training for that occupation. In no case should there be a conflict between these conditions and the additional requirements specified in certain plans of training.

### 2.0 ENTRANCE REQUIREMENTS

2.1 Entry into the occupation as an apprentice requires:

The completion of designated first year courses specific to the occupation

OR

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

OR

Enrolment in a program of studies that includes all entry and advanced level skills and required work experiences as approved by the Provincial Apprenticeship and Certification Board.

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 plans 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 towards the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 A Registration 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 Provincial Apprenticeship and Certification Board one week notice in writing.

4.0 TERMINATION OF A MEMORANDUM OF UNDERSTANDING

After the probationary period referred to in Section 3.0 herein, the memorandum of understanding may be terminated by the Board by mutual consent of the parties thereto or cancelled by the Board for proper and sufficient cause in the opinion of the Board.

5.0 APPRENTICESHIP PROGRESSION SCHEDULE AND WAGE RATES

5.1 Progression Schedule

<b>7200 Hour Programs</b>	<b>Requirements for Progression</b>	<b>Progress To</b>
First Year Apprentice	25% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 1800 hours	Second Year
Second Year Apprentice	50% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 3600 hours	Third Year
Third Year Apprentice	75% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 5400 hours	Fourth Year
Fourth Year Apprentice	100% of Course Credit Hours, <b>Plus</b> completion and sign-off of workplace skills required for certification totaling 7200 hours	Write Certification Examination
<b>5400 Hour Programs</b>		
First Year Apprentice	33% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 1800 hours	Second Year
Second Year Apprentice	66% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 3600 hours	Third Year
Third Year Apprentice	100% of Course Credit Hours, <b>Plus</b> completion and sign-off of workplace skills required for certification totaling 5400 hours	Write Certification Examination

<b>4800 Hour Programs</b>	<b>Requirements for Progression</b>	<b>Progress To</b>
First Year Apprentice	33% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 1600 hours	Second Year
Second Year Apprentice	66% of Course Credit Hours, <b>Plus</b> relevant work experience totaling 3200 hours	Third Year
Third Year Apprentice	100% of Course Credit Hours, <b>Plus</b> completion and sign-off of workplace skills required for certification totaling 4800 hours	Write Certification Examination

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 which shall not be less than:

<b>Program Duration</b>	<b>Wage Rates</b>		<b>Comments</b>
<b>7200 Hours</b>	1 <sup>st</sup> Year	55%	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 <sup>nd</sup> Year	65%	
	3 <sup>rd</sup> Year	75%	
	4 <sup>th</sup> Year	90%	
<b>5400 Hours and 4800 Hours</b>	1 <sup>st</sup> Year	55%	
	2 <sup>nd</sup> Year	70%	
	3 <sup>rd</sup> Year	85%	
4000 (Hairstylist) - 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 Board.

## 7.0 PERIODIC EXAMINATIONS

7.1 Every apprentice shall submit to such occupational tests and examinations as the Board 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 Board may shorten the term of apprenticeship and advance the date of completion accordingly.

## 8.0 GRANTING OF CERTIFICATES OF APPRENTICESHIP

Upon the successful completion of apprenticeship, the Board 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 normally shall not exceed one apprentice to every one journeyperson employed. Exceptions for specific occupations may occur with the approval of the Provincial Apprenticeship and Certification Board.

## 12.0 RELATIONSHIP OF THE PLAN OF TRAINING 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 Provincial Apprenticeship and Certification Board.

#### 14.0 EMPLOYMENT, RE-EMPLOYMENT AND TRAINING REQUIREMENTS

- 14.1 The plan of training requires Apprentices to attend regularly their place of employment.
- 14.2 The plan of training requires Apprentices to regularly attend training programs for that occupation as prescribed by The Provincial Apprenticeship and Certification Board.
- 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 M.O.U.'s reinstated by the Provincial Apprenticeship and Certification Board but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. 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 opportunity to be re-employed before another is hired.
- 14.6 The employer will permit each apprentice to attend regularly training programs as prescribed by the Provincial Apprenticeship and Certification Board.
- 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.



REQUIREMENTS FOR RED SEAL CERTIFICATION  
IN THE WELDER OCCUPATION

1. Evidence that the required work experiences outlined in this plan of training has been obtained. This evidence must be in a format that clearly outlines the experiences and a signature (s) of an appropriate person(s) attesting that these experiences have been obtained to the level required.
2. Normally, have a combination of training from an accredited training program and suitable work experience totalling 5400 hours

Or

Have a total of 7200 hours of suitable work experience.

3. Completion of a National Red Seal examination to be set at a place and time determined by the Industrial Training Division of the Department of Education.
4. Pay the appropriate examination fee.

## ROLES AND RESPONSIBILITIES OF STAKEHOLDERS IN THE APPRENTICESHIP PROCESS

Apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section captures, in a broad sense, these roles and the responsibilities that result from them.

### **Apprentices**

- ▶ to complete all required technical training courses as approved by the Provincial Apprenticeship and Certification Board.
- ▶ to find appropriate employment
- ▶ to complete all required work experiences in combination with the required hours.
- ▶ to ensure that the work experiences are well documented
- ▶ to approach apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyman.
- ▶ to obtain the required hand tools as specified by the Board for each period of training of the apprenticeship program.
- ▶ to provide feedback to Training Institutions, the Industrial Training Division and Employers in an effort to establish a process of continuous quality improvement.

### **Employers**

- ▶ to provide high quality work experiences in an environment that is conducive to learning.
- ▶ to remunerate apprentices as set out in the Plan of Training or Collective Agreements.
- ▶ to provide feedback to Training Institutions, Industrial Training Division and Apprentices in an effort to establish a process of continuous quality improvement.
- ▶ where appropriate, to release apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ▶ to ensure that work experiences of the apprentices are documented.

### **Training Institutions**

- ▶ to provide a high quality learning environment.
- ▶ to provide the necessary student support services that will enhance an apprentices ability to be successful.
- ▶ to participate with other stakeholders in the continual updating of programs.

### **Industrial Training Division**

- ▶ to establish and maintain provincial program advisory committees under the direction of the Provincial Apprenticeship and Certification Board.
- ▶ to promote apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved such as career guidance counsellor, teachers, parents, etc.
- ▶ to establish and maintain a protocol with apprentices, training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ▶ to ensure that all apprentices are appropriately registered and records are maintained as required.
- ▶ to schedule all necessary technical training periods for apprentices to complete requirements for certification.
- ▶ to administer provincial/interprovincial examinations.

### **Provincial Apprenticeship and Certification Board**

- ▶ to set policies to ensure that the provisions of the Apprenticeship Training Act are implemented.
- ▶ to ensure that advisory and examination committees are established and maintained.
- ▶ to accredit institutions to deliver apprenticeship training programs.
- ▶ to designate occupations for apprenticeship training and / or certification.

## SUGGESTED COURSE LAYOUT FOR WELDER

### Program & Apprenticeship Registration

#### ENTRY LEVEL COURSES

WD1160 - Welding Shop Fundamentals .....	90 hrs.
WD1210 - Oxy-Fuel Cutting & Welding .....	60 hrs.
WD1230 - SMAW Fundamentals .....	60 hrs.
SF1200 - Introduction to Template Development .....	45 hrs.
DR1700 - Basic Drawing & Sketching .....	75 hrs.
WD2110 - SMAW Position Butt Welding .....	120 hrs.
WD2210 - SMAW Position Fillet Welding .....	75 hrs.
DR1120 - Blueprint Reading for Welders .....	75 hrs.
WD1510 - Metallurgy fundamentals .....	45 hrs.
WD1130 - GMAW Fundamentals .....	45 hrs.
WD2260 - FCAW Fundamentals .....	30 hrs.
WD1400 - Introduction to Pipe Welding .....	45 hrs.

\*Related courses are to be interspersed throughout the program.

### Required Work Experience (if applicable)

#### ADVANCED LEVEL COURSES

WD1520 - GTAW Fundamentals .....	45
WD2270 - FCAW Position Welding .....	60
WD2190 - Specialized Cutting and Welding .....	30
WD2160 - GMAW Position Welding .....	45
WD2250 - GTAW Position Welding .....	90
WD2240 - Pipe, Tubing & Specialized Welding .....	150

Work Experience

Journeyman Certification

**NAME & NUMBER:** WD1160 - Welding Shop Fundamentals

**DESCRIPTION**

This general studies course requires the use of safety equipment, tools, fasteners, shop equipment and facilities and manuals. It involves the development of safety practices in the operation and maintenance of shop tools, equipment and facilities.. It includes information on general safety regulations, occupational health and safety, and fire prevention and suppression.

**MAJOR TOPICS/TASKS**

Practice safety; Complete the appropriate St. John's Ambulance First Aid Course for this occupation; Complete a Workplace Hazardous Materials Information Systems Course; Use and maintain gripping and turning tools, measuring devices and levels; Use and maintain cutting tools; Use and maintain threading devices; Install fasteners; Safely and effectively use, maintain and store pullers, drivers and presses; Solder metals; Use power tools; Drill materials; Cut metals (power); Grind and finish metals; Use and maintain compressed air system; Use and maintain shop equipment

**PURPOSE / AIMS**

1. To gain an appreciation of the need for safety regulations in the operation and maintenance of shop tools, equipment and facilities
2. To be able to administer first aid and CPR
3. To develop an awareness of hazardous workplace materials

**PREREQUISITES** None

**COURSE DURATION** 90hrs

**LEARNING RESOURCES**

Benchwork  
Welding Skills  
Metalwork Technology

**EVALUATION** Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED** December 1993

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Practice safety
  - a. List general workplace safety regulations
  - b. List fire safety regulations
  - c. Describe the operation and uses of different types of fire extinguishers
  - d. Explain the safety standards prescribed by the Occupational Health and Safety Regulations
  - e. Interpret occupational safety code
  - f. Apply safe work habits at all times
  - g. Use and maintain personal safety equipment
  - h. Implement exhaust control procedures
  - I. Use fire fighting equipment
  - j. Respect noise level regulations
  - k. Reduce factors that contribute to spontaneous combustion
  - l. Identify potential hazards to personal safety
  - m. Check for unsafe conditions
  - n. Report accidents
  
2. Complete the appropriate St. John's Ambulance First Aid Course for this occupation.  
Either
  - a. Standardor
  - b. Emergency
  
