



**PROVINCIAL PLAN OF TRAINING**

**FOR THE**

**REFRIGERATION**

**AND AIR CONDITIONING MECHANIC**

**OCCUPATION**

<b>Document Status</b>	<b>Date Distributed</b>	<b>Mandatory Implementation Date</b>	<b>Comments</b>
Original Version	July 2004	September 2005	
Addendum # 1	November 2004	September 2005	Refer to Addendum Page

**July 2004**

## Addendum # 1

---

1. Requirements for Red Seal Certification:  
Revisions: Added #2 - **Successful completion of all required courses in program.**  
#3 - Removed "Normally"  
changed "accredited" to "**approved**" and;  
added OR "**A total of 9000 hours of suitable work experience in the occupation accompanied by sign-off of required work competencies**".
  
2. Moved Math course to Related Courses  
RF-1150 Refrigeration Shop Fundamentals - 120 hours **to 100 hours**  
Added pre-requisites **TS-1510; TS-1520; TS-1530**  
RF-1300 Electrical Fundamentals for Refrigeration - pre-requisite **RF-1150**  
RF-2110 Domestic Refrigeration Systems - added pre-requisite **RF-1300**  
Program content total from 1181 **to 1161**  
Entry level total from 1151 **to 1131**  
MP-1430 AC Motors and Starters under Block #3 - **removed RF-1300**
  
3. TS-1510 Occupational Health and Safety:  
Course Outcomes - "Upon successful completion of this unit, the apprentice will be able to **be aware of how to**:"
  
4. RF-1150 Refrigeration Shop Fundamentals:  
Deleted from Course Outline / Learning Objectives: **#1(l,m,n); #2; #3**

## **Preface**

---

This Apprenticeship Training Standard is based on the 2004 edition of the National Occupational Analysis for the Refrigeration and Air Conditioning Mechanic trade. It was developed through the cooperative efforts of the Atlantic Apprenticeship Council, which consists of both the Atlantic Directors of Apprenticeship and Apprenticeship Board Chairs. This document describes the curriculum content for the Refrigeration and Air Conditioning Mechanic apprenticeship training program and outlines each of the technical training units necessary for completion of apprenticeship.

## **Acknowledgement**

---

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

# **Apprenticeship Plan of Training Evaluation Form**

Thank you for your interest in the development and revision of this Plan of Training. Upon review of this document, please record your feedback in relation to the following items:

- course division and organization
- relevancy of the content
- errors or omissions
- other suggestions for improvement and consideration

Overall comments are to be entered on this evaluation form and specific changes are to be entered directly on the document in the relevant area(s). When all feedback has been recorded, return this evaluation form along with the revised Plan of Training to the Apprenticeship Office noted at the bottom of the page.

(PLEASE PRINT)

Trade: Refrigeration and Air Conditioning Mechanic

Full Name: \_\_\_\_\_

Type of Position: (Trade Practitioner, Instructor, etc.): \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Comments: (Use a separate sheet of paper if necessary)

---

---

---

---

---

---

---

---

---

---

Return Evaluation Form and Plan of Training to:

*Manager, Industrial Training  
Division of Institutional and Industrial Education  
Department of Education  
P.O. Box 8700  
St. John's, NF  
A1B 4J6*

# Table of Contents

---

Preface .....	i
Acknowledgment .....	ii
Evaluation Form .....	iii
Conditions Governing Apprenticeship Training .....	1
Regulations Specific to Refrigeration & Air Conditioning Mechanic Occupation .....	7
Requirements for Red Seal Certification .....	8
Roles and Responsibilities of Stakeholders in the Apprenticeship Process .....	9
Program Outcomes .....	11
Program Content .....	12
Program Structure .....	13
<b>REQUIRED RELATED COURSES</b>	
Math .....	69
Workplace Communications .....	72
Customer Service .....	74
Quality Assurance/Quality Control .....	76
Introduction to Computers .....	78
Workplace Skills .....	82
Job Search Techniques .....	84
Entrepreneurial Awareness .....	86

## **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 Training and Certification 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:**

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

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent and in addition may be required to have completed certain academic subjects as specified in particular 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	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus relevant work experience totaling a minimum of 5400 hours	Fourth Year
Fourth Year Apprentice	Completion of advanced level (Block 4) courses and (Block 5) <i>if applicable</i> , plus sign-off of workplace skills required for certification totaling a minimum of 7200 hours**	Write Certification Examination
<b>5400 Hour Programs</b>	<b>Requirements for Progression</b>	<b>Progress To</b>
First Year Apprentice	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus sign-off of workplace skills required for certification totaling a minimum of 5400 hours	Write Certification Examination



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

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

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

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

Program Duration	Wage Rates		Comments
<b>7200 Hours</b>	1 <sup>st</sup> Year	55%	These wage rates are percentages of the prevailing journeyperson'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%	
<b>4000 Hours</b>			(Hairstylist Program) - The apprentice shall be paid no less than the minimum wage for hours worked and a commission agreed upon between the apprentice and the employer.

## 6.0 TOOLS

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

## 7.0 PERIODIC EXAMINATIONS AND EVALUATION

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.

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

## 8.0 GRANTING OF CERTIFICATES OF APPRENTICESHIP

Upon the successful completion of apprenticeship, the 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.

**REGULATIONS SPECIFIC TO  
THE REFRIGERATION AND AIR CONDITIONING MECHANIC OCCUPATION**

1. RATIO OF APPRENTICES TO JOURNEYPERSONS

The ratio of apprentices to journeypersons shall not exceed one apprentice for each journeyperson employed.

## **REQUIREMENTS FOR RED SEAL CERTIFICATION**

1. Evidence that the required work experiences outlined in this plan of training have been obtained. This evidence must be in a format that clearly outlines the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.
2. Successful completion of all required courses in program.
3. A combination of training from an approved training program and suitable work experience totalling 7200 hours

OR

A total of 9000 hours of suitable work experience in the occupation accompanied by sign-off of required work competencies.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Industrial Training Division.
5. Payment of the appropriate examination fee.

## **ROLES AND RESPONSIBILITIES OF STAKEHOLDERS IN THE APPRENTICESHIP PROCESS**

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

### **The Apprentice**

- ▶ 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.

### **The Employer**

- ▶ to provide high quality work experiences in an environment that is conducive to learning.
- ▶ to remunerate apprentices as set out in this 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.

### **The Training Institution**

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

### **The Industrial Training Division**

- ▶ to establish and maintain 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 counsellors, teachers, parents, etc.
- ▶ to establish and maintain a protocol with 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.

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

- ▶ to set policies to ensure that the provisions of the Apprenticeship Training and Certification 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.



## **Program Outcomes**

Upon completion of the Refrigeration and Air Conditioning Mechanic Program, apprentices will have demonstrated the knowledge and skills required to perform the following tasks:

- Task 1 Utilizes mechanical and architectural drawings, acts, codes, standards, legislation, and service and operating manuals.
- Task 2 Operates and maintains tools and equipment.
- Task 3 Demonstrates work practices and procedures.
- Task 4 Coordinates refrigeration and air conditioning installation and maintenance.
- Task 5 Performs system components, accessories and materials acquisition and handling.
- Task 6 Plans installation of refrigeration and air cooling systems.
- Task 7 Installs refrigeration and air cooling systems.
- Task 8 Commissions refrigeration and air cooling systems.
- Task 9 Maintains refrigeration and air cooling systems.
- Task 10 Plans installation of heating, ventilating and air conditioning systems.
- Task 11 Installs heating, ventilating and air conditioning systems.
- Task 12 Commissions heating, ventilating and air conditioning systems.
- Task 13 Maintains heating, ventilating and air conditioning systems.
- Task 14 Plans installation of control systems.
- Task 15 Installs control systems.
- Task 16 Commissions control systems.
- Task 17 Maintains control systems.

**PROGRAM CONTENT**

NL Course No.	Course Name	Hours	Pre-requisites	Page No.
TS-1510	Occupational Health & Safety	6		16
TS-1520	WHMIS	6		19
TS-1530	First Aid	14		22
DR-1700	Basic Drawing & Sketching	75	-	23
MP-1430	AC Motors and Starters	120	RF-1300, MP-2340	26
MP-2330	Power Control Circuits	60	RF-1300	29
MP-2340	Three Phase Systems	90	RF-1300	31
RF-1102	Refrigeration Fundamentals	120	RF-1150	33
RF-1140	Refrigerant Piping	60	RF-1150, RF-1102	36
RF-1150	Refrigeration Shop Fundamentals	100	TS-1510, TS-1520, TS-1530	39
RF-1200	Packaged & Split Air Conditioning Systems	75	RF-1102	44
RF-1300	Electrical Fundamentals for Refrigeration	120	RF-1150	47
RF-2110	Domestic Refrigeration Systems	75	RF-1102, RF-1300	50
RF-2142	Commercial Refrigeration Systems	90	RF-2110	52
RF-2152	Industrial Refrigeration Systems	90	RF-2110	55
RF-2160	Compressors	75	RF-1102, MP-1430	59
RF-2220	Central Air Conditioning Systems	75	RF-1200	61
RF-2300	Heat Pumps	90	RF-2110, MP-1430, MP-2330	63
TS-1300	Rigging	45	-	65
WD-1240	Oxy-Fuel Cutting, Welding and Brazing	60	RF-1150	67
MA-1060	Math	60	-	69
CM-2150	Workplace Communications	45	-	72
MR-1210	Customer Service	30	-	74
SP-2330	QA/QC	30	-	76
MC-1050	Introduction to Computers	30	-	78
SD-1700	Workplace Skills	30	-	82

NL Course No.	Course Name	Hours	Pre-requisites	Page No.
SD-1710	Job Search Techniques	15	-	84
SD-1720	Entrepreneurial Awareness	15	-	86
OT-1220	Workplace Exposure	60	-	-
<b>Total Hours</b>		<b>1761</b>		

