Plan of Training

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Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Advanced Education and Skills
Apprenticeship and Trades Certification Division

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PLAN OF TRAINING

Automotive Service Technician

October 2014

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Advanced Education and Skills
Apprenticeship and Trades Certification Division

Approved by:

Chairperson, Provincial Apprenticeship and Certification Board

Date: Oct 2/14

Preface

This Apprenticeship Standard is based on the 2011 edition of the National Occupational Analysis and the 2013 Interprovincial Program Guide for the Automotive Service Technician trade.

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

Acknowledgements

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

We offer you a sincere thank you.

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Document Status	Date Distributed	Mandatory Implementation Date	Comments
PACB approved October 2014	April 2014	September 2014	Updated 2010 POT to reflect 2013 Interprovincial Program Guide

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A. Profile Chart

OCCUPATIONAL SKILLS			
SV1105 Safety in the Shop	**SV1177** Shop Tools and Equipment	**CM2160** Communication Essentials	**SV1157** Service Information Systems and Trade Related Documents
WD1301 Oxy-Fuel Welding/Cutting	**SV1710** Gas Metal Arc Welding (GMAW [MIG])	**SV1680** Preventative Maintenance Inspections (PMI)	
ENGINE AND ENGINE SUPPORT SYSTEMS			
SV1690 Accessory Drive Systems	**SV1306** Engine Principles (Gasoline and Diesel)	**SV1310** Cooling Systems	**SV1197** Lubrication and Fluids Servicing
SV2850 Fuel Delivery	**SV1600** Ignition Systems	**SV4010** Engine Diagnostics and Repair	**SV2236** Gasoline Fuel Systems
SV2221 Emission Control Systems	**SV4020** Intake and Exhaust Systems	**SV4030** Diesel Fuel Systems Diagnostics and Repair	
VEHICLE MANAGEMENT SYSTEMS			
SV2018 Vehicle Management Systems			
DRIVE LINE SYSTEMS			
SV1287 Drive Shafts and Axle Shafts	**SV3010** Manual Transmissions and Transaxles	**SV3020** Clutches	**SV3030** Transfer Cases and Four-Wheel Drive/All-Wheel Drive (4WD/AWD) Systems
SV3040 Drive Axles, Differentials and Final Drive Assemblies	**SV3050** Automatic Transmissions and Transaxles		
ELECTRICAL AND COMFORT CONTROL SYSTEMS			
SV1130 Electrical and Electronic Principles	**SV1385** Starting Systems	**SV1395** Charging Systems	**SV2870** Lighting and Wiper Systems
SV2156 Body Electrical, Options and Accessories	**SV2860** Instrumentation and Information Displays	**SV4050** Heating, Ventilation and Air Conditioning (HVAC) Systems	

STEERING AND SUSPENSION, BRAKING, CONTROL SYSTEMS, TIRES, HUBS AND WHEEL BEARINGS			
SV1217 Tires, Wheels and Hubs	**SV1642** Braking Systems I (Non-ABS)	**SV1256** Suspension Systems I	**SV1227** Steering Systems
SV3000 Braking Systems II (ABS)	**SV4040** Suspension Systems II		
BODY COMPONENTS, TRIM AND RESTRAINT SYSTEMS			
SV1551 Body Components and Trim	**SV4060** Restraint Systems		
HYBRID SYSTEMS			
SV1700 Hybrid Systems I	**SV2880** Hybrid Systems II		