3. Complete a Workplace Hazardous Materials Information Systems Course
  
4. Use and maintain gripping and turning tools, measuring devices and levels
  - a. Describe the use of the different types of precision measuring tools
  - b. Describe the pliers (all types), screwdrivers (all types), wrenches (all types), clamps (all types) and vices (all types) used for fitting and assembling as per assigned information too within specifications required
  - c. Use measuring tools (measuring tapes, rules, scale rules, calipers, micrometers, gauges, straight edges, plumb bobs, squares, and calculators) and levels
  - d. Use pliers, screwdrivers, wrenches, torque multipliers, hammers and mallets and other gripping and turning tools
  - e. Use a torque wrench
  - f. Use scribes and markers
  
5. Use and maintain cutting tools
  - a. Identify, maintain and use punches, chisels, files and saws
  - b. Sharpen chisels and twist drills and drill bits

- c. Shape and sharpen a cold chisel
  - d. Maintain and store cutting tools
  - e. Cut sheet metal
  - f. Make bench projects
  - g. Cut bolts
  - h. Drill and ream holes
6. Use and maintain threading devices
- a. Explain the purpose of threading taps and dies
  - b. Select and safely use proper tools for given job
  - c. Maintain threading tools
  - d. Make an internal thread
  - e. Make and external thread
  - f. Restore damaged thread
  
  - g. Remove a broken screw
  - h. Use tap and drill chart
7. Install fasteners
- a. Describe safety requirements for using hand tools and fasteners
  - b. Describe the different types of fasteners
  - c. Explain oxidation, corrosion, tensile strength and shear strength
  - d. Describe the types of fastener tools
  - e. Describe as per the assigned information, rivets, keys, nuts, screws, pins, splines, studs, bolts, snaprings, bonds (thread locking compounds), washers, lock wires and self-locking nuts
  - f. Use and identify fasteners such as rivets, nails, wood screws, sheet metal screws, bolts, nuts, washers, masonry anchors and shields
  - g. Describe specific uses for each fastener
  - h. Recognize sizes of fasteners
  - I. Rivet and soft solder lap joint in a galvanized sheet
  - j. Torque bolts
  - k. Identify bolt grades
  - l. Identify miscellaneous anchoring devices
8. Safely and effectively use, maintain and store pullers, drivers and presses
- a. Describe types and explain the uses of pullers, drivers and presses
9. Solder metals
- a. Describe soldering tools, materials and applications
  - b. Describe methods of tinning and soldering
  - c. Describe types of solders

- d. Select solder and heating unit
  - e. Solder wire connections, sheet metal, and copper fittings and tubing
  - f. Shut down and store equipment
10. Use power tools
- a. Describe the different types of power tools
  - b. Describe the different types of hydraulic tools
  - c. Describe safety requirements for using power tools
  - d. Describe types of hydraulic and pneumatic lines and fittings and explain their applications
  - e. Operate portable power tools
  - f. Operate treading machines
  - g. Operate power cleaning equipment
  - h. Operate hydraulic punches, pullers, drivers and presses
11. Drill materials
- a. Describe the parts of a twist drill
  - b. Describe drill sizes and speed requirements
  - c. Describe types and uses of reaming tools
  - d. Safely and effectively operate power drilling equipment (hammer and portable drill)
  - e. Select and use cutting fluids
  - f. Identify and select clamping devices
  - g. Maintain drilling equipment
12. Cut metals (power)
- a. Explain the purpose of cutting power tools
  - b. Safely and effectively use power operated saws, friction cut-off equipment and shears
  - c. Maintain metal cutting power tools
  - d. Identify and use abrasives
13. Grind and finish metals
- a. Describe types and explain applications of:
    - I. portable and stationary grinders
    - ii. grinding wheels
    - iii. grinding discs
    - iv. grinder dressers
    - v. rotary wire brushes
  - b. Install grinding wheel disc and brush
  - c. Adjust tool rest
  - d. Dress grinding wheel
  - e. Safely and effectively operate stationary and portable grinders
  - f. Maintain equipment



14. Use and maintain compressed air system
  - a. Demonstrate safety precautions when using and maintaining compressors
  - b. Use and maintain air and fluid hoses
  
15. Use and maintain shop equipment
  - a. jacks
  - b. shop cranes
  - c. chain hoists
  - d. steam cleaner
  - e. solvent cleaning tanks
  
16. Use measuring and layout tools
  - a. Measure length, width and thickness
  - b. Measure inside diameters
  - c. Measure outside diameters
  - d. Measure leg and throat of fillet welds
  - e. Maintain measuring and layout tools

**NAME & NUMBER**            WD1210 - Oxy-Fuel Cutting & Welding

**DESCRIPTION**

This OFW course requires the use of welding equipment and accessories, materials and supplies and safety equipment. It involves setting up OFW equipment; preparing, cutting and welding metal; and shutting down, disassembling and storing equipment. It includes information on safety requirements, cylinder pressures, combustion and flames, storage and transporting of cylinders, and types of regulators.

**MAJOR TOPICS/TASKS**

Set-up and use welding equipment (OFW); Set up and use cutting equipment; Fusion weld (OFW); Braze weld metals (OFW); Assemble metals using brazing process

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1160 - Welding Shop Fundamentals

**COURSE DURATION**        60hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         December 1993

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Set-up and use welding equipment (OFW)
  - a. Describe oxy-fuel equipment and components
  - b. Explain lighting procedures and describe types of flame
  - c. Demonstrate safety precautions when handling this equipment
  - d. Set up, adjust equipment and check for leaks

- e. Light torch and make flame adjustments
  - f. Shut down equipment and place in designated location
2. Set up and use cutting equipment
- a. Explain cutting procedures and equipment used
  - b. List metals that can be cut and metals that cannot be cut
  - c. Set up and adjust the cutting equipment for the assigned project
  - d. Cut mild steel 90° FREEHAND
  - e. Cut mild steel 90° GUIDED
  - f. Cut mild steel at a 30° BEVEL FREEHAND
  - g. Cut mild steel at a 30° BEVEL GUIDED
  - h. Cut regular and irregular shapes FREEHAND
  - I. Cut off bolt and/or nut FREEHAND (optional)
3. Fusion weld (OFW)
- a. Explain the procedure used to weld in the flat position
  - b. Explain the steps in oxy-fuel welding
  - c. Describe the types of metals that are suitable for the welding process
  - d. Explain the steps in oxy-fuel cutting
  - e. Describe types of flames, pressures and tip sizes and the application of each
  - f. Prepare metal for welding
  - g. Set up and adjust welding equipment
  - h. Run fusion welding beads
  - I. Weld mild steel butt joint
  - j. Weld mild steel open-corner joint
  - k. Weld mild steel lap joint
  - l. Fuse weld sheet metal
4. Braze weld metals (OFW)
- a. Describe braze welding processes as applied to various metals including cast iron
  - b. Explain the purpose of filler metals in the brazing process
  - c. Describe type of flame adjustment for brazing
  - d. Prepare metal
  - e. Set up and adjust welding equipment
  - f. Tack weld metal
  - g. Braze weld tee joint (m.s. in flat position)
  - h. Braze weld butt joint (m.s. in flat position)
  - I. Prepare and bronze weld cast iron
  - j. Perform silver brazing
5. Assemble metals using brazing process
- a. Operate oxy-fuel equipment to assemble metals using the brazing process

- b. Prepare joints for brazing:
  - i. 3/4 copper tee with fittings
  - ii. tee joint (1/8x4x4 flat bar, m.s.)
- c. Braze tee joint 1/8x1x4 copper to mild steel
- d. Braze stainless steel tee joint (1/8x1x4"s.s.)

**NAME & NUMBER**            WD1230 - SMAW Fundamentals

**DESCRIPTION**

This SMAW course requires the use of safety equipment, SMAW equipment and accessories, and materials and supplies. It involves setting up equipment, preparing and welding metal, shutting down equipment and testing the weld. It includes information on basic electricity, types of electrodes, types of welding machines, joint design and weld faults.

**MAJOR TOPICS/TASKS**

Describe welding methods; Explain proper procedures for handling heavy objects; Describe steel types and shapes; Set up equipment (SMAW); Strike and maintain arc (SMAW); Fillet weld flat (SMAW); Weld sheet metal (SMAW); Weld using various electrodes

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1160 - Welding Shop Fundamentals

**COURSE DURATION**        60hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Describe welding methods
  - a. Define the terminology associated with welding methods
    - I. Explain or describe carbon steel electrodes, classification of mild steel and low alloy steel electrodes, operator protection, basic machine and circuit theory, AC & DC, Arc Blow, duty cycle, rated amperage, thawing pipes,

- striking and maintaining arc, stringer and weave beads, faults, safety
  - b. Describe the shielded metal arc welding process
  - c. List advantages and disadvantages of each arc welding process
  - d. Describe the potential discontinuities associated with welding processes
  - e. Explain appropriate inspection methods to locate discontinuities
  - f. Describe the five basic joint configurations
  - g. Describe applicable safety techniques
  - h. Describe the steps in the arc welding process
  - I. Explain the procedure used for welding in a flat position with SMAW
  - j. Explain joint types, designs and terminology
2. Explain proper procedures for handling heavy objects
3. Describe steel types and shapes
- a. Describe the characteristics of hot and cold rolled steel
  - b. Determine the size of various structural shapes
4. Set up equipment (SMAW)
- a. Describe the equipment used for arc welding
  - b. Explain the types and uses of SMAW machines and components
  - c. Describe AC transformers, AC/DC rectifiers, DC generators, engine drive (gasoline, diesel) sources
  - d. Set up SMAW equipment
  - e. Install a ground clamp and/or terminal lug
  - f. Maintain SMAW equipment
  - g. Install an electrode holder with a terminal lug or jack plug connector
  - h. Shut down and store equipment
5. Strike and maintain arc (SMAW)
- a. Explain why correct electrode selection, current, polarity settings, arc length, travel speed, and electrode angles important are important for quality welds
  - b. Describe work and travel angles for weld metal deposition
  - c. Deposit a stringer bead
  - d. Deposit weave beads
6. Fillet weld flat (SMAW)
- a. Strike and maintain an arc
  - b. Run stringer beads
  - c. Run weave beads
  - d. Weld joints:
    - I. tee
    - ii. lap

- iii. corner
7. Weld sheet metal (SMAW)
- a. Describe electrode types and sizes used for sheet metal welding
  - b. Describe the common joints used in sheet metal welding
  - c. Weld 16 gauge mild steel semi-vertical position, travel down:
    - I. corner joint
    - ii. lap joint
8. Weld using various electrodes
- a. Describe basic classifications and applications of electrodes
  - b. Describe or explain electrode types for special applications, mild steel and low alloy electrodes, functions of flux coating, electrode identification, electrode prefix and suffix lettering system, identification of parent metal, welding position, power source, joint design and fit up, electrode diameter, metal properties, production efficiency, low hydrogen electrode, AWS and CSA electrode codes and champhetrode cutting
  - c. Operate larger diameter electrodes for high speed deposit of quality welds on a production basis
  - d. Demonstrate the proper setting for a variety of electrodes

**NAME & NUMBER**            WD2110 - Position Butt Welding (SMAW)

**DESCRIPTION**

This SMAW course requires the use of safety equipment, SMAW equipment and accessories, and materials and supplies. It involves setting up SMAW equipment, preparing and welding the joint, shutting down the equipment and testing the weld. It includes information on codes and standards and distortion control.