## PROGRAM STRUCTURE

Entry Level Courses				
NL Course No.	Course Name	Hours	Pre-requisites	Page No.
TS-1510	Occupational Health & Safety	6		16
TS-1520	WHMIS	6		19
TS-1530	First Aid	14		22
DR-1700	Basic Drawing & Sketching	75	-	23
MP-2330	Power Control Circuits	60	RF-1300	29
RF-1102	Refrigeration Fundamentals	120	RF-1150	33
RF-1140	Refrigerant Piping	60	RF-1150, RF-1102	36
RF-1150	Refrigeration Shop Fundamentals	100	TS-1510, TS-1520, TS-1530	39
RF-1200	Packaged & Split Air Conditioning Systems	75	RF-1102	44
RF-1300	Electrical Fundamentals for Refrigeration	120	RF-1150	47
RF-2110	Domestic Refrigeration Systems	75	RF-1102, RF-1300	50
TS-1300	Rigging	45	-	65
WD-1240	Oxy-Fuel Cutting, Welding and Brazing	60	RF-1150	67
MA-1060	Math	60	-	69
CM-2150	Workplace Communications	45	-	72
MR-1210	Customer Service	30	-	74
SP-2330	QA/QC	30	-	76
MC-1050	Introduction to Computers	30	-	78

Entry Level Courses				
NL Course No.	Course Name	Hours	Pre-requisites	Page No.
SD-1700	Workplace Skills	30	-	82
SD-1710	Job Search Techniques	15	-	84
SD-1720	Entrepreneurial Awareness	15	-	86
OT-1220	Workplace Exposure	60	-	-
<b>Total Hours</b>		<b>1131</b>		

Required Work Experience

Block #2				
NL Course No.	Course Name	Hours	Pre-requisites	Page No.
MP-2340	Three Phase Systems	90	RF-1300	31
RF-2142	Commercial Refrigeration Systems	90	RF-2110	52
<b>Total Hours</b>		<b>180</b>		

Required Work Experience

Block #3				
NL Course No.	Course Name	Hours	Pre-requisites	Page No.
MP-1430	AC Motors and Starters	120	MP-2340	26
RF-2300	Heat Pumps	90	RF-2110, MP-1430, MP-2330	63
<b>Total Hours</b>		<b>210</b>		

Required Work Experience
--------------------------

<b>Block #4</b>				
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>	<b>Page No.</b>
RF-2152	Industrial Refrigeration Systems	90	RF-2110	55
RF-2160	Compressors	75	RF-1102, MP-1430	59
RF-2220	Central Air Conditioning Systems	75	RF-1200	61
<b>Total Hours</b>		<b>240</b>		

## **TS-1510            OCCUPATIONAL HEALTH AND SAFETY**

### **Description:**

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

### **Course Outcomes:**

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

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

### **Theory:**

1. Interpret the Occupational Health and Safety Act laws and regulations
  - i) Explain the scope of the act
    - Application of the act
    - Federal/Provincial jurisdictions
    - Canada Labour Code
    - Rules and regulations
    - Private home application
    - Conformity of the Crown by the Act
2. Explain responsibilities under the Act & Regulations
  - i) Duties of employer, owner, contractors, sub-contractors, employees, and suppliers
3. Explain the purpose of joint health and safety committees
  - i) Formation of committee
  - ii) Functions of committee
  - iii) Legislated rights
  - iv) Health and safety representation
  - v) Reporting endangerment to health
  - vi) Appropriate remedial action
  - vii) Investigation of endangerment
  - viii) Committee recommendation
  - ix) Employer's responsibility in taking remedial action
4. Examine right to refuse dangerous work
  - i) Reasonable grounds for refusal
  - ii) Reporting endangerment to health

- iii) Appropriate remedial action
  - iv) Investigation of endangerment
  - v) Committee recommendation
  - vi) Employer's responsibility to take appropriate remedial action
  - vii) Action taken when employee does not have reasonable grounds for refusing dangerous work
  - viii) Employee's rights
  - ix) Assigning another employee to perform duties
  - x) Temporary reassignment of employee to perform other duties
  - xi) Collective agreement influences
  - xii) Wages and benefits
5. State examples of work situations where one might refuse work.
6. Describe discriminatory action
- i) Definition
  - ii) Filing a complaint procedure
  - iii) Allocated period of time a complaint can be filed with the Commission
  - iv) Duties of an arbitrator under the Industrial Relations Act
  - v) Order in writing inclusion
  - vi) Report to commission Allocated period of time to request Arbitrator to deal with the matter of the request
  - vii) Notice of application
  - viii) Failure to comply with the terms of an order
  - ix) Order filed in the court
7. Explain duties of commission officers
- i) Powers and duties of officers
  - ii) Procedure for examinations and inspections
  - iii) Orders given by officers orally or in writing
  - iv) Specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
  - v) Service of an order
  - vi) Prohibition of persons towards an officer in the exercise of his/her power or duties
  - vii) Rescinding of an order
  - viii) Posting a copy of the order
  - ix) Illegal removal of an order
8. Interpret appeals of others
- i) Allocated period of time for appeal of an order
  - ii) Person who may appeal order
  - iii) Action taken by Commission when person involved does not comply with the order

- iv) Enforcement of the order
  - v) Notice of application
  - vi) Rules of court
9. Explain the process for reporting of accidents
- i) Application of act
  - ii) Report procedure
  - iii) Reporting notification of injury
  - iv) Reporting accidental explosion or exposure
  - v) Posting of act and regulations

**Practical:**

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

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



## **TS-1520           WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)**

### **Description:**

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

### **Course Outcomes:**

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

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

### **Required Knowledge and Skills:**

1. Define WHMIS safety
  - Rational and key elements
  - History and development of WHMIS
  - WHMIS legislation
  - WHMIS implementation program
  - Definitions of legal and technical terms
2. Examine hazard identification and ingredient disclosure
  - Prohibited, restricted and controlled products
  - Classification and the application of WHMIS information requirements
  - Responsibilities for classification
    - the supplier
    - the employer
    - the worker - Classification: rules and criteria
  - information on classification
  - classes, divisions and subdivision in WHMIS
  - general rules for classification
  - class A - compressed gases
  - class B - flammable and combustible materials
  - class C - oxidizing material
  - class D - poisonous and infectious material
  - class E - corrosive material
  - class F - dangerously reactive material
  - Products excluded from the application of WHMIS legislation
    - consumer products
    - explosives
    - cosmetics, drugs, foods and devices

- pest control products
  - radioactive prescribed substances
  - wood or products made of wood
  - manufactured articles
  - tobacco or products of tobacco
  - hazardous wastes
  - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
  - Comparison of classification systems - WHMIS and TDG
  - General comparison of classification categories
  - Detailed comparison of classified criteria
3. Explain labeling and other forms of warning
- Definition of a WHMIS label
    - supplier label
    - workplace label
    - other means of identification
  - Responsibility for labels
    - supplier responsibility
    - employer responsibility
    - worker responsibility
  - Introduce label content, design and location
    - supplier labels
    - workplace labels
    - other means of identification
4. Introduce material safety data sheets (MSDS)
- Definition of a material safety data sheet
  - Purpose of the data sheet
  - Responsibility for the production and availability of data sheets
    - supplier responsibility
    - employer responsibility
    - workers responsibility

## Practical

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

1. Locate WHMIS label and interpret the information displayed.

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

**SUGGESTED RESOURCES:**

1. WHMIS Regulation
2. Sample MSDS sheets

## **TS-1530**

## **FIRST AID**

### **Description:**

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

Complete a **St. John Ambulance** Standard First Aid Certificate course.

## **DR-1700                      BASIC DRAWING & SKETCHING**

### **Description:**

Course provides training in blueprint reading and sketching.

### **Major Topics / Tasks:**

Construct geometric shapes and lines; Explain various views; 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

### **Date Developed:**

### **Course Outline / Learning Objectives:**

1. Construct geometric shapes and lines
  - a. Describe the alphabet of lines
  - b. List the basic drawing symbols
  - c. Explain what is meant by quality of lines
  - d. Describe metric, mechanical, architectural and civil scales
  - e. Describe the different types of pencil lead grades
  - f. Describe letter types
  - g. Describe lettering instrument types
  - h. Explain spacing, sizes and lettering techniques
  - i. Draw lines to scale
  - j. Scale lines
  - k. Divide lines into equal parts
  - l. Bisect lines
  - m. Construct angles
  - n. Bisect angles
  - o. Construct concave and convex curves
  - p. Construct circles, arcs, tangents, ellipses, polygons, etc.

2. Explain various 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. Describe types of dimensions and lines used
  - i. Explain the rules of dimensioning
  - j. Explain the various methods of producing lines
  - k. Identify standard drawing symbols used on electrical, hydraulic and pneumatic drawings
  - l. Identify colour codes used for electrical, hydraulic and pneumatic schematics
  - m. Explain the purpose and methods of dimensioning
  - n. Explain intersections and developments
  
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 conventions associated with sectional views such as symbols, cutting plane lines, broken-out lines, etc.
  - b. Describe the purpose and types of sectional views
  - c. Locate section
  - d. Select type of view
  - e. Determine scale
  - f. Sketch view
  - g. Dimension sketch
  - h. Make notations
  
5. Sketch primary auxiliary views
  - a. Visualize the view
  - b. Layout the sketch
  - c. Sketch view
  - d. Dimension sketch
  - e. 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

## **MP-1430**

## **AC MOTORS AND STARTERS**

### **Description:**

Course provides the training to install and maintain AC motors and starters.

### **Major Topics/Tasks:**

Install, test and maintain AC motors; Test and repair AC motors; Test for speed, power, frequency and phase; Install synchronous motors and starters; Connect and verify power factor correction equipment; Install and maintain AC motor starters; Install and maintain electric control circuits.

### **Purpose / Aims:**

1. To develop the skills and knowledge required to install and maintain AC motors.
2. To develop an appreciation of safety code requirements for AC motor installation and maintenance.