B. NOA Comparison Table

2011 NOA Sub-task		2014 POT	
Task 1 – Uses and maintains tools and equipment.			
1.01	Maintains tools and equipment.	SV1177	Shop Tools and Equipment
		SV1165	Hand Tools
		SV1187	Fasteners, Tubing and Fittings
1.02	Uses hoisting and lifting equipment.	SV1177	Shop Tools and Equipment
		SV1105	Safety in the Shop
		TS1510	Occupational Health and Safety
1.03	Uses personal protective equipment (PPE) and safety equipment.	SV1105	Safety in the Shop
		TS1530	Standard First Aid
		TS1520	WHMIS
Task 2 – Performs common trade activities.			
2.01	Uses technical information.	SV1157	Service Information Systems and Trade Related Documents
2.02	Estimates preliminary job cost.	SV1157	Service Information Systems and Trade Related Documents
2.03	Maintains safe work environment.	SV1105	Safety in the Shop
Task 3 – Diagnoses engine systems.			
3.01	Diagnoses cooling systems.	SV1310	Cooling Systems
3.02	Diagnoses lubricating systems.	SV1197	Lubrication and Fluids Servicing
3.03	Diagnoses base engine.	SV1306	Engine Principles (Gasoline and Diesel)
Task 4 – Repairs engine systems.			
4.01	Repairs cooling systems.	SV1310	Cooling Systems
4.02	Repairs lubricating systems.	SV1197	Lubrication and Fluids Servicing
4.03	Repairs base engine.	SV4010	Engine Diagnostics and Repair
Task 5 – Diagnoses engine support systems.			
5.01	Diagnoses fuel delivery systems.	SV2850	Fuel Delivery
		SV2236	Gasoline Fuel Systems
		SV4030	Diesel Fuel Systems Diagnostics and Repair
5.02	Diagnoses ignition systems.	SV1600	Ignition Systems
5.03	Diagnoses intake/exhaust systems.	SV4020	Intake and Exhaust Systems
5.04	Diagnoses emission systems.	SV2221	Emission Control Systems
5.05	Diagnoses accessory drive systems and mounts.	SV1690	Accessory Drive Systems
		SV3010	Manual Transmissions and Transaxles
		SV3050	Automatic Transmissions and Transaxles

2011 NOA Sub-task		2014 POT	
5.06	Diagnoses diesel engine support systems.	SV2850	Fuel Delivery Systems
		SV4030	Diesel Fuel Systems Diagnostics and Repair
		SV1600	Ignition Systems
		SV4020	Intake and Exhaust Systems
		SV2221	Emission Control Systems
Task 6 – Repairs engine support systems.			
6.01	Repairs gasoline delivery systems.	SV2850	Fuel Delivery Systems
		SV2236	Gasoline Fuel Systems
		SV4030	Diesel Fuel Systems Diagnostics and Repair
6.02	Repairs ignition systems.	SV1600	Ignition Systems
6.03	Repairs intake/exhaust systems.	SV4020	Intake and Exhaust Systems
6.04	Repairs emission systems.	SV2221	Emission Control Systems
6.05	Repairs accessory drive systems and mounts.	SV1690	Accessory Drive Systems
		SV3010	Manual Transmissions and Transaxles
		SV3050	Automatic Transmissions and Transaxles
6.06	Repairs diesel engine support systems.	SV2850	Fuel Delivery Systems
		SV4030	Diesel Fuel Systems Diagnostics and Repair
		SV1600	Ignition Systems
		SV4020	Intake and Exhaust Systems
		SV2221	Emission Control Systems
Task 7 – Diagnoses vehicle management systems.			
7.01	Reads diagnostic trouble codes (DTCs).	SV2018	Vehicle Management Systems
7.02	Monitors parameters.	SV2018	Vehicle Management Systems
7.03	Interprets test results.	SV2018	Vehicle Management Systems
7.04	Tests system circuitry and components.	SV2018	Vehicle Management Systems
Task 8 – Repairs vehicle management systems.			
8.01	Updates component software.	SV2018	Vehicle Management Systems
8.02	Replaces components.	SV2018	Vehicle Management Systems
8.03	Verifies vehicle management system repair.	SV2018	Vehicle Management Systems
		SV1130	Electrical and Electronic Principles