**MAJOR TOPICS/TASKS**

Butt weld plate flat (SMAW); Butt weld plate horizontal (SMAW); Butt weld plate vertical (SMAW); Butt weld plate overhead (SMAW)

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1230 - SMAW Fundamentals

**COURSE DURATION**        120hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Butt weld plate flat (SMAW)
  - a. Explain joint types, designs and terminology
  - b. Run stringer beads
  - c. Run weave beads
  - d. Weld single V butt joint
  - e. Weld 1gf joint (with backing strip)



- f. Perform guided bend test
- 2. Butt weld plate horizontal (SMAW)
    - a. Explain the procedure used for welding in horizontal position (SMAW)
    - b. Set up equipment
    - c. Run stringer beads horizontal
    - d. Weld single V butt joint
    - e. Weld 2gf joint (with backing strip)
  - 3. Butt weld plate vertical (SMAW)
    - a. Explain the procedure used for welding in vertical-up position (SMAW)
    - b. Set up equipment
    - c. Run stringer and weave beads vertical up
    - d. Weld single V butt joint
    - e. Weld 3gf joint (with backing strip)
  - 4. Butt weld plate overhead (SMAW)
    - a. Explain the procedure used for welding in overhead position (SMAW)
    - b. Set up equipment
    - c. Run stringer and weave beads overhead
    - d. Weld single V butt joint
    - e. Weld 4gf joint (with backing strip)

**NAME & NUMBER**            WD2210 - SMAW Position Fillet Welding

**DESCRIPTION**

This SMAW course requires the use of safety equipment, SMAW equipment, and materials and supplies. It involves setting up SMAW equipment, preparing and welding the joint, shutting down the equipment and testing the weld. It includes information on codes and standards, joint design, expansion and contraction, and pre-heat and post-heat.

**MAJOR TOPICS/TASKS**

Fillet weld horizontal (SMAW); Fillet weld vertical (SMAW); Fillet weld overhead (SMAW); Cut using arc-air

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1230 - SMAW Fundamentals

**COURSE DURATION**        75hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**          May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Fillet weld horizontal (SMAW)
  - a. Explain the procedure used for welding in a horizontal position with SMAW
  - b. Set up equipment
  - c. Run parallel stringer beads on m.s. plate in both directions
  
  - d. Weld joints:

- I. tee joint (multipass)
    - ii. lap joint (single pass)
2. Fillet weld vertical (SMAW)
  - a. Explain the procedure used for welding in a vertical down position with SMAW
  - b. Set up equipment
  - c. Run stringer beads vertical down
  - d. Weld joints:
    - I. corner
    - ii. tee
  - e. Identify and explain the procedure used for welding in vertical-up position (SMAW)
  - f. Run stringer and weave beads vertical up
  - g. Weld joints:
    - I. lap
    - ii. tee
  - h.
3. Fillet weld overhead (SMAW)
  - a. Explain the procedure used for welding in an overhead position with SMAW
  - b. Set up equipment
  - c. Run stringer beads overhead
  - d. Weld joints:
    - I. corner
    - ii. tee
4. Cut using arc-air
  - a. Set up arc-air gouging equipment
  - b. Identify and select carbon rod
  - c. Cut, groove, gouge and remove metal
  - d. Maintain equipment
5. Complete fillet weld brake test
  - a. Flat weld brake test
  - b. Horizontal brake test
  - c. Vertical brake test
  - d. Overhead brake test

**NAME & NUMBER**            WD1400 - Introduction to Pipe Welding

**DESCRIPTION**

This SMAW course requires the use of safety equipment, SMAW equipment and accessories, and materials and supplies. It involves setting up SMAW equipment, preparing and welding metal, shutting down equipment, and testing the joint. It includes information on stainless steel, aluminum and steel alloys, codes and standards, and types of electrodes.

**MAJOR TOPICS/TASKS**

Explain common practices in welding pipe and tubing; Explain ASME and boiler and pressure vessel act requirements; Weld pipe and tubing (SMAW)

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD2110 - Position Butt Welding (SMAW)

**COURSE DURATION**        45hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Explain common practices in welding pipe and tubing
  - a. description of pipes and tubing
  - b. flat positions
  - c. root face and spacing
  - d. operation of contour marker
  - e. wall thickness

- d. Identification of test positions and procedures
2. Describe tack welding of pipe sections
  - a. preparation of test specimens
  - b.. cutting and grinding the coupons
3. Explain the effect of carbon content on steels
4. Weld pipe and tubing (SMAW)
  - a. Weld two pieces of M.S. pipe/tubing in the 1G positions using stringer and weave beads

**NAME & NUMBER**            WD2240 - Pipe, Tubing & Specialized Welding

**DESCRIPTION**

This SMAW course requires the use of safety equipment, SMAW equipment and accessories, and materials and supplies. It involves setting up SMAW equipment, preparing and welding metal, shutting down equipment, and testing the joint. It includes information on stainless steel, aluminum and steel alloys, codes and standards, and types of electrodes.

**MAJOR TOPICS/TASKS**

Weld pipe and tubing (SMAW); Weld medium and high carbon steels

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1400 - Introduction to Pipe Welding

**COURSE DURATION**        150hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Weld pipe and tubing (SMAW)
2. Weld medium and high carbon steels, using preheat and post-heat with SMAW. Joints and positions are optional
  - a. Explain procedures for welding medium and high carbon steels using SMAW
  - b. Describe the characteristics of medium and high carbon steels weldability and processes used

- c. Explain the effect of carbon content on steels
  - d. Describe pre and post-heat and low hydrogen electrodes
3. Weld pipe and tubing (SMAW)
- a. Weld two pieces of M.S. pipe/tubing in the 2G, 5G, and 6G positions using stringer and weave beads

**NAME & NUMBER**            WD1130 - GMAW Fundamentals

**DESCRIPTION**

This GMAW course requires the use of safety equipment, GMAW equipment and accessories, and materials and supplies. It involves setting up GMAW equipment, preparing and welding the joint, shutting down the equipment and testing the joint. It includes information on types of shielding gasses, power supplies, types of wire, methods of transfer, welding techniques, codes and standards, and GMAW parameters.

**MAJOR TOPICS/TASKS**

Describe the GMAW process methods; Disassemble and reassemble GMAW welding system; Fillet weld flat (GMAW); Fillet weld horizontal (GMAW); Butt weld flat (GMAW)

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1160 - Welding Shop Fundamentals

**COURSE DURATION**        45hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         February 1994

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Describe the GMAW process methods
  - a. metal transfer
  - b. power source constant current and potential
  - c. polarity
  - d. arc voltage



- e. slope and adjustment
  - f. inductance
  - g. shielding gas and regulation
  - h. electrode wire
  - I. assembly of equipment
  - j. gun
  - k. feeder
  - l. welding variables and effects
  - m. electrode extension
  - n. welding voltage and current
  - o. travel speed
  - p. penetration
  - q. travel and work angles
  - r. manipulation
  - s. maintenance of tube
  - t. nozzle
  - u. cable
  - v. conduit pulsed arc machines
2. Disassemble and reassemble GMAW welding system
3. Fillet weld flat (GMAW)
- a. Describe shielding gas selection, drift and mixtures for steel, addition of carbon dioxide, electrode wires, wires for carbon steel, operating problems, work and travel angles, and gun manipulation
  - b. Describe methods of establishing the arc and starting the weld, stopping the weld at the finishing end of the joint, shielding gas after or post weld flow, work and travel angles, and common faults
  - c. Run stringer beads in a flat position on m.s. material
  - d. Weld in a flat position (GMAW)
    - I. "T" joint
    - ii. lap joint
3. Fillet weld horizontal (GMAW)
- a. Run stringer beads in horizontal position m.s.
  - b. Weld in horizontal position:
    - I. "T" joint
    - ii. lap joint
4. Butt weld flat (GMAW)
- a. Describe flat position butt welds, joint design fit up, defects commonly encountered, gun manipulation, and work and travel angles

- b. Weld in flat position:
  - I. square butt joint
  - ii. single vee butt joint
- c. Perform guided bend test on coupons

**NAME & NUMBER**            WD2160 - GMAW Position Welding

**DESCRIPTION**

This GMAW course requires the use of safety equipment, GMAW equipment and accessories, and materials and supplies. It involves setting up GMAW equipment, preparing and welding the joint, shutting down the equipment and testing the weld. It includes information on types of welding machines, types of shielding gas, power supplies, types of wire, codes and standards, welding techniques, methods of transfer and GMAW parameters.

**MAJOR TOPICS/TASKS**

Fillet weld vertical; Fillet weld overhead; Butt weld horizontal; Butt weld vertical; Butt weld overhead; Weld pipe and tubing, all positions; Join aluminum and aluminum alloys

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1130 - GMAW Fundamentals

**COURSE DURATION**        60hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         February 1994

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Fillet weld vertical (GMAW)
  - a. Describe the GMAW process used on the vertical position such as work and travel angle, gun manipulation, defects commonly encountered and effects of welding variables
  - b. Run stringer beads in vertical position on m.s.