**Prerequisites:** RF-1300, MP-2340

**Course Duration:** 120 hrs

**Date Developed:** October 1998

### **Course Outline / Learning Objectives:**

1. Install, test and maintain AC motors
  - a. Describe the operation and the connection of single phase motors
  - b. Describe the operation and the connection of 3 phase motors
  - c. Describe the types of single phase and three phase motors.
  - d. List the electrical code requirements for installation of AC motors.
  - e. Describe single phase and three phase voltage and current.
  - f. Explain overcurrent and overload protection
  - g. Maintain single phase motors
  - h. Test and maintain three phase motors
2. Test and repair AC motors
  - a. Interpret name plate data
  - b. Examine and test AC motors
  - c. Dismantle and clean motors
  - d. Maintain brush mechanism
  - e. Remove and replace bearings, bushings and seals



3. Test for speed, power, frequency and phase
  - a. Check speed of equipment (motors, generators, blowers compressors, etc.) using correct test equipment
  - b. Determine frequency of equipment and test for frequency
  - c. Test phase and phase angles
  - d. Determine phase sequence
  
4. Install synchronous motors and starters
  - a. Install synchronous motors
  - b. Install synchronous motor starting equipment
  - c. Maintain synchronous motors and starters
  - d. Test and troubleshoot synchronous motor starting circuits
  
5. Connect and verify power factor correction equipment
  - a. Describe the use and operation of a power factor meter
  - b. Explain power factor improvement
  - c. Use appropriate meters to measure power in watts, volt amperes, power factor and vars
  - d. Install and verify the use of power factor improvers (capacitors and synchronous motors)
  - e. Verify inductive and capacitance effect on currents
  - f. Install capacitors in shunt
  
6. Install and maintain AC motor starters
  - a. Describe the operation of AC motor starters and synchronous motor starters
  - b. Install and maintain manual starters
  - c. Install and maintain single phase magnetic starters complete with controls
  - d. Install and maintain three phase magnetic starters complete with controls
  - e. Install and maintain single phase reversing type magnetic starters
  - f. Install and maintain three phase reversing type magnetic starters
  - g. install and maintain reduced voltage starters
  - h. Install and maintain starting compensator
  - i. Install and maintain mechanical interlocking circuits
  - j. Determine installation requirements according to code
  - k. Install two speed controller for a 2 winding squirrel cage motor
  - l. Maintain speed controller for a 2 winding squirrel cage motor
  
7. Install and maintain electric control circuits
  - a. Describe the different types of control devices, sending units, and circuits
  - b. List the electrical code requirements for the installation of control circuits
  - c. Interpret schematic
  - d. Convert from schematic to panel diagram
  - e. Install control switches

- f. Install control relay
- g. Install control protection devices
- h. Maintain and calibrate controls (brakes, clutches, timers)
- i. Install and maintain speed controller for wound rotor control
- j. Install AC quick stop controllers

## **MP-2330                      POWER CONTROL CIRCUITS**

### **Description:**

Course provides the training for the safe installation and repair of power control circuits.

### **Major Topics/Tasks:**

Install and troubleshoot industrial control circuits; Test and replace industrial control circuits and components containing thyristors; Test and replace controls and sending units; Install and maintain solid state; Maintain optoelectronic components and circuits; Describe lockout procedures; Demonstrate fibre optics

### **Purpose / Aims:**

1. To develop the skills and knowledge required to install and repair control circuits.
2. To develop an appreciation of safety code requirements for control circuits

**Prerequisites:** RF-1300

**Course Duration:** 60 hrs.

**Date Developed:** October 1998

### **Course Outline / Learning Objectives:**

1. Install and troubleshoot industrial control circuits
  - a. Test firing networks
  - b. Use data books
2. Test and replace industrial control circuits and components containing thyristors.
  - a. Silicon control rectifiers (SCR)
  - b. TRIAC
  - c. DIAC
  - d. Unijunction Transistor (UJT)
  - e. Silicon Unilateral
  - f. Silicon Control Switch (SCS)
  - g. Silicon Bilateral Switch (SBS)
  - h. Pulse Transformer
3. Test and replace controls and sending units
  - a. Describe the operation of sending units and gauges
  - b. Identify, test and replace electrical relays, switches and voltage regulators
  - c. Identify, isolate and repair defective components

- d. Remove and replace units and/or gauges
- 4. Install and maintain solid state drives
  - a. Install and maintain DC drives
  - b. Install and maintain AC variable frequency drives
- 5. Maintain optoelectronic components and circuits
  - a. Explain the operation of LEDs, phototransistors and tunnel diodes
  - b. Test and replace photoelectric cells, photo transistors, light activated SCR's, optical isolators, digital read outs, and LED's
- 6. Describe lockout procedures
- 7. Demonstrate fibre optics
  - a. Describe fibre optics

## **MP-2340**

## **THREE-PHASE SYSTEMS**

### **Description:**

Course provides training for the installation and maintenance of three-phase transformers.

### **Major Topics/Tasks:**

Connect and verify three phase circuits; Install and maintain three phase transformer systems

### **Purpose / Aims:**

1. To develop the skills and knowledge required to install and maintain three phase transformers.
2. To develop an appreciation of safety code requirements for three phase transformers.

**Prerequisites:** RF 1300

**Course Duration:** 90 hrs.

**Date Developed:** October 1998

### **Course Outline / Learning Objectives:**

1. Connect and verify three phase circuits
  - a. Describe the operation and specify the uses of 3 phase transformers.
  - b. Distinguish between Delta and Wye connections.
  - c. Calculate fuse size and CL fuse size for 3 phase banks.
  - d. Describe phase rotation.
  - e. Explain power factor.
  - f. Explain three phase power.
  - g. Connect a 3 Phase 3 wire Wye circuit and verify voltage and current relationship.
  - h. Connect a 3 phase 3 wire Delta circuit and verify voltage and current relationship.
  - i. Connect a 3 phase 4 wire Wye circuit and verify voltage current relationship.
  - j. Connect a 3 phase 4 wire Delta circuit and verify high leg characteristics.
  - k. Identify phase sequence of supply.

2. Install and maintain three phase transformer systems
  - a. Describe the types of three phase transformers.
  - b. Describe the types of transformer hookups.
  - c. Explain balance and neutral.
  - d. Connect 3 phase 3 wire transformer and measure phase, line voltage current (dry type).
  - e. Connect 3 phase 4 wire transformer and measure phase, line, and neutral voltage and current (dry type).
  - f. Service and maintain transformer taps.
  - g. Perform dielectric test on oil.
  - h. Connect, test and adjust voltage regulator.
  - i. Install lightning arresters.
  - j. Install surge suppressors.
  - k. Check for balanced neutral.
  - l. Check for dangers of a floating neutral in transformer banking.
  - m. Install over current protection.

## **RF-1102                      REFRIGERATION FUNDAMENTALS**

### **Description:**

This course in refrigeration systems requires the use of tools and equipment, test instruments and materials and supplies. It involves testing refrigeration systems for temperature and pressure. It includes information on refrigeration principles, refrigerants, testing, heat loss and gain, insulation and types of systems.

### **Major Topics/Tasks:**

Apply refrigeration cycle principles; Interpret basic compression refrigeration systems and common applications; Use refrigerants (gases and cylinder); Describe the operation of common defrost systems; cooling test equipment; evaporators and low pressure recirculating systems; basic absorption systems; Calculate heat gain and heat loss; Interpret requirements of system accessory devices on sophisticated commercial systems.

### **Purpose / Aims:**

1. To develop the skills and knowledge required for installation of refrigeration systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:**        RF1150

**Course Duration:**    120 hrs.

**Date Developed:**    June 2004

### **Course Outline / Learning Objectives:**

1. Apply refrigeration cycle principles
  - a. Describe how a mechanical refrigeration system operates.
  - b. Read temperature scales
  - c. Read pressure scales
  - d. Read temperature - pressure charts
  - e. Explain temperature heat diagram
  - f. Explain pressure - enthalpy diagrams
  
2. Interpret basic compression refrigeration systems and common applications:
  - a. low side float control
  - b. high side float control

- c. TEV controlled
  - d. automatic expansion valves
  - e. capillary control
3. Use refrigerants (gases and cylinder)
- a. Describe halocarbon and ammonia refrigerants:
    - i. types in use
    - ii. thermodynamic properties
    - iii. physical properties
    - iv. enthalpy diagrams
  - b. Interpret code and safety requirements pertaining to the use of refrigerants and cylinders
  - c. Identify, refill and transfer halocarbons to charging cylinders
  - d. Remove refrigerant from system using an approved refrigerant recovery unit
4. Describe operation of common defrost systems:
- a. hot gas
  - b. electric
5. Use cooling test equipment
- a. Select air measuring instrument
  - b. Select cooling test instrument
  - c. Measure temperature, pressure and volume of air
  - d. Operate refrigeration diagnostic instruments
6. Identify types, uses and explain the operation of evaporators
7. Specify basic absorption systems
- a. Describe the operation of a basic absorption system
  - b. Draw a basic absorption system
  - c. Interpret operation of absorption systems
8. Install and service refrigerant metering devices
- a. Explain the operation of hand expansion valves, capillary tubes, high and low side floats, automatic expansion valves and thermostatic expansion valves
  - b. Install, test and service high and low side floats
  - c. Install, test and service automatic expansion valves
  - d. Install, test and service thermostatic expansion valves
  - e. Install, test and service manual expansion valves
  - f. Install, test and service capillary tubes



9. Operate and maintain flow control devices
  - a. maintain solenoid valves
  - b. Maintain suction pressure and evaporator pressure regulators
  - c. Maintain check valves
  - d. Maintain refrigerant driers and moisture indicators
  
10. Troubleshoot commercial/industrial refrigeration systems (mechanical)
  - a. Identify types, uses and explain the operation of evaporators
  - b. Analyze compressor malfunctions
  - c. Identify condensing unit problems
  - d. Identify evaporator problems
  - e. Identify TEV problems
  - f. Identify pressure motor control problems
  - g. Identify liquid line solenoid valve problems
  - h. Identify receiver problems
  - i. Identify filter dryer problem
  - j. Analyze manifold gauge readings to identify possible problem areas in a malfunctioning system
  - k. Identify indications of problem such as:
    - i. non-condensibles in system
    - ii. blocked evaporators
    - iii. overcharged refrigeration system
    - iv. undercharged refrigeration system
    - v. evaporator or condenser fans not operating
  - l. Identify hot gas defrost system problem
  - m. Isolate causes of vibration problems
  - n. Identify and isolate leaks in refrigeration systems

## RF-1140

## REFRIGERANT PIPING

### Description:

This course in piping fundamentals requires the use of tools and equipment, and materials and supplies. It involves selecting, measuring, bending, threading, flaring, swaging and compression joints. It includes information on the assembly of different types of pipes and component parts.