2011 NOA Sub-task		2014 POT	
Task 9 – Diagnoses drive line systems.			
9.01	Diagnoses drive shafts and axles.	SV1287	Drive Shafts and Axle Shafts
9.02	Diagnoses manual transmissions/trans-axles.	SV3010	Manual Transmissions and Transaxles
9.03	Diagnoses automatic transmissions/transaxles.	SV3050	Automatic Transmissions and Transaxles
9.04	Diagnoses clutches.	SV3020	Clutches
9.05	Diagnoses transfer cases.	SV3030	Transfer Cases and Four-Wheel Drive/All-Wheel Drive (4WD/AWD) Systems
9.06	Diagnoses final drive assemblies.	SV3040	Drive Axles, Differentials and Final Drive Assemblies
Task 10 – Repairs drive line systems.			
10.01	Repairs drive shafts and axles.	SV1287	Drive Shafts and Axle Shafts
10.02	Repairs manual transmissions/transaxles.	SV3010	Manual Transmissions and Transaxles
10.03	Repairs automatic transmissions/transaxles.	SV3050	Automatic Transmissions and Transaxles
10.04	Repairs clutches.	SV3020	Clutches
10.05	Repairs transfer cases.	SV3030	Transfer Cases and Four-Wheel Drive/All-Wheel Drive (4WD/AWD) Systems
10.06	Repairs final drive assemblies.	SV3040	Drive Axles, Differentials and Final Drive Assemblies
Task 11 – Diagnoses electrical systems and components.			
11.01	Diagnoses starting/charging systems and batteries.	SV1385	Starting Systems
		SV1395	Charging Systems
		SV1377	Batteries
11.02	Diagnoses basic wiring and electrical systems.	SV1130	Electrical and Electronic Principles
		SV2156	Body Electrical, Options and Accessories
11.03	Diagnoses lighting and wiper systems.	SV2870	Lighting and Wiper Systems
11.04	Diagnoses entertainment systems.	SV2156	Body Electrical, Options and Accessories
11.05	Diagnoses electrical options.	SV2156	Body Electrical, Options and Accessories

2011 NOA Sub-task		2014 POT	
11.06	Diagnoses instrumentation and information displays.	SV1130	Electrical and Electronic Principles
		SV2860	Instrumentation and Information Displays
11.07	Diagnoses electrical accessories.	SV1130	Electrical and Electronic Principles
		SV2156	Body Electrical, Options and Accessories
Task 12 – Repairs electrical systems and components.			
12.01	Repairs starting/charging systems and batteries.	SV1385	Starting Systems
		SV1395	Charging Systems
		SV1377	Batteries
12.02	Repairs basic wiring and electrical systems.	SV1130	Electrical and Electronic Principles
		SV2156	Body Electrical, Options and Accessories
12.03	Repairs lighting and wiper systems.	SV2870	Lighting and Wiper Systems
12.04	Repairs entertainment systems.	SV2156	Body Electrical, Options and Accessories
12.05	Repairs electrical options.	SV2156	Body Electrical, Options and Accessories
12.06	Repairs electrical accessories.	SV1130	Electrical and Electronic Principles
		SV2156	Body Electrical, Options and Accessories
12.07	Installs electrical accessories.	SV1130	Electrical and Electronic Principles
		SV2156	Body Electrical, Options and Accessories
12.08	Repairs instrumentation and information displays.	SV1130	Electrical and Electronic Principles
		SV2860	Instrumentation and Information Displays
Task 13 – Diagnoses heating, ventilation and cooling (HVAC) and comfort control systems.			
13.01	Diagnoses air flow control systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems
13.02	Diagnoses refrigerant systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems
13.03	Diagnoses heating systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems
Task 14 – Repairs heating, ventilation and cooling (HVAC) and comfort control systems.			
14.01	Repairs air flow control systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems
14.02	Repairs refrigerant systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems

2011 NOA Sub-task		2014 POT	
14.03	Repairs heating systems.	SV4050	Heating, Ventilation and Air Conditioning (HVAC) Systems
Task 15 – Diagnoses steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings.			
15.01	Diagnoses steering, suspension and control systems.	SV1227	Steering Systems
		SV1256	Suspension Systems I
		SV4040	Suspension Systems II
15.02	Diagnoses braking and control systems.	SV1642	Braking Systems I (Non ABS)
		SV3000	Braking Systems II (ABS)
15.03	Diagnoses tires, wheels, hubs, and wheel bearings.	SV1217	Tires, Wheels and Hubs
Task 16 – Repairs steering and suspension, braking, control systems, tires, wheels, hubs and wheel bearings.			
16.01	Repairs steering, suspension and control systems.	SV1227	Steering Systems
		SV1256	Suspension Systems I
		SV4040	Suspension Systems II
16.02	Repairs braking and control systems.	SV1642	Braking Systems I (Non-ABS)
		SV3000	Braking Systems II (ABS)
16.03	Repairs tires, wheels, hubs and wheel bearings.	SV1217	Tires, Wheels and Hubs
Task 17 – Diagnoses body components, trim and restraint systems.			
17.01	Diagnoses restraint systems.	SV4060	Restraint Systems
17.02	Diagnoses wind noise, rattles and water leaks.	SV1551	Body Components and Trim
17.03	Diagnoses interior and exterior components and trim.	SV1551	Body Components and Trim
17.04	Diagnoses latches, locks and movable glass.	SV1551	Body Components and Trim
Task 18 – Repairs body components, trim, restraint systems and installed accessories.			
18.01	Repairs restraint systems.	SV4060	Restraint Systems
18.02	Repairs problems with wind noise, rattles and water leaks.	SV1551	Body Components and Trim
18.03	Repairs interior and exterior components and trim.	SV1551	Body Components and Trim
18.04	Repairs latches, locks and movable glass.	SV1551	Body Components and Trim
18.05	Install interior and exterior accessories.	SV1551	Body Components and Trim