- c. Weld in vertical position
  - I. "T" joint
  - ii. lap joint

2. Fillet weld overhead (GMAW)
  - a. Describe the overhead position, the necessary position, the necessary safety, positioning of the joint, common defects encountered, gun manipulation, effects of welding variables on weld characteristics
  - b. Run stringer beads in overhead position
  - c. Weld in the overhead position
    - I. "T" joint
    - ii. lap joint
  
3. Butt weld horizontal (GMAW)
  - a. Describe horizontal butt welds, joint design, joint fit up, common defects, work and travel angles, gun manipulation, welding variables and characteristics
  - b. Weld butt joint:
    - I. square butt joint
    - ii. single "V" joint
  - c. Perform guided bend test
  
4. Butt weld vertical (GMAW)
  - a. Describe the vertical position butt weld's joint design and fit up, common defects, work and travel angles, gun manipulation effects of welding variables and characteristics
  - b. Weld in vertical position:
    - I. square butt
    - ii. single vee
  - b. Perform guided bend test
  
5. Butt weld overhead (GMAW)
  - a. Describe the butt weld in the overhead position, joint design and fit up, common defects, work and travel angles, gun manipulation, effects of welding variables and characteristics
  - b. Weld butt joint
    - I. square butt joint
    - ii. single "V" joint
  - c. Perform guided bend test
  
6. Weld pipe and tubing, all positions (GMAW)
  - a. Describe pipe and tubing welding requirements for welding all positions, joint preparation, root face and spacing, backing rings, welding and fabricated fittings, jigs and fixtures, line of cut, contour marker, test positions, tack welding for performance test, test coupons, common defects, work and travel angles, gun manipulation, welding variables
  - b. Weld two pieces of m.s. in:

- I. 1G position
    - ii. 2G position
    - iii. 5G position
  - c. Perform guided bend test
  
- 7. Join aluminum and aluminum alloys (GMAW)
  - a. Explain the procedure for welding in flat vertical and horizontal position using GMAW. Characteristics of aluminum alloys, systems used for designation of alloy groups, alloy compositions, GMAW of aluminum and aluminum alloys
  - b. Determine the correct filler metal for a specified job
  - c. Weld with GMAW in flat, vertical, and horizontal positions:
    - I. tee joint
    - ii. lap joint

**NAME & NUMBER**            WD2260 -FCAW Fundamentals

**DESCRIPTION**

Course provides basic training for flux core arc welding.

**MAJOR TOPICS/TASKS**

Describe FCAW processes; Weld using FCA process; Fillet weld in 1G and 2G positions; Butt weld in the 1GF position

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1130 - GMAW Fundamentals

**COURSE DURATION**        30hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**          January 1999

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Describe FCAW processes
  - a. Describe FCAW methods of transfer
  - b. Describe power source constant current and potentials
  - c. Describe arc voltage, slope and adjustment
  - d. Describe inductance, shielding gas and regulation
  - e. Describe welding variables and effects
  - f. Explain electrode extension
  - g. Describe welding voltage and current
  - h. Describe travel speed

- I. Explain penetration
  - j. Describe conduit pulsed arc machines
  - k. Describe electrode wires
- 2. Weld using FCA process.
    - a. Assemble equipment, gun and feeder
    - b. Maintain tube, nozzle and cable
    - c. Select shielding gas
    - d. Determine drift and mixtures for steel
    - e. Select wires for carbon steel
    - f. Determine conditions for addition of carbon dioxide
    - g. Determine work and travel angles and gun manipulation
    - h. Identify operating problems
- 3. Fillet weld in 1G and 2G positions
  - 4. Butt weld in the 1GF position



**NAME & NUMBER**            WD2270 - FCAW Position Welding

**DESCRIPTION**

This FCAW course requires the use of safety equipment, FCAW equipment and accessories, and materials and supplies. It involves setting up FCAW equipment, preparing and welding the joint, shutting down the machine, and testing the weld. It includes information on FCAW parameters, types of wire, and drive roll systems.

**MAJOR TOPICS/TASKS**

Fillet weld flat; Fillet weld vertical; Fillet weld overhead; Fillet weld horizontal; Butt weld flat; Butt weld horizontal; Butt weld vertical; Butt weld overhead

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD2260 - FCAW Fundamentals

**COURSE DURATION**        60hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Fillet weld vertical (FCAW)
  - a. Run stringer beads in a vertical position on m.s. material
  - b. Weld in a vertical position (FCAW)
    - I. "T" joint
    - ii. lap joint

2. Fillet weld overhead (FCAW)
  - a. Run stringer beads in overhead position
  - b. Weld in overhead position
    - I. "T" joint
    - ii Lap joint
  
3. Butt weld horizontal (FCAW)
  - a. Weld butt joint
    - I. Square butt joint
    - ii. Single "V" joint
  - b. Perform guided bend test
  
4. Butt weld vertical (FCAW)
  - a. Weld in vertical position
    - I. Square butt joint
    - ii. Single "V" joint
  - b. Perform guided bend test
  
5. Butt weld overhead (FCAW)
  - a. Weld in overhead position
    - I. Square butt joint
    - ii. Single "V" joint
  - b. Perform guided bend test

**NAME & NUMBER**            WD1520 - GTAW Fundamentals

**DESCRIPTION**

This GTAW course requires the use of safety equipment, GTAW equipment and accessories, and materials and supplies. It involves setting up GTAW equipment, preparing and welding the joint, shutting down the machine and testing the weld. It includes information on filler metals, electrodes, electrical theory, types of shielding gases, types of power sources and exotic metals.

**MAJOR TOPICS/TASKS**

Explain GTAW processes; Set up GTAW equipment; Fillet weld flat; Fillet weld horizontal; Butt weld flat; Join stainless steel; Weld alloy steels; Weld broken or cracked magnesium castings using GTAW process; Join aluminum and aluminum alloys

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1160 - Welding Shop Fundamentals

**COURSE DURATION**        60hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**            Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**        May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Explain GTAW processes
  - a. Describe the GTAW process, welding machines requirements, current requirement, shielding gas, the GTAW torch, electrodes, conditioning of the thoriated electrode, typical GTAW, general precautions, safety aspects, travel and work angles, filler

- rods, pulsed arc machines, and sycrowave machines
  - b. Describe:
    - I. joint types
    - ii. edge preparations
    - iii. joint terminology
    - iv. weld types
    - v. the flat position
    - vi. work, travel and filler rod angles
  - c. Describe fillet weld terminology: facial shapes or profiles, face, throat, toe, depth of fusion and penetration, fillet weld size and measurement, common faults, work, travel, and rod angles, electrode stickout, shielding gas and welding current, tungsten electrodes
  - d. Explain the procedure for welding in flat, vertical and horizontal position using GTAW
2. Set up GTAW equipment
- a. Disassemble and reassemble GTAW system in preparation for operation
  - b. Deposit stringer beads on cold roll (cr) material
3. Fillet weld flat
- a. Describe the flat position, the butt joint, current requirements, electrode type, size and preparation, nozzle size, shielding gas, filler rod type and preparation torch and filler rod manipulation
  - b. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in flat position:
    - I. without filler rod
    - ii. with filler rod
  - c. Weld lap joint with filler rod
  - d. Weld "T" joint with filler rod
4. Fillet weld horizontal (GTAW)
- a. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in horizontal position:
    - I. without filler rod
    - ii. with filler rod
  - b. Weld lap joint with filler rod
  - c. Weld "T" joint with filler rod
5. Butt weld flat (GTAW)
- a. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in flat position:
    - I. without filler rod
    - ii. with filler rod
  - b. Weld "V" joint on 1/4" m.s.

- c. Weld square butt joint
  - d. Perform guided bend test on specimens
6. Join stainless steel
- a. Explain the procedure for welding stainless steel in F, V and H positions using GTAW processes, major types of s.s., thermal conductivity and expansion, identification, condition, weldability, distortion control
  - b. Set up GTAW machines
  - c. Weld with SMAW and GTAW in flat, semi-vertical and horizontal positions:
    - I. tee joint
    - ii. lap joint
    - iii. butt joint
7. Weld alloy steels
- a. Explain the procedure used for GTAW of various alloy steels
  - b. Describe alloy steels and added elements, weldability, tests, pre and post-heating and measurement of S.A.E. numbering, common problems, welding austenitic manganese and chrome-moly steels
8. Weld broken or cracked magnesium castings using GTAW process
- a. Explain the procedure for welding magnesium with GTAW
  - b. Describe the welding characteristics of magnesium, uses of magnesium, weldability, identification, joint design and preparation, flame adjustment required for the GTAW process, post weld cleaning.
9. Join aluminum and aluminum alloys
- a. Describe the characteristics of aluminum alloys, systems used for designation of alloy groups, alloy compositions, GTAW of aluminum and aluminum alloys

**NAME & NUMBER**            WD2250 - GTAW Position Welding

**DESCRIPTION**

This GTAW course requires the use of safety equipment, GTAW equipment and accessories, and materials and supplies. It involves setting up GTAW equipment, preparing and welding the joint, shutting down the equipment and testing the weld. It includes information on codes and standards, manipulation of electrodes, types of power sources, types of shielding gases, filler metals, electrode selection, and techniques for welding aluminum and stainless steel.

**MAJOR TOPICS/TASKS**

Fillet weld vertical; Fillet weld overhead; Butt weld horizontal; Butt weld vertical; Butt weld overhead; Weld pipe and tubing in all positions

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1520 - GTAW Fundamentals

**COURSE DURATION**        120hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Fillet weld vertical (GTAW)
  - a. Explain the procedure used for welding in the vertical position, also common faults, work, travel and filler rod angles
  - b. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material vertical position:

- I. without filler rod
    - ii. with filler rod
  - c. Weld lap joint with filler rod
  - d. Weld "T" joint with filler rod
  
2. Fillet weld overhead (GTAW)
  - a. Describe the GTAW process used on steels in the overhead position. Also common faults, work, travel and filler rod angles
  - b. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in overhead position:
    - I. without filler rod
    - ii. with filler rod
  - c. Weld lap joint with filler rods
  - d. Weld tee joint with filler rods
  
3. Butt weld horizontal (GTAW)
  - a. Describe the horizontal position, joint design, joint preparation, welding conditions torch and filler rod manipulation and common faults to this position
  - b. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in horizontal position:
    - I. without filler rod
    - ii. with filler rod
  - c. Weld square butt joint
  - d. Weld single vee joint on 1/4" m.s.
  
4. Butt weld vertical (GTAW)
  - a. Describe the vertical position, joint design, and preparation, welding conditions, torch and filler rod angles and manipulation, common faults to this position
  - b. Produce puddle and run continuous beads on 1/8" m.s. (c.r.) material in vertical position:
    - I. without filler rod
    - ii. with filler rod
  - c. Weld square butt weld
  - d. Weld single vee joint 1/4" plate
  - e. Perform guided bend test on specimens
  
5. Butt weld overhead (GTAW)
  - a. Describe the overhead position, joint design and preparation, welding conditions, torch and filler rod manipulations, work and travel angles, faults common to the position
  
  - b. Produce puddle and run continuous bead on 1/8" m.s. (c.r.) material in overhead:

- I. without filler rod
    - ii. with filler rod
  - c. Weld square butt joint
  - d. Weld single vee joint on 1/4 " plate
  - e. Perform guided bend test on specimens
  
- 6. Weld pipe and tubing in all positions (GTAW)
  - a. Describe: advantages of welded pipe and tubing, advantages of GTAW process, pipe and tubing, pipe welding practices, the four positions, joint preparation, root face and spacing, heat treatment, common faults, gas backing and purging, pipe alignment, lines of cut, test position electrodes, filler rod manipulation, filler finish passes, sequence, stringer beads



**NAME & NUMBER**            WD2190 - Specialized Welding & Cutting

**DESCRIPTION**

This specialized welding and cutting course requires the use of safety equipment, welding equipment and accessories, and materials and supplies. It involves setting up welding equipment, preparing and welding joints or cutting metal, shutting down equipment and testing welds. It includes information on stud welding, welding and cutting processes, consumables, principles of operation, process parameters and power supplies.