### Major Topics/Tasks:

Thread and assemble steel pipe; Bend tubing; Install and replace copper and brass pipe; Maintain piping systems by coding, inspecting, maintaining and repairing; Assemble plastic pipe; Assemble fibreglass pipe; Fabricate and/or install hangers and supports

### Purpose / Aims:

1. To develop the skills and knowledge required for assembling refrigerant piping systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:** RF-1150, RF-1102

**Course Duration:** 60 hrs.

**Date Developed:** December 1998 (revised June 2004)

### Course Outline / Learning Objectives:

1. Thread and assemble steel pipe
  - a. Describe the different pressures and temperatures to which pipes are subjected
  - b. Describe the operation of pressure gauges and explain maintenance and repair procedures
  - c. Select gasket material for high temperature water system, oil systems, cold water lines and high pressure steam systems
  - d. Cut a ring and full face gasket for a 4" and 6" flanged joint
  - e. Tighten bolts in proper sequence
  - f. Cut, ream, and thread pipe by hand
  - g. Cut, ream, and thread pipe with machine
  - h. Install fittings on pipe
  - i. Install hangers and supports

- j. Assemble victualic pipe and fittings
  - k. Install valves on pipe
  - l. Construct piping arrangements using a variety of fittings
  - m. Use thread lubricants on joints for specific services
  - n. Hydrostatically test a pipeline
  - o. Describe types of hydraulic and pneumatic lines and fittings and explain their applications
2. Bend tubing
- a. Bend tube using tube benders
  - b. Hot bend tubing
3. Install and replace copper and brass pipe
- a. Read charts, drawings and piping diagrams and select required piping and fittings for specific applications
  - b. Install a piping circuit using fittings and couplings to establish:
    - i. Changes in direction at 90, 45, and 33 ½ degree angles including T's and wye's
    - ii. Offsets at various angles
    - iii. Reduction of pipe size
  - c. Anneal and bend rigid copper pipe
  - d. Cut out and replace a section of pipe
  - e. Introduce inert gas into pipe for brazing, soldering and welding
  - f. Cut threads
  - g.. Cut and solder copper pipe
  - h. Assemble pipe and fittings
  - i. Construct piping arrangements using a variety of fittings
  - j. Join lengths of pipe using coupling, unions and cap or plug at end
4. Maintain piping systems by coding, inspecting, maintaining and repairing
- a. Code piping systems to indicate product and direction of flow in system
  - b. Repair piping leaks by installing new gaskets, new pipe sections, new pipe fittings and soldering
  - c. Repair and maintain gate, globe, angle check non-return and control valves
  - d. Repair and maintain pipe line filters and strainers
  - e. Repair and maintain piping support systems
  - f. Replace safety and relief valves
  - g. Repair and maintain pipe insulation
5. Assemble plastic pipe
- a. Make joints on PVC, ABS, PE, CPVC, and SDR pipe
  - b. Dismantle joints on PVC and ABS pipe
  - c. Join plastic pipe by solvent welding

- d. Join plastic pipe with clamps and insert fittings
  - e. Thread plastic pipe
  - f. Install supports
6. Fabricate and/or install hangers and supports
- a. Make templates
  - b. Interpret specification sheets
  - c. Install anchoring devices into:
    - i. Wooden members
    - ii. Gypson and other types of finish wall
    - iii. Concrete
    - iv. Masonry block and brick
  - d. Fabricate hangers and supports for pipe and equipment
  - e. Install pipe hangers and supports
  - f. Install equipment hangers and supports
  - g. Isolate sound and vibration
  - h. Fabricate one-piece angle, or channel wall brackets
  - i. Fabricate three-piece angle, or channel wall brackets
  - j. Fabricate U-bolts
  - k. Fabricate clevis hangers
  - l. Fabricate a pipe saddle support and a pipe stanchion saddle

## **RF-1150 REFRIGERATION SHOP FUNDAMENTALS**

### **Description:**

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

### **Major Topics/Tasks:**

Practice safety; Standard First Aid, Workplace Hazardous Materials Information Systems, use and maintenance of tools and 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
4. To develop the skills and knowledge required for making precision measurements.

**Prerequisites:** TS-1510, TS-1520, TS-1530

**Course Duration:** 100 hrs.

**Date Developed:** June 2004

### **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
2. 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 to within specifications required
    - c. Use pliers, screwdrivers, wrenches, torque multipliers, hammers and mallets and other gripping and turning tools
    - d. Use torque wrench
    - e. Use scribe and markers
  3. Use and maintain flaring tools
    - a. Single and double flare tubing
    - b. Bend tubing
    - c. Measure and cut tubing
    - d. Use compression fittings
    - e. Anneal tubing before flaring as may be necessary
    - f. Test and inspect flared fittings
  4. Use and maintain cutting tools
    - a. Identify, maintain and use punches, chisels, files and saws
    - b. Sharpen chisels, 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
  5. Use and maintain threading devices
    - a. Select and safely use proper tools for given job
    - b. Maintain threading tools
    - c. Make an internal thread
    - d. Make an external thread
    - e. Restore damaged thread
    - f. Remove broken screw
    - g. Use tap and drill chart
  6. 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 types of tubing and flaring tools and explain the application of each
  - e. Explain the purpose of threading taps and dies
  - f. Describe the types of fastener tools
  - g. Describe as per the assigned information, rivets, keys, nuts, screws, pins, splines, studs, bolts, snap rings, bonds (thread locking compounds), washers, lock wires and self-locking nuts
  - h. Use and identify fasteners such as rivets, nails, wood screws, sheet metal screws, bolts, nuts, washers, masonry anchors and shields
  - i. Describe specific uses for each fastener
  - j. Recognize sizes of fasteners
  - k. Rivet and soft solder lap joint in galvanized sheet
  - l. Torque bolts
  - m. Identify bolt grades
  - n. Identify miscellaneous anchoring devices
7. Safely and effectively use, maintain and store pullers, drivers and presses
- a. Describe types and explain the uses of pullers, drivers and presses
8. 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
9. Use power tools
- a. Describe the different types of power tools
  - b. Describe safety requirements for using power tools
  - c. Operate portable power tools
  - d. Operate power cleaning equipment
10. 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

11. 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
  
12. 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
  
13. Use explosive actuated tools
  - a. Select the proper tool for a specific use
  - b. Follow Occupational Health and Safety regulations
  - c. Choose the correct shot and fastener for the job
  - d. Apply safety practices while using explosive actuated tools
  - e. Fasten construction material to masonry and steel
  - f. Maintain and clean explosive actuated tools
  
14. Use and maintain compressed air system
  - a. Describe types of compressors and components
  - b. Demonstrate safety precautions when using and maintaining compressors
  
15. Use and maintain shop equipment
  - a. steam cleaner
  - b. solvent cleaning tanks
  
16. Lock-out procedures
  - a. Describe government regulation regarding lock-out procedures
  
17. Electrical Safety
  - a. Recognize electrical hazards in the shop



18. Describe types and explain the uses of semi-precision measuring tools such as
  - a. combination
  - b. set
  - c. steel rule
  - d. trammels
  - e. dividers
  - f. inside and outside calipers
  - g. surface gauges
  - h. combination depth and hook rule
  - i. measuring tape
  - j. hermaphrodite calipers and short rule
  - k. tape measure
  - l. plumb bobs
  - m. levels
  - n. scribes
  - o. squares
  
19. Describe types and explain the use of precision measuring tools such as
  - a. micrometers (all types)
  - b. vernier calipers (all types)
  - c. surface plates (all types)
  - d. telescopic gauges
  - e. small hole gauges
  - f. depth gauges
  - g. dial indicators (all types)
  
20. Solve problems on decimals
  
21. Solve problems using metric measurements
  
22. Solve problems on English/Metric conversions
  
23. Use and maintain precision and semi-precision measuring tools
  - a. Identify and explain the purpose of the given measuring tools
  - b. Measure outside and inside diameters
  - c. Measure projection and depth
  - d. Measure runout, endplay and backlash
  - e. Maintain measuring tools

## **RF-1200 PACKAGED AND SPLIT AIR CONDITIONING SYSTEMS**

### **Description:**

This course in air conditioning requires the use of tools and equipment, test instruments and materials and supplies. It involves designing, installing, trouble shooting and servicing packaged and split conditioning systems. It includes information on types and operation of packaged and split air conditioning systems and component parts.

### **Major Topics/Tasks:**

Analyze air conditioning operating and cycle principles; Interpret operation of different system designs; Identify air distribution systems; Install and service split systems; Install and service air cleaners; Install and service humidification units; Install and service dehumidification; Select and use instruments to measure temperature, CFM and pressure of air; Install air filters

### **Purpose / Aims:**

1. To develop the skills and knowledge required for the installation and maintenance of packaged and split air conditioning systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:** RF1102

**Course Duration:** 75 hrs.

**Date Developed:** February 1994

### **Course Outline / Learning Objectives:**

1. Analyze air conditioning operating and cycle principles
  - a. Define air conditioning
  - b. Interpret air structures and properties of air
  - c. Calculate heat loads
  - d. Measure pressure, temperature, velocity and humidity of air using sling psychrometer, aspirating psychrometer, velocimeter, anemometer, draft gauge, U tube monometer, inclined monometer, pilot tube, barometer and smoke generators
  - e. Use psychometric charts

2. Interpret operation of different system designs:
  - a. window air conditioners
  - b. packaged air conditioners
  - c. central air conditioners
  - d. heat pumps
  
3. Identify air distribution systems:
  - a. extended plenum
  - b. reducing trunk
  - c. perimeter loop
  
4. Install and service split systems
  - a. Locate, prepare and mount condensing and evaporator sections
  - b. Connect duct-work to sections
  - c. Erect piping as per specifications
  - d. Interpret and inspect electrical requirements and connections
  - e. Service refrigeration cycle components
  - f. Service air cycle components
  - g. Service low temperature devices
  - h. Service fan and dampen motors
  - i. Service compressor motors
  - j. Service control circuits
  - k. Service capacity control devices
  - l. Troubleshoot and repair system malfunctions
  