2011 NOA Sub-task		2014 POT	
Task 19 – Diagnoses hybrid and alternate fuel systems.			
19.01	Implements hybrid safety protocols.	SV1700	Hybrid Systems I
19.02	Diagnoses hybrid systems.	SV2880	Hybrid Systems II
19.03	Diagnoses alternate fuel systems.	SV2880	Hybrid Systems II
Task 20 – Repairs hybrid and alternate fuel systems.			
20.01	Repairs hybrid systems.	SV2880	Hybrid Systems II
20.02	Repairs alternate fuel systems.	SV2880	Hybrid Systems II

C. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable.

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

Upon completion of an entry level program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

Block I				
Course No.	**2013 IPG**	**Course Name**	**Hours**	**Pre-Requisite(s)**
TS1510	AST-100	Occupational Health and Safety	6	None
TS1520	AST-100	WHMIS	6	None
TS1530	AST-100	Standard First Aid	14	None
SV1105	AST-100	Safety in the Shop	12	None
SV1125	NL Only	Gaskets, Seals and Bearings	30	None
SV1165	AST-105	Hand Tools	30	SV1105
SV1177	AST-105 AST-110	Shop Tools and Equipment	24	SV1165
SV1187	AST-105	Fasteners, Tubing and Fittings	6	SV1177
SV1157	AST-120	Service Information Systems and Trade Related Documents	12	None
SV1217	AST-125	Tires Wheels and Hubs	24	SV1177
WD1301	AST-130	Oxy-Fuel Welding/Cutting	30	SV1177
SV1710	AST-135	Gas Metal Arc Welding (GMAW [MIG])	30	SV1177
SV1642	AST-140	Braking Systems I (Non-ABS)	60	SV1177
SV1690	AST-145	Accessory Drive Systems	18	SV1177

Block I				
Course No.	**2013 IPG**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SV1551	AST-150	Body Components and Trim	18	SV1177
SV1130	AST-155	Electrical and Electronic Principles	90	SV1177
SV1377	NL Only	Batteries	18	SV1177
SV1256	AST-160	Suspension I	48	SV1177
SV1680	AST-165	Preventative Maintenance Inspections (PMI)	18	SV1177
SV1700	AST-170	Hybrid Systems I	24	SV1177
SV1306	AST-200	Engine Principles (Gasoline and Diesel)	90	SV1177
SV1310	AST-205	Cooling Systems	30	SV1177
SV1197	AST-210	Lubrication and Fluids Servicing	24	SV1177
SV1385	AST-215	Starting Systems	30	SV1377
SV1395	AST-220	Charging Systems	30	SV1377
SV1600	AST-235	Ignition Systems	30	SV1377
SV1287	AST-240	Drive Shafts and Axle Shafts	30	SV1177
SV1227	AST-245	Steering Systems	60	SV1177
AP1101	-	Introduction to Apprenticeship	15	None
*AM1100	-	Math Essentials	30	None
AM1220	-	Mechanical Math Fundamentals	30	AM1100
CM2160	AST-115	Communication Essentials	45	None
SD1760	-	Workplace Essentials	45	None
MC1060	-	Computer Essentials	15	None
		Total Hours	**1022**	

***A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1100 - Math Essentials. Please check with your training institution.**

Required Work Experience

Block II				
Course No.	**2013 IPG**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SV2870	AST-225	Lighting and Wiper Systems	30	Block I
SV2850	AST-230	Fuel Delivery	18	Block I
SV2236	AST-305	Gasoline Fuel Systems	42	Block I
SV2018	AST-310	Vehicle Management Systems	48	Block I
SV2221	AST-330	Emission Control Systems	30	Block I
SV2156	AST-425	Body Electrical, Options and Accessories	48	Block I
SV2860	AST-430	Instrumentation and Information Displays	12	Block I
SV2880	AST-445	Hybrid Systems II	12	Block I
		Total Hours	**240**	