**MAJOR TOPICS/TASKS**

Weld using submerged arc; Cut using arc-air; Cut using plasma-arc; Spot weld; Build up metal parts (SMAW); Apply surfacing; Join cast iron

**PURPOSE / AIMS**

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES**            WD1160 - Welding Shop Fundamentals

**COURSE DURATION**        45hrs

**LEARNING RESOURCES**

Hobart Series  
Welding Skills  
New Brunswick Modules

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**         May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Weld using submerged arc
  - a. Describe the submerged arc process, advantages, types of welds, joint design, welding position, wire, flux, starting arc, current, voltage, speed, common faults, safety and safety rules
  - b. Set up saw equipment

- c. Perform fillet weld in flat position
  - d. Weld butt joint flat position:
    - I. square butt joint
    - ii. "V" groove butt joints
2. Cut using arc-air
- a. Describe the processes, uses, electrodes, current and air requirements, work and travel angles, problems, safety
  - b. Set up arc-air gouging equipment
  - c. Identify and select carbon rod
  - d. Cut, groove, gouge and remove metal
  - e. Maintain equipment
3. Cut using plasma-arc
- a. Describe the plasma arc, plasma cutting, fields of use, advantages, types basic system and set up, parameters, cutting with low amperage prestart up check procedures, safety
  - b. Set up, adjust and efficiently operate manual plasma arc cutting equipment as required for the cutting of ferrous and nonferrous metals
  - c. Perform cutting operations on the following materials:
    - I. carbon steel
    - ii. stainless steel
    - iii. aluminum
    - iv. copper
4. Spot weld
- a. Explain procedure for resistance and/or arc spot welding operations on carbon sheet using portable and stationary equipment. Joint design. Safety requirements
  - b. Resistance spot weld lap joint on 20 gauge carbon steel
  - c. Arc spot weld lap joint on 20 gauge carbon steel:
    - I. GMAW
    - ii. GTAW
5. Build up metal parts (SMAW)
- a. Describe types and kinds of metal wear
  - b. Describe the effects of heating and cooling on the building up process
  - c. Build up worn up or broken metal parts to restore the part to its original shape and usable condition
  - d. Select electrode suitable for given conditions and restore part to original size and condition
6. Apply surfacing

- a. Describe hard surfacing using the SMAW and OAW processes. Describe the principles of surfacing, applications, kinds of wear, abrasion, impact, corrosion, surfacing materials and safety precautions
- b. Set up equipment and prepare project
- c. Select surfacing material
- d. Apply surfacing

(SUGGESTED PROJECT: Apply austenitic or semi-austenitic surfacing material to wearing surface of dipper tooth using SMAW process, tooth may be simulated if necessary)

7. Join cast iron

- a. Explain the procedure for welding cast iron in flat position using SMAW
- b. Describe types of cast iron, identification and weldability of cast iron, SMAW of grey cast iron, oxy-acetylene braze welding
- c. Prepare project for welding
- d. Weld cast iron using SMAW

**NAME & NUMBER** SF1200 - Introduction to Template Development

**DESCRIPTION**

Course provides introductory level training for the layout and development of templates.

**MAJOR TOPICS/TASKS**

Identify layout work and template development; Develop shapes with appropriate bending and joining allowances; Develop template using triangular, radial lines and parallel line developments; Complete layout operations to develop templates for structural fabrications; Complete layout operations as required to develop wrap around templates for use in welded fabrication of joints in pipe and tubing

**PURPOSE / AIMS**

1. To develop the introductory skills and knowledge required for fitting metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES** None

**COURSE DURATION** 45hrs

**LEARNING RESOURCES**

Pipe and Template Development

**EVALUATION** Theory and Practical Applications Require a Pass Mark 70%.

**DATE DEVELOPED**

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Identify layout work and template development
  - a. Describe methods used to establish line of cut
  - b. Describe terms and operations commonly used in layout
  - c. Identify terms common to templates
  - d. Identify layout tools
2. Develop shapes with appropriate bending and joining allowances

3. Develop template using triangular, radial lines and parallel line developments
4. Complete layout operations to develop templates for structural fabrications for each of the following:
  - a. compound beams
  - b. plate girders
  - c. tubular hollow sections
  - d. box section members
  - e. beam selections
  - f. stairs and handrails
5. Complete layout operations as required to develop wrap around templates for use in welded fabrication of joints in pipe and tubing for each of the following:
  - a. A 90° single cut elbow 3" schedule #40 B.I. Pipe
  - b. A 90° double cut elbow 3" schedule #40 B.I. Pipe
  - c. A "T" 3" schedule #40 B.I. Pipe
  - d. A 30° lateral 3" schedule #40 B.I. Pipe
  - e. A true "Y" 3" schedule #40 Pipe
  - f. A concentric reducer 3" schedule #40 B.I. to 2" schedule #40 B.I. Pipe

**NAME & NUMBER** SF1300 - Advanced Template Development

**DESCRIPTION**

Course provides advanced training in the layout of structural shapes.

**MAJOR TOPICS/TASKS**

Describe types and determine sizes of carbon and alloy steel structural shapes; Layout structural shapes

**PURPOSE / AIMS**

1. To develop the introductory skills and knowledge required for fitting metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

**PREREQUISITES** SF1200 - Introduction to Template Development

**COURSE DURATION** 90hrs

**LEARNING RESOURCES**

Pipe Template Development

**EVALUATION** Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Describe types and determine sizes of carbon and alloy steel structural shapes
2. Layout structural shapes
  - a. Prepare joints required for the fitting of structural shapes to accuracy as required to provide efficient welding operations.
  - b. Work from industrial prints and/or sketches as necessary to provide for both accuracy of dimensions and quality of welding.
  - c. Layout and fit common joints and assemblies with various standard structural shapes.
  - d. Determine bend allowance on various thickness of materials.

**NAME & NUMBER** DR1120 - Blueprint Reading for Welders

**DESCRIPTION**

This course requires the use of drawings, views, joint configuration, abbreviations, and weld symbols. It includes information on joint and welding symbols for weldment fabrication.

**MAJOR TOPICS/TASKS**

Interpret welding symbols and abbreviations; Catalogue basic joints for Weldment Fabrication; Identify fillet welds; Recognize groove welds; Determine back or backing and melt-thru welds; Recognize plug and slot welds; Recognize surfacing welds; Recognize flange welds; Determine spot welds; Identify projection welds; Recognize seam welds; Recognize stud welds; Interpret pipe-welding symbols; Describe inspection and testing; Identify international standard symbols for welding

**PURPOSE / AIMS**

1. To develop the skills and knowledge required to read and interpret drawings

**PREREQUISITES** DR1700 - Basic Drawing & Sketching

**COURSE DURATION** 75hrs

**LEARNING RESOURCES**

Blueprint Reading for Welders

**EVALUATION** Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED** May 1998

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Interpret welding symbols and abbreviations
  - a. Interpret welding symbols
  - b. Locate weld symbols
  - c. Determine additional welding symbol elements
  - c. Identify obsolete weld symbols
  - d. Select preferred symbols
  - e. Determine contour and finish symbols
  - f. Identify multiple weld symbols

- g. Determine member to be bevelled
  - h. Select dimensions on welding symbols
  - I. Designate special information
  - j. Locate welding symbol on orthographic views
  - k. Identify duplicate welds
  - l. Determine multiple reference lines and their application
  - m. Interpret welding abbreviations
2. Catalogue basic joints for Weldment Fabrication
- a. Recognize basic joints
  - b. Recognize other kinds of joints
  - c. Determine joints commonly used with structural shapes
  - d. Determine joint fitup
3. Identify fillet welds
- a. Determine size of the legs
  - b. Determine length of fillet welds
  - c. Determine the extent of welding
  - d. Identify pitch and intermittent welding
  - c. Determine contour and finishing
  - d. Select fillet weld in combination with other symbols
4. Recognize groove welds
- a. Identify groove welds
  - b. Determine depth of groove preparation
  - c. Identify groove weld size
  - d. Determine root opening of groove welds
  - e. Determine groove angle
  - f. Identify contour and finish
  - e. Select groove weld combinations
  - f. Determine the application of back gouging to groove welds
  - g. Determine the application of backing and spacer material to groove welds
  - h. Identify consumable inserts and their application to groove welds
5. Determine back or backing and melt-thru welds
- a. Determine size of backing and melt-thru welds
  - b. Identify contour and finish
  - c. Select applications of back or backing symbols
  - d. Select applications of melt-thru symbols with groove symbols
6. Recognize plug and slot welds
- a. Determine size of plug and slot welds



- b. Determine angle of countersink
  - c. Identify depth of filling
  - d. Determine number of plug and slot welds
  - e. Identify pitch
  - f. Identify contour and finish
  - g. Recognize plug welds with three or more joints
7. Recognize surfacing welds
- a. Identify surfacing welds
8. Recognize flange welds
- a. Determine dimensions
  - b. Recognize the application of the edge-flange and corner-flange weld symbols
9. Determine spot welds
- a. Dimension the spot-weld symbol
  - b. Identify contour and finish symbols
10. Identify projection welds
11. Recognize seam welds
- a. Determine flush-contour symbol
  - b. Identify multiple-joint seam welds
12. Recognize stud welds
13. Interpret pipe-welding symbols
- a. Identify symbols for pipe layout
  - b. Dimension pipe layout
  - c. Determine methods of representing a pipe layout
14. Describe inspection and testing
- a. Determine practices and symbols
  - b. Identify nondestructive testing symbols
15. Identify international standard symbols for welding

**NAME & NUMBER**            WD1510 - Metallurgy Fundamentals

**DESCRIPTION**

This metallurgy course requires the use of hardenable steel, heating sources and temperature indicators. It involves shaping metal, determining heat ranges, applying heat, monitoring color and temperature and quenching. It includes information on structure and properties of metals, heat treatment processes, production of materials, corrosion, expansion and contraction, millworking, casting, heat line bending, pre-heat and post-heat and alloying elements.