5. Install and service air cleaners
  - a. Select, clean or replace stationary filters
  - b. Select, clean or replace rotating filters
  - c. Check pressure drop across filters (efficiency test)
  - d. Check and clean charged media filters
  - e. Test and clean two-stage electronic air cleaners
  - f. Troubleshoot electronic filter power pack
  
6. Install and service humidification units
  - a. Analyze humidification conditions on psychometric chart
  - b. Install and service pan type humidifiers
  - c. Install and service atomizing water spray humidifiers
  - d. Install and service air washer humidifiers
  - e. Install and adjust humidity controllers
  - f. Install and service water control components
  - g. Troubleshoot and repair system malfunctions
  
7. Install and service dehumidification units
  - a. Install coils in ducts or air handling units

- b. Pipe coils to cooling equipment
  - c. Insulate materials below dew point temperatures
  - d. Interpret dehumidification process on psychometric chart
  - e. Check refrigerant cycle components
  - f. Check air cycle components
  - g. Check water cycle components
  - h. Check specific dehumidification controls
8. Select and use instruments to measure temperature, CFM and pressure of air
- a. Identify and describe the use of air measuring instruments
9. Install air filters
- a. Select air cleaners and compare based on ratings, efficiencies and cost
  - b. Schedule maintenance requirements for commercial air cleaners

## **RF-1300 ELECTRICAL FUNDAMENTALS FOR REFRIGERATION**

### **Description:**

Course provides the training to construct and test basic AC and DC circuits and their components. Also provides training for installing, connecting and maintaining single-phase transformers.

### **Major Topics/Tasks:**

Explain electrical fundamentals; Set up an Edison Three-Wire Circuit; Construct basic series and parallel circuits; Test and replace basic wiring components such as terminals, fuses, circuit breakers and resistors; Use Electrical Meters to check circuit voltage, current and resistance; Construct basic AC circuits. Install and maintain single phase transformer systems; Install and connect single phase transformers

### **Purpose / Aims:**

1. To develop the skills and knowledge required to construct and test basic DC and AC circuits.
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues
4. To develop the skills and knowledge required to install and maintain single phase transformers.
5. To develop an appreciation of safety code requirements for single phase transformer installation

**Prerequisites:** RF-1150

**Course Duration:** 120 hrs.

**Date Developed:** June 2004

### **Course Outline / Learning Objectives:**

1. Explain electrical fundamentals
  - a. Explain static electricity and the electron theory.
  - b. Describe the characteristics of conductors and insulators.
  - c. Explain magnetic fields.
  - d. Explain electromagnetism and electromagnetic induction
  - e. Explain system ground.
2. Set up an Edison Three-Wire Circuit
  - a. Describe the operation of three wire circuits.

3. Construct basic series and parallel circuits
  - a. Explain minimization of voltage drop.
  - b. Solve problems on Ohm's Law.
  - c. Explain conductor sizes and resistivity and line voltage drop.
  - d. Solve problems on power loss and voltage drop.
  - e. Construct a series circuit
    - i. Measure voltage, current, resistance and power
    - ii. Troubleshoot circuit problems
  - f. Construct a parallel circuit
    - i. Measure voltage, current, resistance and power
    - ii. Troubleshoot circuit problems
  - g. Construct a series/parallel circuit
    - i. Measure voltage, current, resistance and power
    - ii. Troubleshoot circuit problems
4. Test and replace basic wiring components such as terminals, fuses, circuit breakers and resistors
5. Use Electrical Meters to check circuit voltage
  - a. Describe the use of electric meters.
  - b. Use ammeter to check circuit amperage
6. Use VOM and DVOM to check circuit resistance
7. Construct basic AC circuits
  - a. Describe the reaction of inductors, capacitors, transistors and diodes to electric current
  - b. Explain AC current and voltage
  - c. Describe single phase current and voltage
  - d. Describe capacitance and inductance.
  - e. Describe AC power and power factor.
8. Install and maintain single phase transformer systems
  - a. Explain electromagnetic induction.
  - b. Describe different single phase types of transformers.
  - c. Describe protective devices used with transformers.
  - d. Explain polarity.
  - e. Explain voltage, impedance and V-A ratings.
  - f. Explain protective grounding and bonding.
  - g. Describe the operation and specify the use of single phase transformers.
  - h. Check transformers for polarity.
  - i. Check transformers for short, ground, continuity.
  - j. Install a single phase transformer (dry type).
  - k. Install and connect a single phase 3 wire transformer and multi tap.

- I. Install and connect two single phase transformers in parallel (dry type).
9. Install and connect single phase transformers
- a. Troubleshoot single phase transformers
  - b. Calculate fuse size and CL fuse sizes for single phase transformers.
  - c. Connect transformers in parallel

## **RF-2110            DOMESTIC REFRIGERATION SYSTEMS**

### **Description:**

This course in refrigeration systems requires the use of tools and equipment, test instruments and materials and supplies. It involves installation, troubleshooting and repair of domestic refrigeration systems. It includes information on types of domestic refrigeration systems and component parts.

### **Major Topics/Tasks:**

Describe types and explain the operation of domestic refrigeration systems; Repair and service domestic refrigerators and freezers; Install and service window air conditioners

### **Purpose / Aims:**

1. To develop the skills and knowledge required for the installation and maintenance of domestic refrigeration systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:**      RF1102, RF-1300

**Course Duration:** 75 hrs.

**Date Developed:** February 1994

### **Course Outline / Learning Objectives:**

1. Describe types and explain the operation of domestic refrigeration systems
2. Repair and service domestic refrigerators and freezers
  - a. Replace evaporators
  - b. Replace condenser and oil coolers
  - c. Replace compressors
  - d. Replace electric defrost heaters and anti-condensation warmers (refrigerators)
  - e. Troubleshoot electrical and refrigeration systems
  - f. Replace dryer filters
  - g. Test system for refrigeration leaks
  - h. Replace electrical controls
  - i. Evacuate and recharge system with refrigerant (and oil if required)
  - j. Repair evaporator



- k. Repair condenser
  - l. Service and repair capillary tubing
3. Install and service window air conditioners
- a. Prepare equipment base
  - b. Interpret electrical requirements
  - c. Interpret water requirements
  - d. Test air handling equipment
  - e. Start equipment as per manufacturer's manuals and adjust controls as required
  - f. Check cooling system capacity
  - g. Check control circuits
  - h. Troubleshoot and repair system malfunctions

## **RF-2142      COMMERCIAL REFRIGERATION SYSTEMS**

### **Description:**

This course in refrigeration systems requires the use of tools and equipment, test instruments and materials and supplies. It involves sizing, installation, troubleshooting and repair of commercial refrigeration systems. It includes information on types and operation of commercial refrigeration systems and component parts.

### **Major Topics/Tasks:**

Service commercial systems; Install and service walk-in coolers and freezers; Install and service remote systems; Install and service commercial ice making units; Install and service heat reclaim systems

### **Purpose / Aims:**

1. To develop the skills and knowledge required for installing and maintaining commercial refrigeration systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:**      RF-2110

**Course Duration:** 90 hrs.

**Date Developed:** June 2004

### **Course Outline / Learning Objectives:**

1. Interpret basic compression refrigeration systems and common applications
  - a. multiple evaporator system
  - b. compound system
  - c. cascade system
  - d. modulating
2. Maintain evaporators and low pressure recirculating systems
  - a. Maintain evaporator defrosting methods
  - b. Maintain suction line accumulators
3. Analyze insulation for selected usage
  - a. Determine the insulation requirements for low, medium and high temperature rooms

4. Interpret requirements of system accessory devices on sophisticated commercial systems.
5. Install and service evaporators and defrost systems
  - a. Confirm evaporator is correct size and type for the system, before installation
  - b. Read diagrams, prints and schematics
  - c. Mount evaporators as per specifications
  - d. Test and connect electrical connections for electric heating defrost including sensing controls
  - e. Connect and service electric fan motors
  - f. Clean and service evaporators
  - g. Inspect and maintain drainlines
6. Install and service valves and regulators
  - a. Install, test and service manual shut-off valves
  - b. Install, test and service automatic shut-off valves
  - c. Install, test and service modulating shut-off valves
7. Service commercial systems
  - a. Add refrigerant to system
  - b. Add oil to compressor units
  - c. Pump-down system as may be required to install components
  - d. Change dryer(s)
  - e. Evacuate non-condensibles from system
  - f. Adjust controls such as thermostats, timers hi-lo motor controls, and flow devices
  - g. Adjust drive systems (pulleys, belts and direct drives)
  - h. Clean dirty condensers
  - i. Defrost blocked evaporators
  - j. Test fittings for leaks and tighten or repair as required
  - k. Oil and clean fan motors
  - l. Monitor system for normal operation
8. Install and service walk-in coolers and freezers
  - a. Determine refrigeration heat load
  - b. Determine size of components
  - c. Size refrigerant lines
  - d. Locate system components
  - e. Erect piping system
  - f. Leak test system
  - g. Evacuate system
  - h. Charge system with refrigerant
  - i. Test electrical system

- j. Check system for normal operation
  - k. Adjust controlling devices
  - l. Troubleshoot and repair electrical control problems
  - m. Troubleshoot and repair refrigeration problems
9. Install and service remote systems
- a. Locate and place system components
  - b. Pipe single compressor systems
  - c. Pipe multiple compressor systems
  - d. Pipe single evaporator systems
  - e. Pipe multiple evaporator and multiple temperature evaporator system
  - f. Install refrigerant line devices
  - g. Test system for leaks
  - h. Evacuate system and charge with refrigerant
  - i. Check system for normal operation
  - j. Adjust refrigerant controls
  - k. Adjust electrical controls
  - l. Troubleshoot and repair or replace defective refrigeration components
  - m. Troubleshoot and repair or replace defective electrical components
10. Install and service commercial ice making units
- a. Locate and install equipment
  - b. Remove shipping restraint devices
  - c. Check electrical power supply connections
  - d. Install system drains
  - e. Inspect all safety controls
  - f. Check for proper rotation of motors
  - g. Start unit as per manufacturer's operating manuals
  - h. Check system for correct operation and adjust controls as required
  - i. Troubleshoot and repair system malfunctions
11. Install and service heat reclaim systems
- a. Describe the operation and application of heat reclaim coils
  - b. Describe principles and operation of a fresh air-exhaust heat recovery unit
  - c. Sketch and explain the operation of an exhaust fresh air "heat recovery unit"
  - d. Pipe heat reclaim condensers in series
  - e. Pipe heat reclaim condensers in parallel
  - f. Locate and install regulating valves
  - g. Locate and install solenoids and check valves
  - h. Locate and install heat reclaim diverting valve
  - i. Troubleshoot and repair system malfunctions

## **RF-2152          INDUSTRIAL REFRIGERATION SYSTEMS**

### **Description:**

This course in refrigeration systems requires the use of tools and equipment, measuring instruments and materials and supplies. It involves sizing, installing, troubleshooting and repairing industrial refrigeration systems. It includes information on types and operation of industrial refrigeration systems and component parts.