Required Work Experience

Block III				
Course No.	**2013 IPG**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SV3010	AST-315	Manual Transmissions and Transaxles	48	Block II
SV3020	AST-320	Clutches	30	Block II
SV3030	AST-325	Transfer Cases and Four-Wheel Drive/All-Wheel Drive (4WD/AWD) Systems	30	Block II
SV3040	AST-340	Drive Axles, Differentials and Final Drive Assemblies	30	Block II
SV3000	AST-410	Braking Systems II (ABS)	30	Block II
SV3050	AST-420	Automatic Transmissions and Transaxles	72	Block II
		Total Hours	**240**	

Required Work Experience

Block IV				
Course No.	**2013 IPG**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SV4000	NL Only	Engine Removal and Installation	12	Block III
SV4010	AST-300	Engine Diagnostics and Repair	60	Block III
SV4020	AST-335	Intake and Exhaust Systems	24	Block III
SV4030	AST-400	Diesel Fuel Systems Diagnostics and Repair	24	Block III
SV4040	AST-415	Suspension Systems II	30	Block III
SV4050	AST-435	Heating, Ventilation and Air Conditioning (HVAC) Systems	30	Block III
SV4060	AST-440	Restraint Systems	30	Block III
SV4070	NL Only	Electronic Power Steering	12	Block III
SV4080	NL Only	Ozone Depletion Substances	6	Block III
SV4090	NL Only	Provincial Government Inspections (MVI)	12	Block III
		Total Hours	**240**	
		Total Program Credits	**1742**	

BLOCK I

TS1510 Occupational Health and Safety

Learning Outcomes:

- Demonstrate knowledge of how to prevent accidents and illnesses.
- Demonstrate knowledge of how to improve health and safety conditions in the workplace.

Duration: 6 Hours

Pre-Requisite(s): None

Objectives and Content:

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 and Regulations.
   i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Explain the purpose of joint health and safety committees.
   i. formation of committee
   ii. functions of committee
   iii. legislated rights
   iv. health and safety representation
   v. reporting endangerment to health

vi. appropriate remedial action
vii. investigation of endangerment
viii. committee recommendation
ix. employer's responsibility in taking remedial action

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

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

6. Describe discriminatory action.
   i. definition
   ii. filing a complaint procedure
   iii. allocated period of time a complaint can be filed with the Commission
   iv. duties of an arbitrator under the Labour Relations Act
   v. order in writing inclusion
   vi. report to commission allocated period of time to request arbitrator to deal with the matter of the request
   vii. notice of application
   viii. failure to comply with the terms of an order
   ix. order filed in the court

7. Explain duties of commission officers.
   i. powers and duties of officers
   ii. procedure for examinations and inspections
   iii. orders given by officers orally or in writing

iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
v. service of an order
vi. prohibition of persons towards an officer in the exercise of his/her power or duties
vii. rescinding of an order
viii. posting a copy of the order
ix. illegal removal of an order

8. Interpret appeals of others.
   i. allocated period of time for appeal of an order
   ii. person who may appeal order
   iii. action taken by commission when person involved does not comply with the order
   iv. enforcement of the order
   v. notice of application
   vi. rules of court

9. Explain the process for reporting of accidents.
   i. application of act
   ii. report procedure
   iii. reporting notification of injury
   iv. reporting accidental explosion or exposure
   v. posting of act and regulations

Practical Requirements:

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.

2. Conduct a safety inspection of shop area.

TS1520 Workplace Hazardous Materials Information System (WHMIS)

Learning Outcomes:

- Demonstrate knowledge of Interpreting and applying the Workplace Hazardous Materials Information System (WHMIS) Regulation under the Occupational Health and Safety Act.