**MAJOR TOPICS/TASKS**

Describe properties of metals; Explain causes of metal failure; Describe casting; Explain millworking; Allow for expansion and contraction; Select and heat treat metals; Perform identification tests; Forge and form metals by hand; Describe principle and method of flame straightening distorted structural members; Describe the different welding processes

**PURPOSE / AIMS**

1. To develop the skills and knowledge to conduct various heat treatment procedures on carbon steel
2. To develop an understanding of the effects of heat on metals and alloys

**PREREQUISITES**            WD1210 - Oxy-Fuel Cutting & Welding

**COURSE DURATION**        45hrs

**LEARNING RESOURCES**

**EVALUATION**                Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED**          February 1994

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Describe properties of metals
  - a. Describe the types of materials currently used: steel, iron, aluminum, magnesium, copper, nickel, lead, and their alloys
  - b. Describe the process of producing iron and steel
  - c. Describe the physical, chemical and mechanical properties of steel, iron, aluminum, lead and their alloys

- d. Describe solid state changes of materials
  - e. Describe the mechanical properties of metals
2. Explain causes of metal failure
- a. Explain why metals fail
  - b. List corrosion resistant materials
  - c. Describe the corrosive process affected by chemical and environmental factors for different materials
  - d. List appropriate materials for various environments
  - e. Describe the precautionary process to alleviate corrosion
3. Describe casting
- a. Describe the casting designs
  - b. Define casting terminology
  - c. Explain the applications of the casting process
  - d. Describe potential discontinuities associated with castings
  - e. Describe appropriate methods of inspection to locate potential discontinuities
4. Explain millworking
- a. Define the terminology associated with the millworking process including forging, casting and extrusion
  - b. Explain the application of forging, casting and extrusion
  - c. Describe how the metal properties are affected by the millworking process
  - d. Describe potential discontinuities associated with the millworking process
  - e. Describe appropriate methods of inspection to locate potential discontinuities
5. Allow for expansion and contraction
- a. Describe effects of contraction and expansion forces when cutting and welding
  - b. Describe methods to prevent or control distortion
  - c. Use principles of expansion and contraction to remove corroded or sized machine parts
  - d. Make allowances for and correct distortion resulting from expansion and contraction occurring as a result of welding and cutting operations
  - e. Perform pre-heat requirements (flame and electrical)
  - f. Perform post-heat requirements (flame and electrical)
6. Select and heat treat metals
- a. Describe hardening, tempering, annealing, normalizing, stress relieving and recrystallization
  - b. Describe the influence of heat on the properties of materials
  - c. Explain when, how, and why the pre-heat, post-heat and preening applications are employed

- d. Describe the effects of carbon and other common alloys on the heat treatment of metals
  - e. Describe the effects of heat on the micro-structure of metals
  - f. Describe the effects of different cooling mediums and cooling rates on the micro-structure of metals
  - g. Describe case hardening methods
  - h. Describe heat sources used for heat treating purposes
  - I. Use temperature indicators for heat treatment purposes
  - j. Carry out hardening and annealing procedure on medium to high carbon steel
7. Perform identification tests
- a. spark test and color code
  - b. magnetic test and hardness test
  - c. file test
8. Forge and form metals by hand
- a. Determine the most practical heating source (oxy-acetylene heating equipment or small forging furnace)
  - b. Assemble the equipment and test it for safe operation
  - c. Ignite and adjust the heating equipment for efficient operation
  - d. Heat the work slowly and thoroughly to forging temperature
  - e. Forge the work into the required shape
  - f. Cool the work to place it in the condition required
  - g. Shut down the heating equipment and leave it in a safe condition
- 9 Describe principle and method of flame straightening distorted structural members
10. Describe the different welding processes

**NAME & NUMBER** DR1700 - Basic Drawing & Sketching

**DESCRIPTION**

This drafting course requires the use of basic drawings, specifications, bills of materials, drawing instruments and facilities, and CAD software and hardware. It involves reading basic drawings and diagrams, sketching, interpretation of specifications, and operating the CAD system. It includes information on sketching techniques, types of drawings, and CAD commands.

**MAJOR TOPICS/TASKS**

Construct geometric shapes and lines; Describe dimensioning; Sketch orthographic projections; Sketch sectional views; Sketch primary auxiliary views; Identify information from blueprints and drawings; Interpret specifications; Identify information from bill of materials; Operate the CAD system

**PURPOSE / AIMS**

1. To develop the skills and knowledge required to read drawings and sketch views.

**PREREQUISITES** None

**COURSE DURATION** 75 hrs

**LEARNING RESOURCES**

**EVALUATION** Theory and Practical Applications Require a Pass Mark of 70%.

**DATE DEVELOPED** June 1996

**COURSE OUTLINE / LEARNING OBJECTIVES:**

1. Construct geometric shapes and lines
  - a. Draw lines to scale
  - b. Scale lines
  - c. Divide lines into equal parts
  - d. Bisect lines
  - e. Construct angles
  - f. Bisect angles
  - g. Construct concave and convex curves
  - h. Construct circles, arcs, tangents, ellipses, polygons, etc.

- I. Explain the various methods of producing lines
  - j. Describe the alphabet of lines
  - k. List the basic drawing symbols
  - l. Explain what is meant by quality of lines
  - m. Describe metric, mechanical, architectural and civil scales
  - n. Describe the different types of pencil lead grades
  - o. Describe letter types
  - p. Describe lettering instrument types
  - q. Explain spacing, sizes and lettering techniques
2. Describe dimensioning
    - a. Describe types of dimensions and lines used
    - b. Explain the rules of dimensioning
    - c. Explain the purpose and methods of dimensioning
3. Sketch orthographic projections
    - a. Visualize object
    - b. Select views
    - c. Layout sketch
    - d. Sketch projection
    - e. Dimension sketch
    - f. Make notations
4. Sketch sectional views
    - a. Explain intersections and developments
    - b. Explain conventions associated with sectional views such as symbols, cutting plane lines, broken-out lines, etc.
    - c. Describe the purpose and types of sectional views
    - d. Locate section
    - e. Select type of view
    - f. Determine scale
    - g. Sketch view
    - h. Dimension sketch
    - I. Make notations
5. Sketch primary auxiliary views
    - a. Describe different view orientations
    - b. Describe obliques, isometrics and perspectives
    - c. Explain sketching techniques
    - d. Explain main view and possible views
    - e. Describe the six principle views
    - f. Explain association of surfaces

- g. Explain matching pictorials
  - h. Visualize the view
  - I. Layout the sketch
  - j. Sketch view
  - k. Dimension sketch
  - l. Make notations
6. Identify information from blueprints and drawings
- a. Visualize views and projections
  - b. Identify information from schematic diagrams, assembly drawings, views, feeder maps, etc.
  - c. Identify sequence of fabrication according to blueprint
  - d. Identify cut of materials from sketches
  - e. Interpret horizontal, vertical, curved, inclined lines, fillets, and radii on working drawings
  - f. Identify dimensions of holes, cylinders, circles, angles and arcs
7. Interpret specifications
- a. Interpret specifications
  - b. Identify tolerance specifications
  - c. Interpret specifications (company standards books)
8. Identify information from bill of materials
9. Operate the CAD system
- a. Explain the functions of the CAD system
  - b. Start up the system
  - c. Set up directories and manage files
  - d. Start AutoCAD
  - e. Operate the system

**REQUIRED RELATED COURSES**



**COURSE NAME & NUMBER:** Workplace Correspondence CM2150

**DESCRIPTIVE TITLE:** Workplace Correspondence

**CALENDAR TITLE:**

**1.0 Type and Purpose** Communications 2150 gives students the opportunity to study the principles of effective writing. Applications include letters, memos, and short report writing.

**2.0 Major Topics** Review of Sentence and Paragraph Construction; Business Correspondence; Informal Report; Job Search Techniques.

**PREREQUISITES:** Nil

**CO-REQUISITES:** Nil

**COURSE DURATION** 45hrs

**SUGGESTED TEXT/  
LEARNING RESOURCES:**

**Textbooks:** Business English and Communications, Fourth Canadian Edition, Clark, Zimmer, et al., McGraw-Hill Ryerson, 1990

Student Projects and Activities for Business English and Communications, Fourth Canadian Edition, Clark, et al., McGraw-Hill, 1990

Effective Business Writing, Jennifer MacLennon

Simon and Shuster Handbook for Writers, Second Edition, Troyka Lynn Quitman, Prentice Hall

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College English Communication, Third Canadian Edition, Stewart, Zimmer, et al., McGraw-Hill Ryerson Limited, 1989

Business and Administrative Communication, Second Edition, Kitty O. Locker. IRWIN, 1991

**References:** Pittman Office Handbook, Smith/Hay-Ellis  
The Gregg Reference Manual, Fourth Canadian Edition, Sabin/O'Neill

McGraw Hill Handbook

**Other Resources:** Business Letter Business (Video), Video Arts

Guest Speakers

Sell Yourself (Video)

**COURSE AIMS:**

1. To help students understand the importance of well-developed writing skills in business and in career development.
2. To help students understand the purpose of the various types of business correspondence.
3. To examine the principles of effective business writing.
4. To examine the standard formats for letters and memos.
5. To provide opportunities for students to practice writing effective letters and memos.
6. To examine the fundamentals of informal reports and the report writing procedure.
7. To provide an opportunity for students to produce and informal report.

**MAJOR TOPICS/TASKS:**

- 1.0 Review of Sentence and Paragraph Construction
- 2.0 Business Correspondence
- 3.0 Informal Report/Present Orally

**COURSE OUTLINE:**

- 1.0 Review of Sentence and Paragraph Construction
  - 1.1 Examining and applying principles of sentence construction
  - 1.2 Examining and applying principles of paragraph construction
- 2.0 Business Correspondence
  - 2.1 Examining the value of well-developed business writing skills
  - 2.2 Examining principles of effective business writing
  - 2.3 Examining business letters and memos
- 3.0 Informal Report
  - 3.1 Examining the fundamentals of informal business reports

### 3.2 Applying informal report writing skills

#### **LEARNING OBJECTIVES:**

#### 1.0 Review of Sentences and Paragraph Construction

- 1.1.1 Define a sentence and review the four types.
- 1.1.2 Identify the essential parts of a sentence, particularly subject and predicate, direct and indirect object.
- 1.1.3 Differentiate among phrases, clauses, and sentences.
- 1.1.4 Explore the major concepts related to subject-verb agreement.
- 1.1.5 Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.

#### 1.2 Examine and Apply Principles of paragraph Construction

- 1.2.1 Discuss the basic purposes for writing.
- 1.2.2 Define a paragraph and describe the major characteristics of an effective paragraph.
- 1.2.3 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.