### **Major Topics/Tasks:**

Troubleshoot industrial refrigeration systems; Install and service circulating pumps; Install and service industrial ice making units; Install and service multistage systems; Install and service plate freezers; Install and service blast freezers; Install and service recirculating and liquid transfer equipment; Maintain evaporators and low pressure recirculating systems. Install and service chillers and secondary cooling systems.

### **Purpose / Aims:**

1. To develop the skills and knowledge required for the installation and maintenance of industrial refrigeration systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:**      RF-2110

**Course Duration:** 90 hrs.

**Date Developed:** June 2004

### **Course Outline / Learning Objectives:**

1. Maintain evaporators and low pressure recirculating systems
  - a. Maintain recirculating systems
  - b. Maintain an intercooler
  - c. Operate liquid transfer system
  - d. Pipe and connect components for hot gas defrost:
    - i. DY systems
    - ii. liquid recirculating system
    - iii. gravity flooded system
2. Install and service circulating pumps
  - a. Install pumps

- b. Change couplings
  - c. Align pumps
  - d. Inspect and replace seals
  - e. Check clearances
  - f. Check motor amperage draw
  - g. Inspect and replace pump stainers and filters
3. Install and service commercial / industrial ice making units
- a. Identify and explain the different methods of ice manufacturing
  - b. Relate the manufactured ice to the type of ice making assembly
  - c. Recognize and describe ice handling equipment operation
  - d. Explain and sketch screw delivery and air delivery of ice to different usage
  - e. Set up and adjust ice bin controls
  - f. Service and troubleshoot a package ice making unit
  - g. Pipe in supply water
  - h. Install necessary drain lines
  - i. Remove shipping restraint devices
  - j. Connect power source as required
  - k. Evacuate and charge system
  - l. Inspect all safety controls
  - m.. Check for proper rotation of motors
  - n. Adjust belts and align direct drive couplings
  - o. Adjust ice cutting knives as per specifications
  - p. Start system as per manufacturers manuals
  - q. Check operation and adjust system as required
  - r. Troubleshoot and repair system malfunctions
4. Install and service multistage systems
- a. Identify multi-stage systems:
    - i. compound-compression system
    - ii. cascade system
  - b. Locate and install system components
  - c. Pipe refrigerant system as per specifications
  - d. Check electrical power supply
  - e. Set up and adjust operating and safety devices
  - f. Evacuate and charge system
  - g. Adjust belts and align direct drive couplings
  - h. Start up unit as per manufacturer manuals
  - i. Check for proper rotation of all motors
  - j. Check operation and adjust controls as required
  - k. Check amperage draw of all motors
  - l. Troubleshoot and repair system malfunctions

5. Install and service plate freezers
  - a. Locate and install plate freezer
  - b. Remove shipping constraints
  - c. Install hydraulic ram
  - d. Check electrical power supply connections
  - e. Install bolts and freezer plates and adjust plate spacing
  - f. Install refrigerant piping as per specifications
  - g. Start system as per manufacturer's manuals
  - h. Check defrost operation and set up defrost regulators
  - i.. Troubleshoot and repair system malfunctions
  
6. Install and service blast freezers
  - a. Locate coils
  - b. Insure proper placement and rotation of fans
  - c. Install refrigerant piping as per specifications
  - d. Assure system drainage
  - e. Adjust balancing valves
  - f. Inspect fan intakes and plenum for loose debris
  - g. Check operation of blast freezer room vents
  - h. Start equipment as per manufacturer's manuals
  - i. Check for proper operation and adjust controls as required
  - j. Troubleshoot and repair system malfunctions
  
7. Install and service recirculating and liquid transfer equipment
  - a. Locate and install suction accumulator
  - b. Locate and install high pressure receiver
  - c. Review operation and service procedures of refrigerate dump trap systems
  - d. Locate and install liquid ammonia pump
  - e. Install interconnecting pipe
  - f. Install necessary controls
  - g. Check electrical circuits
  - h. Troubleshoot and repair system malfunctions
  
8. Maintain evaporators and low pressure recirculating systems
  - a. Maintain evaporator defrosting methods
  - b. Maintain suction line accumulators
  - c. Maintain recirculating system
  - d. Maintain an intercooler
  - e. Operate liquid transfer system
  - f. Maintain oil pot and oil separators
  - g. Install a dry expansion evaporator

9. Install and service liquid chillers and secondary cooling systems
  - a. Locate and install system components for chiller unit
  - b. Pipe water and refrigerant lines to specifications
  - c. Inspect electrical circuits for correct connections according to specifications
  - d. Set-up and check operating and safety controls
  - e. Evacuate and charge the system as required
  - f. Install circulating brine equipment
  - g. Pipe brine system
  - h. Review engineering plans for ice rinks
    - i. Field trip to an ice rink
    - ii. Assemble piping for simulation of rink floor piping
  - i. Charge brine system
  - j. Check brine pH and specific gravity
  - k. Start pumps and check amperage draw
  - l. Start equipment following start-up procedures and make adjustment as required
  - m. Troubleshoot and repair system malfunctions



## **RF-2160**

## **COMPRESSORS**

### **Description:**

This course in refrigeration systems requires the use of tools and equipment, test instruments and materials and supplies. It involves removal, inspection, testing, rebuilding and replacing compressors. It includes information on types and operation of compressors and component parts.

### **Major Topics/Tasks:**

Align and adjust pulleys and belts; Align direct drive systems; Install compressor assemblies; Repair compressor assemblies

### **Purpose / Aims:**

1. To develop the skills and knowledge required for the installation and maintenance of compressors with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:** RF-1102, MP-1430

**Course Duration:** 75 hrs.

**Date Developed:** February 1994

### **Course Outline / Learning Objectives:**

1. Align and adjust pulleys and belts
  - a. Inspect, replace and adjust V-belts on single and multiple grooved pulleys
  - b. Select pulley sizes and belts to obtain pre-determined speed
  - c. Remove, replace and align pulleys and V-belts
2. Align direct drive systems
  - a. Check base for level
  - b. Install motor and compressor for direct coupling
  - c. Align with feeler gauges and straight edge
  - d. Align with dial micrometer
  - e. Check alignment to manufacturer's specifications
  - f. Drill and pin motor and compressor to base

3. Install compressor assemblies
  - a. Describe types of compressors and explain their operation
  - b. Explain volumetric efficiency
  - c. Confirm compressor is the correct one for the system
  - d. Prepare and anchor compressor or unit foundations
  - e. Remove and replace or install commercial welded hermetic compressors
  - f. Remove and replace or install bolted (field serviceable) hermetic compressors
  - g. Remove and replace or install external drive compressors
  - h. Align and adjust pulleys and direct drives as required
  - i. Connect piping, tubing couplings and fittings to compressors
  - j. Connect electrical wiring and accessories to compressors
  - k. Test for leaks after installation (refrigerant, oil, water lines)
  - l. Evacuate non-condensibles from system
  - m. Charge system with specified refrigerant
  - n. Check running amperage, oil levels, and operating temperatures
  - o. Perform acid test
  
4. Repair compressor assemblies
  - a. Disassemble, inspect and repair and reassemble open and semi hermetic compressors:
    - i. Reciprocating
    - ii. Rotary
  - b. Test and inspect compressors after reassembly
  - c. Describe the principles of operation, start-up / operating procedures for
    - i. Centrifugal compressor
    - ii. Screw compressor

## **RF-2220            CENTRAL AIR CONDITIONING SYSTEMS**

### **Description:**

This course in air conditioning requires the use of tools and equipment, test instruments and materials and supplies. It involves designing, installing, troubleshooting and servicing central air conditioning systems. It includes information on types of central air conditioning systems and component parts. It includes heat loss and heat gain calculations. Use of psychometric charts, etc.

### **Major Topics/Tasks:**

Install and service air handling units; Maintain building ventilating equipment

### **Purpose / Aims:**

1. To develop the skills and knowledge required for installing and maintaining central air conditioning systems with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:**        RF-1200

**Course Duration:** 75 hrs.

**Date Developed:** June 2004

### **Course Outline / Learning Objectives:**

1. Calculate heat gain and heat loss
  - a. Plot the relationship between temperature, relative humidity, moisture content and specific volume of air-vapor mixture on the psychometric chart
  - b. Determine quantities of heat and methods of heat transfer to raise or lower temperature
  - c. Calculate residential and commercial heat gain and loss.
2. Install and service air handling units
  - a. Describe the operation of air handling equipment
  - b. Describe the operation of air distribution systems and air handling units
  - c. Explain heat reclaim
  - d. Explain air treatment methods
  - e. Calculate loads
  - f. Explain the operation of heating and cooling coils

- g. Describe procedures for duct sizing
  - h. Describe the installation method of a floor mounted air handling unit
  - i. Describe the installation method of a ceiling air handling unit
  - j. Connect units to duct-work
  - k. Service fans, shafts and motors
  - l. Service air filters
  - m. Check air cycle supply and return
  - n. Explain the procedure for balancing an air distribution system
  - o. Use air conditioning instruments
  - p. Troubleshoot and repair system malfunctions
3. Maintain building ventilating equipment
- a. Maintain louvres and dampers
  - b. Adjust modulating motors as applicable to operating louvres and dampers
  - c. Maintain air handling equipment
  - d. Operate and maintain building heating and ventilating equipment
4. Identify components of air controller (transformer)
- a. Use and maintain air controller (transformer)
  - b. Use and maintain air and fluid hoses

## RF-2300

## HEAT PUMPS

### Description:

This course in refrigeration systems requires the use of tools and equipment, test instruments and materials and supplies. It involves sizing, installing, troubleshooting and repairing heat pumps. It includes information on types and operation of heat pumps and component parts.