Duration: 6 Hours

Pre-requisite(s): None

Objectives and Content:

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

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

iv. products excluded from the application of WHMIS legislation
- consumer products
- explosives
- cosmetics, drugs, foods and devices
- pest control products
- radioactive prescribed substances
- wood or products made of wood
- manufactured articles
- tobacco or products of tobacco
- hazardous wastes
- products handled or transported pursuant to the Transportation of
- Dangerous Goods (TDG) Act

v. comparison of classification systems – WHMIS and TDG

vi. general comparison of classification categories

vii. detailed comparison of classified criteria

3. Explain labeling and other forms of warning.

i. definition of a WHMIS label
- supplier label
- workplace label
- other means of identification

ii. responsibility for labels
- supplier responsibility
- employer responsibility
- worker responsibility

iii. introduce label content, design and location
- supplier labels
- workplace labels
- other means of identification

4. Introduce material safety data sheets (MSDS).

i. definition of a material safety data sheet

ii. purpose of the data sheet

iii. responsibility for the production and availability of data sheets
- supplier responsibility
- employer responsibility
- workers responsibility

Practical Requirements:

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.

TS1530 Standard First Aid

Learning Outcomes:

- Demonstrate knowledge of recognizing situations requiring emergency action.
- Demonstrate knowledge of making appropriate decisions concerning first aid.

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

Duration: 14 Hours

Pre-requisite(s): None

SV1105 Safety in the Shop

Learning Outcomes:

- Demonstrate knowledge of various types of shop hazards.
- Demonstrate knowledge of safe work habits.

Duration: 12 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify various safety hazards.
   - i. fire hazards
     - classification of fire types
     - purpose and use of fire extinguishers
   - ii. explosion hazards
     - detection and prevention
     - spontaneous combustion
     - storage and handling of fuels
   - iii. hazardous gases
     - carbon monoxide
     - ventilation
     - storage and handling of batteries

2. Describe safe working habits.
   - i. avoiding personal hazards
   - ii. types of PPE
   - iii. following good housekeeping practices
   - iv. reporting injuries

3. Identify workers' rights regarding safety.
   - i. Workers Compensation Act

Practical Requirements:

1. Locate exits, fire alarms.

2. Locate MSDS sheets; manual and electronic copies.

3. Locate shop ventilation systems.

4. Prepare a floor plan showing fire exit routes.

SV1125 Gaskets, Seals and Bearings

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select, remove and install various types of bearings, gaskets, seals, and sealing compounds.
- Demonstrate knowledge of the procedures used identify causes of friction bearing failures.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify and describe friction bearings.
   i. definition
   ii. location

2. Identify causes of friction bearing failure.
   i. contamination
   ii. insufficient lubrication
   iii. improper installation
   iv. misalignment
   v. overloading
   vi. corrosion

3. Identify and describe anti-friction bearings.
   i. definition
   ii. location
   iii. types
      - ball
      - roller
      - needle
   iv. loading design

- radial
- thrust
- combination

v. identification methods

4. Identify causes of anti-friction bearing failure.
   i. spalling
   ii. brinelling
   iii. over-heating
   iv. cracked race
   v. broken or dented cage
   vi. dented shields
   vii. corrosion
   viii. dirt wear
   ix. electrical pitting
   x. improper installation

6. Describe procedures to remove and install anti-friction bearings.
   i. removing and installing
   ii. cleaning
   iii. inspecting
   iv. lubricating
   v. adjusting
   vi. storing and handling
   vii. following safety precautions

7. Identify and describe oil seals.
   i. function
   ii. classification
      - static
      - dynamic
   iii. types
   iv. materials
   v. construction

8. Identify causes of oil seal failure.

9. Describe procedures to remove and install oil seals.

i. removing and installing
ii. inspecting
iii. cleaning (knowing the importance of cleanliness)
iv. using proper tools (knowing the importance of using proper tools)
v. storing and handling

10. Identify and describe gaskets.
    i. function
    ii. types
    iii. materials
    iv. making a gasket (methods)

11. Identify causes of gasket failure.

12. Describe procedures to remove and install gaskets.
    i. removing and installing
    ii. cleaning (knowing the importance of cleanliness)
    iii. torquing bolts

13. Identify and describe sealing compounds.
    i. types
    ii. purpose

14. Identify causes of sealing compound failure.

15. Describe procedures to select and use sealing compounds and the precautions to follow when using them.

Practical Requirements:

1. Remove, service and install a tapered bearing.

2. Fabricate and install a gasket.

3. Remove and replace a non-serviceable bearing.

4. Remove and install an oil seal.

5. Apply sealer as a gasket.

SV1165 Hand Tools

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select, use and maintain various cutting and non-cutting hand tools.