#### 2.0 Business Correspondence

##### 2.1 Examine the Value of Business Writing Skills

- 2.1.1 Discuss the importance of effective writing skills in business
- 2.1.2 Discuss the value of well-developed writing skills to career success

##### 2.2 Examine Principles of Effective Business Writing

- 2.2.1 Discuss the rationale and techniques for fostering goodwill in business communication, regardless of the circumstances
- 2.2.2 Review the importance of revising and proofreading writing

##### 2.3 Examine Business Letters and Memos

- 2.3.1 Differentiate between letter and memo applications in the workplace
- 2.3.2 Identify the parts of a business letter and memo
- 2.3.3 Explore the standard formats for business letters and memos

- 2.3.4 Examine guidelines for writing an acceptable letter and memo which convey: acknowledgment, routine request, routine response, complaint, refusal, and persuasive request, for three of the six types listed
- 2.3.5 Examine samples of well-written and poorly written letters and memos

### 3.0 Informal Report

#### 3.1 Examine the Fundamentals of Informal Business Reports

- 3.1.1 Identify the purpose of the informal report
- 3.1.2 Identify the parts and formats of an informal report
- 3.1.3 Identify methods of information gathering

#### 3.2 Apply Informal Report Writing Skills and Oral Reporting Skills

- 3.2.1 Gather pertinent information
- 3.2.2 Organize information into an appropriate outline
- 3.2.3 Draft a five minute informal report
- 3.2.4 Edit, proofread, and revise the draft to create an effective informal report and present orally using visual aids.

### **RECOMMENDED EVALUATION:**

Required Pass Mark      70%

### **DEVELOPMENT HISTORY:**

Date Developed:

Date Revised: 1999 05 03

**Name and Number:** Customer Service MR1210

**Descriptive Title:** Customer Service

**Summary 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.

**Prerequisites:** None

**Co-requisites:** None

**Suggested Duration:** 30 hrs

**Evaluation:** Theory and Practical Applications Require a Pass Mark of 70%.

**Course Aims:**

1. To know and understand quality customer service
2. To know why quality service is important
3. To know and understand the relationship between “service” and “sales”
4. To understand the importance of and to demonstrate a positive attitude
5. To recognize and demonstrate handling of customer complaints

**Course Objectives (Knowledge):**

1. **Providing Quality Service**
  - Define quality service
  - List the types of quality service
  - Define Service vs. Sales or Selling
  - Explain why quality service is important

- Identify the various types of customers
- Define customer loyalty

**2. Determining Customers Wants and Needs**

- List four levels of customer needs
- Identify important customer wants and needs
- Identify ways to ensure repeat business

**3. Demonstrating a Positive Attitude**

- List the characteristics of a positive attitude
- Explain why it is important to have a positive attitude
- List ways that a positive attitude can improve a customer's satisfaction
- Define perception
- Explain how perception can alter us and customers
- Understand how to deal with perception

**4. Effectively Communicating with customers**

- Describe the main elements in the communication process
- Identify some barriers to effective communication
- Define body language
- Explain how body language would affect customers
- Determine why body language is important
- Define active listening and state why it is important
- Describe the four components of active listening
- Contrast good and bad listeners
- List and discuss the steps of the listening process

**5. Effectively using Questioning Techniques**

- List questioning techniques
- Write two example of an open question
- Perform a questioning and listening role play

**6. Using the Telephone Effectively**

- List the qualities of a professional telephone voice
- Explain why telephone skills are important
- Demonstrate effective telephone skills

**7. Asserting Oneself: Handling Complaints and Resolving Conflict**

- Define assertiveness
- Define communication behaviors
- Relate assertions to effective communication
- Practice being assertive
- Understand the process of assertive guidelines for action
- Practice giving an assertive greeting
- Acknowledge multiple customers

**8. Dealing with Difficult Customers**

- Describe how you would deal with anger
- Complete a guide to controlling feelings
- Determine how you would feel dealing with an upset customer
- Suggest some techniques that might control your own feelings
- Understand leadership styles and the nature of organizations
- List ways to dealing with conflict / customer criticism
- Be aware of certain guidelines when confronting customers
- List ways of preventing unnecessary conflict with customers
- Review current skills and knowledge of customer service
- Develop a customer satisfaction improvement plan

**Name and Number:** General Studies SP2330

**Descriptive Title:** Quality Assurance / Quality Control

**Description:**

This general studies course requires the use of basic tools and equipment and materials and supplies. It requires controlling drawings and specifications and/or calibrating measuring devices in applicable occupations. It involves 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.

**Prerequisites:** None

**Co-requisites:** None

**Suggested Duration:** 30 Hrs

**Course Aims:**

1. To develop the skills and knowledge required to apply quality assurance/quality control procedures
2. To develop an awareness of quality management principles and processes

**Course Objectives (Knowledge):**

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 engineering drawings 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 quality management.



6. Explain why it is important for all employees to understand the structure of the company and its production processes.
7. Explain how human resource effectiveness is maximized in a quality managed organization.
8. Explain the role of company policy in quality management.
9. Explain the purpose of codes and standards.
10. Explain the concepts of quality
  - a. cost of quality
  - b. measurement of quality
  - c. quality control and quality assurance
  - d. elements of quality
  - e. elements of the quality audit
  - f. quality standards
  - g. role expectations and responsibilities
11. Explain the structure of quality assurance and quality control
  - a. Define quality assurance, quality control and documentation terminology
  - b. Describe organizational charts
  - c. List the elements of a quality assurance system
  - d. Explain the purpose of the quality assurance manual
  - e. Describe quality assurance procedures
  - f. Explain the key functions and responsibilities of personnel
12. Complete quality assurance/quality control documentation
  - a. Describe methods of recording reports in industry
  - b. Describe procedures of traceability (manual and computer-based recording)
  - c. Identify needs for quality control procedures

**Major Tasks / Subtasks (Skills):**

1. Apply quality control to projects
  - a. Follow QA/QC procedures for drawings, plans and specifications in applicable occupations.
  - b. Calibrate measuring instruments and devices in applicable occupations.
  - c. Interpret required standards

- d. Follow QA/QC procedures for accepting raw materials
- e. Carry out the project
- f. Control the quality elements (variables)
- g. Complete QA/QC reports

**Evaluation:**

Pass Mark Required 70%

**Development History:**

Date Developed: February 1994

Date Revised: April, 1999

**COURSE NAME & NUMBER:** Introduction to Computers MC1050

**DESCRIPTIVE TITLE:** Introduction to Computers

**CALENDAR ENTRY:**

**Type and Purpose** 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.

**Major Topics** Microcomputer System Hardware and Software Components; Word Processing; Electronic Spreadsheets; Electronic Mail and the Internet.

**PRE-REQUISITES:** Nil

**CO-REQUISITES:** Nil

**SUGGESTED DURATION:** 30 hours

**SUGGESTED TEXT/  
LEARNING RESOURCES:**

**Textbook(s):**

**References:**

**Other Resources:**

**COURSE AIMS:**

1. To provide students with a introduction to computer systems and their operation.
2. To introduce students to popular software packages, their applications and future trends in computer applications.

**MAJOR TOPICS:**

1. Microcomputer System Hardware and Software Components
2. Word Processing
3. Spreadsheet
4. E-Mail and the Internet

**COURSE OUTLINE:**

1.0 Microcomputer System Hardware and Software Components

1.1 Microcomputer Hardware

1.1.1 System Components

1.1.2 Function of each Component

1.2 Microcomputer Software

1.2.1 Software Definition and Types

1.2.2 System Software (Windows 95)

1.2.3 File Management Commands (Windows 95)

2. Word Processing

2.1 Keyboarding Techniques

2.2 Word Processing

2.2.1 Understanding Word Processing

2.2.2 Create a Document

2.2.3 Save, Open and Edit a Document

2.2.4 Edit a Document: Cut and Paste

2.2.5 Understand Hidden codes.

2.2.6 The Select Feature (Block)

2.2.7 Change Layout Format

2.2.8 Change Text Attributes

2.2.9 Use Auxiliary Tools

2.2.10 Select the Print Feature (number of copies and current document)

3. Electronic Spreadsheet

3.1 Spreadsheet Basics

3.2 Operate Menus

3.3 Create a Worksheet

3.4 Use Ranges

3.5 Print a Worksheet

3.6 Edit a worksheet

- 4. Electronic Mail and the Internet
  - 4.1 Electronic Mail
  - 4.2 The Internet

**Learning Objectives:**

- 1. Microcomputer System Hardware and Software Components
  - 1.1 Microcomputer Hardware
    - 1.1.1 System Components
      - 1.1.1.1 Identify major components of a computer system.
    - 1.1.2 Function of each Component
      - 1.1.2.1 Describe the function of the microprocessor.
      - 1.1.2.2 Describe and give examples of I/O DEVICES.
      - 1.1.2.3 Describe primary storage (RAM, ROM, Cache).
      - 1.1.2.4 Define bit, byte, code and the prefixes k.m. and g.
      - 1.1.2.5 Describe secondary storage (diskettes and hard disks, CD ROMS, Zip Drives etc).
      - 1.1.2.6 Describe how to care for a computer and its accessories.
  - 1.2 Microcomputer Software
    - 1.2.1 Software Definition and Types
      - 1.2.1.1 Define software.
      - 1.2.1.2 Describe, operational and application software used in this course.
      - 1.2.1.3 Define file and give the rules for filenames and file extensions..
    - 1.2.2 System Software (Windows 95)
      - 1.2.2.1 Getting Started with Windows
      - 1.2.2.2 Start and quit a Program
      - 1.2.2.3 Get Help
      - 1.2.2.4 Locate a specific file using the **find** function of Win95

- 1.2.2.5 Changing system settings: wall paper, screen saver, screen resolution, background.
- 1.2.2.6 Starting a program by using the Run Command
- 1.2.2.7 Shutting down your computer

### 1.2.3 File Management Commands (Windows 95)

- 1.2.3.1 View directory structure and folder content
- 1.2.3.2 Organizing files and folders
- 1.2.3.3 Copy, delete, and move files and folders
- 1.2.3.4 Create folders
- 1.2.3.5 Maximize and minimize a window
- 1.2.3.6 Print directory/folder content
- 1.2.3.7 Describe the Windows 95 taskbar

## 2. Word Processing

### 2.1 Keyboarding Techniques

- 2.1.1 Identify and locate alphabetic and numeric keys
- 2.1.2 Identify and locate function keys: special keys, home keys, page up key, page down key, numeric key pad, shift keys, punctuation keys, tab key

### 2.2 Word Processing

#### 2.2.1 Understanding word processing

- 2.2.1.1 The Windows Component
- 2.2.1.2 The Menu Bar
- 2.2.1.3 Menu Indicators
- 2.2.1.4 The Document Window
- 2.2.1.5 The Status Bar
- 2.2.1.6 The Help Feature
- 2.2.1.7 Insertion Point Movements

#### 2.2.2 Create a document

- 2.2.2.1 Change the Display
- 2.2.2.2 The Enter Key
- 2.2.2.3 Enter Text

2.2.3 Save, Open and Exit a document.

- 2.2.3.1 Save a document
- 2.2.3.2 Close a document.
- 2.2.3.3 Start a new document Window
- 2.2.3.4 Open a document
- 2.2.3.5 Exit Word Processor

2.2.4 Edit a Document

- 2.2.4.1 Add New Text
- 2.2.4.2 Delete text
- 2.2.4.3 Basic Format Enhancement (split and join paragraphs, insert text)

2.2.5 Understand Hidden Codes

- 2.2.5.1 Display Hidden Codes
- 2.2.5.2 Delete Text Enhancements

2.2.6 The Select Feature

- 2.2.6.1 Identify a Selection
- 2.2.6.2 Move a Selection
- 2.2.6.3 Copy a Selection
- 2.2.6.4 Delete a Selection
- 2.2.6.5 Select Enhancements
- 2.2.6.6 Save a Selection
- 2.2.6.7 Retrieve a Selection

2.2.7 Change Layout Format

- 2.2.7.1 Change layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)

2.2.8 Change Text Attributes

- 2.2.8.1 Change text attributes: (bold, underline, font, etc.)