### Major Topics/Tasks:

Define air to air, water to air and ground to air system; Describe types and explain the operation of heat pumps; Install and service heat pumps; Troubleshoot heat pumps.

### Purpose / Aims:

1. To develop the skills and knowledge required for the installation and maintenance of heat pumps with respect to various codes and standards
2. To practice safety in potentially harmful situations
3. To develop an appreciation for conservation and environmental issues

**Prerequisites:** RF-2110, MP-1430, MP-2330

**Course Duration:** 90 hrs.

**Date Developed:** December 1998

### Course Outline / Learning Objectives:

1. Define air to air, water to air and ground to air system
2. Describe types and explain the operation of heat pumps
3. Install and service heat pumps
  - a. Install outdoor units
  - b. Install indoor units
  - c. Connect refrigerant lines
  - d. Check power supply requirements
4. Troubleshoot heat pumps.
  - a. mechanical system
  - b. heating cycle controls
  - c. cooling cycle controls
  - d. defrost cycle controls

- e. auxiliary heat controls

## **TS-1300**

## **RIGGING**

### **Description:**

This general studies course requires the use of rigging equipment, ladders, block and tackle, and safety equipment. It involves installing, testing and maintaining rigging; and tying knots and splicing rope. It includes information on safety requirements, types of ropes, types of knots, slings, types of scaffolds, and types of ladders.

### **Major Topics/Tasks:**

Use and maintain rigging equipment; Use and maintain overhead cranes; Use scaffolding and rigging

### **Purpose / Aims:**

1. To develop the skills and knowledge required to install safe rigging

**Prerequisites:** None

**Course Duration:** 45 hrs.

**Date Developed:** December 1993

### **Course Outline / Learning Objectives:**

1. Use and maintain rigging equipment
  - a. List the Occupational Health and Safety Regulations for rigging
  - b. Describe the different types of ropes
  - c. List the different kinds of knots
  - d. Describe slings.
  - e. Describe the different types of ladders
  - f. Describe methods of lead balancing
  - g. Describe the proper procedures and equipment for handling heavy objects
  - h. Specify the use of screw jacks versus hydraulic units
  - i. Recognize and use hand signals
  - j. Recognize lifting capabilities
  - k. Recognize necessity for swing staging
  - l. Interpret occupational health and safety regulations
  - m. Select and install ladders
  - n. Install scaffolds
  - o. Demonstrate the safe and proper use of lifting equipment such as come-a-longs, chain falls, jacks, winches, overhead cranes, jacks, skids, cable tuggers, reeve blocks, slings and rope

- p. Demonstrate proper use of knots
  - q. Use lifting attachments such as eye bolts and lifting lugs, beam clamps and crawlers, snatch blocks, spreader bars, shackles and screw jacks
  - r. Transfer loads using lifting equipment
2. Use and maintain overhead cranes
- a. Safely and effectively use overhead cranes
  - b. Use proper lifting procedures
  - c. Use hoisting and/or crane signals
  - d. Use plate grab and/or slings
3. Use scaffolding and rigging
- a. Describe the different types of scaffolds
  - b. Describe the safety factors to be considered when using swing staging
  - c. Explain how suspended scaffolding is erected and when and how it is used
  - d. Describe power scaffolding
  - e. List safety rules for erecting and working on scaffolding (Safety in structural components)
    - i.. footboards
    - ii. putlogs
    - iii. braces
    - iv. ties
    - v. planking
    - vi. scaffold brackets
  - f. Describe special problems of rolling and suspended scaffolding
  - g. Specify the use of elevators
  - h. Describe types and conditions of approved work platforms
  - i. Erect section of tubular steel sectional scaffold
  - j. Describe adjustable tower scaffolding and advantages
  - k. Inspect scaffolding before using
  - l. Direct/assist in loading/unloading masonry units from trucks
  - m. Direct/assist hoisting masonry units to work stations



## **WD-1240 OXY-FUEL CUTTING, WELDING & BRAZING**

### **Description:**

This course requires the use of welding equipment and accessories, materials and supplies and safety equipment. It involves setting up Oxy-Fuel Cutting & Welding 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 (Oxy-Fuel); Set up and use cutting equipment; Fusion weld; Braze weld metals; Assemble copper, brass and steel fittings using silver and silfos brazing alloys.

### **Purpose / Aims:**

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

**Prerequisites:** RF-1150

**Course Duration:** 60 hrs.

**Date Developed:** June 2004

### **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. 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. Perform silver brazing, copper to steel, copper to brass and copper to copper
  - j. Perform silfos brazing copper to copper
4. 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.)

## **MA-1060**

## **MATH**

### **Description:**

This course in Basic Math requires knowledge of general mathematical concepts and processes to enable trades persons to function in the institutional setting by developing numeracy skills required for technical courses. This math course should also provide a foundation for experiential learning through a knowledge of math relating to on-the-job skills and practices.

### **Course Outcomes:**

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

### **Prerequisites:**

**Course Duration:** 60 hrs.

### **Course Objectives (Knowledge):**

1. Define and calculate using whole number operations
2. Define and demonstrate use of correct orders of operations
3. Demonstrate examples of operations with fractions and mixed numbers
4. Demonstrate examples of operations with decimals
5. Demonstrate examples of operations with percentages
6. Employ percent/decimal/fraction conversion and comparison
7. Define and calculate with ratios and proportions
8. Use the Imperial Measurement system in relevant trade applications

9. Use the Metric Measurement system in relevant trade applications
10. Perform Imperial/Metric conversions
11. Define and demonstrate the formulation of variables
12. Demonstrate and define the various properties of angles and make relevant calculations

**Major Tasks/Sub-tasks (Skills):**

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

## **REQUIRED RELATED COURSES**

## **CM-2150                      WORKPLACE COMMUNICATIONS**

### **Description:**

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

### **Course Outcomes:**

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

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

### **Objectives and Content:**

1. Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.
2. Explain the rules of subject-verb agreement.
3. Define and describe the major characteristics of an effective paragraph
4. Examine the Value of Business Writing Skills
  - i) Describe the importance of effective writing skills in business
  - ii) Describe the value of well-developed writing skills to career success as referenced in the Employability Skills
5. Examine Principles of Effective Business Writing
  - i) Discuss the rationale and techniques for fostering goodwill in business communication, regardless of the circumstances
  - ii) Review the importance of revising and proofreading
  - iii) Differentiate between letter and memo applications in the workplace & review samples
  - iv) Identify the parts of a business letter and memo

- v) Review the standard formats for business letters and memos
  - vi) Examine samples of well-written and poorly written letters and memos
  - vii) Examine guidelines for writing sample letters and memos which convey: acknowledgment, routine request, routine response, complaint, refusal, persuasive request and letters of appeal
6. Examine the Fundamentals of Informal Business Reports
- i) Identify the purpose of the informal report
  - ii) Identify the parts and formats of an informal report
  - iii) Identify methods of information gathering
  - iv) Describe the methods of referencing documents
  - v) Review the importance of proof reading and editing
7. Examine types of presentations
- i) Review & discuss components of an effective presentation
  - ii) Review & discuss delivery techniques
  - iii) Review & discuss preparation & use of audio/visual aids
  - iv) Discuss & participate in confidence building exercises used to prepare for giving presentations
8. Interpersonal Communications
- i) Examine and apply listening techniques
  - ii) Discuss the importance of body language

**Practical:**

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

## MR-1220

## CUSTOMER SERVICE

### Description:

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

### Course Outcomes:

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

- define customer service
- explain why service is important
- describe the relationship between “service” and “sales”
- demonstrate an understanding of the importance of a positive attitude
- demonstrate methods of resolving customer complaints

### Objectives and Content:

1. Define quality service
  - i) Identify and discuss elements of customer service
  - ii) Explain the difference between Service vs. Sales or Selling
  - iii) Explain why quality service is important
  - iv) Identify the various types of customers & challenges they may present
  - v) Describe customer loyalty
  - vi) Examine barriers to quality Customer Service
2. Explain how to determine customers wants and needs
  - i) Identify customer needs
  - ii) Explain the difference between customer wants and needs
  - iii) Identify ways to ensure repeat business
3. Demonstrate an understanding of the importance of having a positive attitude
  - i) Identify & discuss the characteristics of a positive attitude
  - ii) Explain why it is important to have a positive attitude
  - iii) Explain how a positive attitude can improve a customer’s satisfaction
  - iv) Define perception and explain how perception can alter us and customers
  - v) Describe methods of dealing with perception
4. Communicating effectively with customers
  - i) Describe the main elements in the communication process
  - ii) Identify some barriers to effective communication



- iii) Explain why body language is important
  - iv) Define active listening and state why it is important
  - v) Identify and discuss the steps of the listening process
  - vi) Identify and discuss questioning techniques
5. Demonstrate using the telephone effectively
- i) Explain why telephone skills are important
  - ii) Describe the qualities of a professional telephone interaction
6. Demonstrate an understanding of the importance of asserting oneself
- i) Define assertiveness
  - ii) Discuss assertive techniques
  - iii) Explain the use of assertiveness when dealing with multiple customers
7. Demonstrate techniques for interacting with challenging customers in addressing complaints & resolving conflict
- i) Examine & discuss ways to control feelings
  - ii) Examine & discuss ways to interact with an upset customer
  - iii) Examine & discuss ways to resolve conflict/customer criticism
  - iv) Examine & discuss ways to prevent unnecessary conflict with customers