2.2.9 Use Auxiliary Tools

- 2.2.9.1 Spell Check

2.2.10 Select the Print Feature

2.2.10.1 Select the Print Feature: (i.e; number of copies and current document)

2.2.10.2 Identify various options in print screen dialogue box

3. Electronic Spreadsheet

3.1 Spreadsheet Basics

3.1.1 The Worksheet Window

3.2 Operates Menus

3.2.1 Use a Menu Bar

3.2.2 Use a Control Menu

3.2.3 Use a Shortcut Menu

3.2.4 Save, Retrieve form Menus

3.3 Create a Worksheet

3.3.1 Enter Constant Values and Formulas

3.3.2 Use the Recalculation Feature

3.3.3 Use Cell References (relative and absolute references)

3.4 Use Ranges

3.4.1 Type a Range for a Function

3.4.2 Point to a Range for a Function

3.4.3 Select a Range for Toolbar and Menu Commands

3.5 Print a Worksheet

3.5.1 Print to the Screen

3.5.2 Print to the Printer

3.5.3 Print a Selected Range

3.6 Edit a Worksheet

3.6.1 Replace Cell Contents

3.6.2 Insert and Delete Rows and Columns

3.6.3 Change Cell Formats

3.6.4 Change Cell Alignments

3.6.5 Change Column Width

3.6.6 Copy and Move Cells



4. Electronic Mail and the Internet

4.1 Electronic Mail

- 4.1.1 Compose and send an e-mail message
- 4.1.2 Retrieve an e-mail attachments
- 4.1.3 Send an e-mail message with attachments
- 4.1.4 Retrieve and save e-mail attachments
- 4.1.3 Print an e-mail message
- 4.1.4 Delete an e-mail message

4.2 The Internet

- 4.2.1 Overview of the World Wide Web
- 4.2.2 Accessing Web sites
- 4.2.3 Internet Web Browsers
- 4.2.4 Internet Search Engines
- 4.2.5 Searching Techniques

**STUDENT EVALUATION:**

Required Pass Mark            70%

**DEVELOPMENT HISTORY:**

**Date Designed            1998**  
**Date Revised             1999**

**Name and Number:** Workplace Skills SD 1700

**Descriptive Title:** Workplace Skills

**Description:**

This course involves participating in meetings, doing safety inspections, completing employment insurance forms, writing letters of employment insurance appeal, and filing a human rights complaint. Includes information on formal meetings, unions, worker's compensation, employment insurance regulations, worker's rights and human rights.

**Prerequisites:** None

**Co-requisites:** None

**Suggested Duration:** 30 Hrs

**Course Aims:**

1. Participate in meetings (conduct meetings).
2. Be aware of union procedures.
3. Be aware of workers' compensation regulations.
4. Be aware of occupational health and safety regulations.
5. Be aware of employment insurance regulations
6. Be aware of workers' rights.
7. Be aware of human rights

**Course Objectives (Knowledge):**

1. Meetings
  - a. Explain preparation requirements prior to conducting a meeting
  - b. Explain the procedures for conducting a meeting.
  - c. Explain participation in meetings.
  - d. Explain the purpose of motions.
  - h. Explain the procedure to delay discussion of motions.
  - i. Explain how to amend and vote upon a motion.

2. Unions
  - a. Why do unions exist?
  - b. Give a concise description of the history of Canadian labour.
  - c. How do unions work?
  - d. Explain labour's structure.
  - e. Describe labour's social objectives.
  - f. Describe the relationship between Canadian labour and the workers.
  - g. Describe the involvement of women in unions.
3. Worker's Compensation
  - a. Describe the aims, objectives, benefits and regulations of the Workers Compensation Board.
  - b. Explain the internal review process.
4. Occupational Health and Safety
  - a. Describe the rules and regulations directly related to your occupation.
5. Employment Insurance Regulations
  - a. Explain employment insurance regulations
  - b. Describe how to apply for employment insurance.
  - c. Explain the appeal process.
6. Worker's Rights
  - a. Define labour standards.
  - b. Explain the purpose of the Labour Standards Act.
  - c. List regulations pertaining to:
    - i. Hours of work.
    - ii. Minimum wage.
    - iii. Employment of children.
    - iv. Vacation pay
7. Human Rights
  - a. Describe what information cannot be included on an application.
  - b. Describe what information cannot be included in an interview
  - c. Why is there a Human Rights Code?
  - d. Define sexual harassment.

**Major Tasks / Subtasks (Skills):**

1. Participate in meetings.
  - a. Follow the form of getting a motion on the floor
  - b. Discuss a motion

- c. Amend a motion
  - d. Vote on a motion.
2. Complete a safety inspection of your shop.
  3. Complete an employment insurance application form.
  4. Write a letter of appeal.
  5. Analyze a documented case of a human rights complaint with special emphasis on the application form, time-frame, documentation needed, and legal advice available.

**Evaluation:**

Required Pass Mark            70%

**Development History:**

Date Developed:  
Date Revised:     April, 1999

**Name and Number:** Job Search Techniques SD 1710

**Descriptive Title:** Job Search Techniques

**Prerequisites:** None

**Co-requisites:** None

**Suggested Duration:** 15 hrs.

**Evaluation:** Theory and Practical Applications Require a Pass Mark of 70%.

**Course Objectives (Knowledge):**

**1. Examine and Demonstrate Elements of Effective Job Search Techniques**

- Identify and examine employment trends and opportunities
- Identify sources that can lead to employment
- Discuss the importance of fitting qualifications to job requirements
- Discuss and demonstrate consideration in completing job application forms
- Establish the aim/purpose of a resume
- Explore characteristics of effective resumes, types of resumes, and principles of resume format
- Explore characteristics of and write an effective cover letter
- Explore, and participate in a role play of a typical job interview with commonly asked questions and demonstrate proper conduct
- Explore other employment related correspondence
- Explore the job market to identify employability skills expected by employer
- Conduct a self-analysis and compare with general employer expectations

**DEVELOPMENT HISTORY:**

Date Developed:

Date Revised: 1999 05 03

**Name and Number:** Entrepreneurial Awareness SD 1720

**Descriptive Title:** Entrepreneurial Awareness

**Prerequisites:** None

**Co-requisites:** None

**Suggested Duration:** 15 hrs

**Evaluation:** Theory and Practical Applications Require a Pass Mark of 70%.

**Course Objectives (Knowledge):**

- 1. Explore Self-Employment: An Alternative to Employment**
  - Identify the advantages and disadvantages of self-employment vs. regular employment
  - Differentiate between an entrepreneur and a small business owner
  - Evaluate present ideas about being in business
  
- 2. Explore the Characteristic of Entrepreneurs**
  - Identify characteristics common to entrepreneurs
  - Relate their own personal characteristics with those of entrepreneurs.
  - Evaluate their present ideas about business people
  
- 3. Identifying Business Opportunities**
  - Distinguish between an opportunity and an idea.
  - List existing traditional and innovative business ventures in the region.
  - Explain the general parameters between which business ventures should fit.
  - Summarize the role of such agencies Regional Economic Development Boards, Business Development Corporations, etc.
  - Identify potential business opportunities within the region.
  
- 4. Demystifying the Entrepreneurial Process.**
  - Explain the entrepreneurial process
  - Describe the purpose of a business plan
  - Identify the main ingredients of a business plan
  - Summarize the role of such agencies as BDC's, ACOA, Women's Enterprise Bureau etc.
  - List other agencies where assistance - financial and otherwise - is available to those interested in starting a business venture.

## REQUIRED WORK EXPERIENCES

National Red Seal Certification requires that all Apprentices obtain appropriate industry based work experiences. The required work experiences identified in this section are written in the broadest terms so as to ensure the apprentices receive experiences in each of the required areas and to ensure that employers have a degree of flexibility in applying the terms and conditions implicit in a Contract of Apprenticeship. What is important is that both the apprentice and the employer understand the obligations laid out in this plan of training which is designed to ensure that at the completion of both the technical training and the required hours of work experience the apprentice has both the knowledge and the skills necessary to successfully complete the Red Seal Examination.

**REQUIRED WORK EXPERIENCES:**

Set up oxy-fuel welding equipment; prepare, cut, and weld metal; shut down, disassemble, and store equipment.

Set up shielded metal arc welding equipment; prepare and weld metal; shut down equipment.

Determine specifications and prepare templates.

Prepare and weld fillet welds in all positions using shielded metal arc welding equipment.

Prepare and weld butt welds in all positions using shielded metal arc welding equipment.

Shape metal, determine heat ranges, apply heat to various metals, monitor colour and temperature, and quench metals.

Prepare and weld fillet welds in all positions using gas metal arc welding equipment.

Prepare and weld butt welds in all positions using gas metal arc welding equipment.

Set up gas tungsten arc welding equipment and prepare and weld fillet welds in all positions including stainless and non-ferrous metals.

Prepare and weld butt welds in all positions using gas tungsten arc welding equipment including stainless and non-ferrous metals.

Prepare and weld pipe and tubing in all positions using gas tungsten arc welding equipment.

Set up flux core arc welding equipment and prepare and weld fillet welds in all positions.

Prepare and weld butt welds in all positions using flux core arc welding equipment.

Perform various special welding and cutting processes including submerged arc, arc-air, plasma-arc, spot welding, and building up metal parts.