**Practical:**

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

## **SP-2330      QUALITY ASSURANCE/QUALITY CONTROL**

### **Description:**

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

### **Course Outcomes:**

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

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

### **Objectives & Content:**

1. Describe the reasons for quality assurance and quality plans.
2. Explain the relationship between quality assurance and quality control.
3. Describe quality control procedures as applied to the production and checking of specifications and processes in applicable occupations.
4. Describe quality control procedures as applied to the acceptance and checking of raw materials.
5. Explain the role of communications in a quality environment.
6. Explain why it is important for all employees to understand the structure of the company and its production processes.
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 in various occupations.
10. Explain the concepts of quality
  - i) cost of quality

- ii) measurement of quality
  - iii) elements of quality
  - iv) elements of the quality audit
  - v) quality standards
  - vi) role expectations and responsibilities
11. Explain the structure of quality assurance and quality control
- i) Describe organizational charts
  - ii) Identify the elements of a quality assurance system such as ISO, CSA, WHMIS, Sanitation Safety Code (SSC)
  - iii) Explain the purpose of the quality assurance manual
  - iv) Describe quality assurance procedures
12. Examine quality assurance/quality control documentation
- i) Describe methods of recording reports in industry
  - ii) Describe procedures of traceability (manual and computer-based recording)
  - iii) Identify needs for quality control procedures

**Practical:**

1. Apply quality control to a project
- i) Follow QA/QC procedures for drawings, plans and specifications in applicable occupations.
  - ii) Calibrate measuring instruments and devices in applicable occupations.
  - iii) Interpret required standards
  - iv) Follow QA/QC procedures for accepting raw materials
  - v) Carry out the project
  - vi) Control the quality elements (variables)
  - vii) Complete QA/QC reports

## MC-1050 INTRODUCTION TO COMPUTERS

### Description:

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

### Course Outcomes:

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

- computer systems and their operation.
- popular software packages, their applications
- security issues of Computers

### Objectives & Content:

1. Identify the major components of microcomputer system hardware and software system.
2. Describe the functions of the microprocessor.
  - i) Describe and give examples of I/O DEVICES.
  - ii) Describe primary storage (RAM, ROM, Cache).
  - iii) Define bit, byte, code and the prefixes k.m. and g.
  - iv) Describe secondary storage (diskettes and hard disks, CD ROMS, Zip Drives etc).
  - v) Describe how to care for a computer and its accessories.
3. Describe microcomputer software
  - i) Define software.
  - ii) Describe types of operational and application software
  - iii) Define file and give the rules for filenames and file extensions.
4. Describe windows software
  - i) Start and quit a Program
  - ii) Demonstrate how to use the help function
  - iii) Locate a specific file using the **find** function
  - iv) Identify system settings:wall paper, screen saver, screen resolution, background
  - v) Start a program by using the Run Command
  - vi) Shutting down your computer
5. Identify File Management commands
  - i) Demonstrate how to view directory structure and folder content

- ii) Organize files and folders
  - iii) Copy, delete, and move files and folders
  - iv) Create folders
  - v) Maximize and minimize a window
  - vi) Describe windows task bar
6. Describe Keyboards
- i) Identify and locate alphabetic and numeric keys
  - ii) Identify and locate function key & special keys
7. Describe Word Processing
- i) Describe Windows components
  - ii) Menu bar
  - iii) Menu indicators
  - iv) Document window
  - v) The Status bar
  - vi) The Help feature
  - vii) Insertion point movements
8. Describe the procedure used to development of a document
- i) Enter text
  - ii) Change the display
9. Describe the procedure for opening, saving and exiting documents
- i) Saving a document
  - ii) Closing a document.
  - iii) Starting a new document Window
  - iv) Opening a document
  - v) Exiting word processor
10. Describe the procedure for editing a Document
- i) Adding new text
  - ii) Deleting text
  - iii) Using basic format enhancement (split and join paragraphs, insert text)
11. Describe the main Select Features
- i) Identify a selection
  - ii) Moving a selection
  - iii) Copying a selection
  - iv) Deleting a selection
  - v) Saving a selection

12. Explain how to change Layout Format
  - i) Changing layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)
13. Explain how to change Text Attributes
  - i) Changing text attributes: (bold, underline, font, etc.)
14. Describe the Auxiliary Tools
  - i) Using Spell Check & Thesaurus
15. Describe Print features
  - i) Selecting the Print Feature: (i.e; number of copies and current document)
  - ii) Identifying various options in print screen dialogue box
16. Examine & Discuss Electronic Spreadsheet
  - i) Spreadsheet Basics
  - ii) The Worksheet Window
17. Describe Menus
  - i) Menu Bar
  - ii) Control menu
  - iii) Shortcut menu
  - iv) Save, Retrieve form menus
18. Describe the components of a worksheet
  - i) Entering constant values and formulas
  - ii) Using the Recalculation feature
19. Describe Use ranges
  - i) Typing a range for a function
  - ii) Pointing to a range for a function
  - iii) Selecting a range for toolbar and menu commands
20. Describe how to print a worksheet
  - i) Printing to the Screen
  - ii) Printing to the Printer
  - iii) Printing a selected Range
21. Describe how to edit a worksheet
  - i) Replacing cell contents
  - ii) Inserting & deleting rows and columns
  - iii) Changing cell formats
  - iv) Changing cell alignments
  - v) Changing column width

- vi) Copying and moving cells
22. State major security issues in using computers
- i) Pass words
  - ii) Accessing accounts
  - iii) Viruses and how they can be avoided
  - iv) Identity theft and ways to protect personal information
23. Describe how to use Electronic Mail
- i) E-mail etiquette
  - ii) E-mail accounts
  - iii) E-mail messages
  - iv) E-mail message with attachments
  - v) E-mail attachments
  - vi) Print e-mail messages
  - vii) Deleting e-mail messages
24. Explain the Internet and its uses
- i) The World Wide Web(www)
  - ii) Accessing Web sites
  - iii) Internet Web Browsers
  - iv) Internet Search Engines
  - v) Searching Techniques
  - vi) Posting documents on-line

**Practical:**

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

## SD-1700

## WORKPLACE SKILLS

### Description:

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

### Course Outcomes:

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

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

### Objectives & Content:

1. Meetings
  - i) Identify & discuss meeting format and preparation required for a meeting.
  - ii) Explain the purpose of an agenda.
  - iii) Explain the roles and responsibilities of meeting participants.
  - iv) Explain the purpose of motions and amendments and withdrawals.
  - v) Explain the procedure to delay discussion of motions.
  - vi) Explain the voting process.
2. Unions
  - i) State why unions exist.
  - ii) Give a concise description of the history of Canadian labour.
  - iii) Explain how unions function.
  - iv) Explain labour's structure.
  - v) Describe labour's social objectives.
  - vi) Describe the relationship between Canadian labour and the workers.
  - vii) Describe the involvement of women in unions.
3. Worker's Compensation
  - i) Describe the aims, objectives, benefits and regulations of the Workplace Health, safety and Compensation Commission.
  - ii) Explain the internal review process.



4. Employment Insurance
  - i) Explain employment insurance regulations
  - ii) Describe how to apply for employment insurance.
  - iii) Explain the appeal process.
  - iv) Identify the components of a letter of appeal.
  
5. Worker's Rights
  - i) Define labour standards.
  - ii) Explain the purpose of the Labour Standards Act.
  - iii) Identify regulations pertaining to:
    - Hours of work
    - Minimum wages
    - Employment of children
    - Vacation pay
  - iv) Explain the purpose of the Occupational Health & Safety Act as it refers to workers' rights
  
6. Human Rights
  - i) Describe what information cannot be included on an employment application.
  - ii) Describe what information cannot be included in an interview.
  - iii) Examine the Human Rights Code and explain the role of the Human Rights Commission.
  - iv) Define harassment in various forms and identify strategies for prevention.
  
7. Workplace Diversity
  - i) Define and explore basic concepts and terms related to workplace inclusively including age, race, culture, religion, socio-economic, sexual orientation with an emphasis on gender issues and gender stereotyping.
  
8. Gender Sensitivity
  - i) Explore gender and stereotyping issues in the workplace by identifying strategies for eliminating gender bias.

**Practical:**

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

## **SD-1710**

## **JOB SEARCH TECHNIQUES**

### **Description:**

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

### **Course Outcomes:**

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

- Demonstrate effective use of Job Search Techniques

### **Objectives & Content:**

1. Identify and examine employment trends and opportunities
2. Identify sources that can lead to employment
3. Access and review information on the Newfoundland and Labrador Apprenticeship and Certification Web site and the Apprenticeship Employment Gateway
4. Analyze job ads and discuss the importance of fitting qualifications to job requirements
5. Identify and discuss employability skills as outlined by the Conference Board of Canada.
6. Discuss the necessity of fully completing application forms.
7. Establish the aim/purpose of a resume
8. Explore characteristics of effective resumes, types of resumes, and principles of resume format .
9. Explore characteristics of an effective cover letter.
10. Identify commonly asked questions in an interview.
11. Explore other employment related correspondence.
12. Explore the job market to identify employability skills expected by an employer.
13. Conduct a self-analysis and compare with general employer expectations.

14. Discuss the value of establishing and maintaining a portfolio.

**Practical:**

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

## **SD-1720                    ENTREPRENEURIAL AWARENESS**

### **Description:**

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

### **Course Outcomes:**

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

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

### **Objectives & Content:**

1. Explore Self-Employment: An Alternative to Employment
  - i) Identify the advantages and disadvantages of self-employment vs. regular employment
  - ii) Differentiate between an entrepreneur and a small business owner
  - iii) Evaluate present ideas about being in business
2. Identify and discuss various types of business ownership
  - i) Explore the Characteristic of Entrepreneurs
  - ii) Identify characteristics common to entrepreneurs
  - iii) Compare one's own personal characteristics with those of entrepreneurs.
  - iv) Examine one's present ideas about business people
3. Identify Business Opportunities
  - i) Distinguish between an opportunity and an idea.
  - ii) Examine existing traditional and innovative business ventures . . . . .
  - iii) Identify and summarize the role of various agencies that support business development.
  - iv) Identify potential business opportunities.
4. Review the Entrepreneurial Process.
  - i) Explain the entrepreneurial process
  - ii) Describe the purpose of a business plan
  - iii) Identify & discuss the main elements of a business plan

**Practical:**

1. From a list potential business opportunities prepare a list of elements that would have to be included in a business plan.