Duration: 30 Hours

Pre-Requisite(s): SV1105

Objectives and Content:

1. Describe the procedures to select, use and maintain the following non-cutting hand tools.
   - i. screwdrivers
     - standard
     - Phillips
     - Robertson
     - Torx
   - ii. pliers
     - combination
     - gripping
     - cutting
     - vise-grips
     - snap ring
     - needle nose
   - iii. special hose clamp tools
   - iv. wrenches
     - open-end
     - box ends
     - ratcheting box ends
     - flex-head box ends
     - obstruction wrenches
     - special-purpose box wrenches
     - adjustable wrenches

- pipe wrenches
- spanner wrenches
- Allen and multi-spline wrenches (recognition of sizes – metric and imperial)

v. sockets and drives (recognition of sizes – metric and imperial)
- drive sizes
- socket points
- deep sockets
- flexible sockets
- drive handles
- speed handles
- ratchets
- universal joints
- adapters
- extensions

vi. hammers
- ball peen
- cross peen
- plastic tip
- brass-headed
- rubber mallets
- dead blow
- sledgehammers
- hammer handles

vii. punches
- starting
- pin
- centre
- aligning

viii. torque wrenches
- types
- sizes
- purpose

ix. torque multiplier

x. torque rods (stick)

2. Describe the procedures to select, use and maintain the following cutting hand tools.
   i. chisels
      - flat
      - cape
      - round nose cape
      - diamond point
      - rivet buster
   ii. chisel holder
   iii. hacksaws
      - types and designs
      - blade classification and selection
   iv. files
      - types, designs and application
      - file handles
      - file cards
   v. twist drills (recognition of sizes – metric and imperial)
      - types and designs
      - sharpening procedures
   vi. taps (recognition of pipe tap sizes – metric and imperial)
      - taper taps
      - plug taps
      - bottoming taps
      - tap handles
   vii. dies (recognition of sizes – metric and imperial)
      - types
      - dies stock
   viii. thread restorers (recognition of sizes – metric and imperial)
      - types and designs

3. Describe the procedures to recondition the following cutting and non-cutting hand tools.
   i. screwdrivers
   ii. chisels
   iii. screw starters
   iv. punches

4. Describe the procedures to select, use and maintain the following metric and imperial measuring tools.

i. steel rules and squares
ii. calipers
iii. micrometers
iv. dial indicators
v. vernier calipers
vi. protractors
vii. dividers
viii. small hole gauges
ix. telescoping gauges
x. wire gauges
xi. drill gauges
xii. screw pitch gauges
xiii. feeler gauges

5. Describe the procedures to select, use and maintain the following miscellaneous tools.
   i. stud extractors
   ii. bushing and seal drivers
   iii. magnetic pickup tools
   iv. mechanical pickup tools
   v. inspection mirrors
   vi. stamping sets
   vii. stethoscopes
   viii. air blowgun

Practical Requirements:

1. Demonstrate the procedures to select, use, inspect, maintain and store hand tools

2. Demonstrate the procedures to select, use, inspect, maintain and store precision measuring instruments.

SV1177 Shop Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of the procedures used to. select, inspect use and maintain shop tools and equipment.

Duration: 24 Hours

Pre-Requisite(s): SV1165

Objectives and Content:

1. Describe the procedures to select, inspect, use and maintain the following shop equipment.
   - i. hoists, floor, cable, and chain
   - ii. floor jacks
   - iii. safety stands
   - iv. hydraulic presses
   - v. drill presses
   - vi. bench grinders
   - vii. bench vises
   - viii. pullers
   - ix. pneumatic equipment
   - x. mobile cranes
   - xi. high pressure washers (heated)
   - xii. parts cleaners
   - xiii. portable air tanks
   - xiv. caustic cleaning tanks
   - xv. sand/glass bead blasters
   - xvi. air compressors
   - xvii. brake cleaning equipment
   - xviii. spring compressors
   - xix. transmission jacks
   - xx. creepers

2. Describe the procedures to select, inspect, use and maintain the following shop tools.
   i. air tools (pneumatic)
   ii. electric tools
   iii. torque multipliers

3. Describe procedures to select, inspect, use and maintain the following vehicle protective equipment.
   i. seat covers
   ii. fender covers
   iii. floor mats

4. Interpret information pertaining to hoisting found on drawings and specifications.

5. Identify types of hoisting equipment and accessories and describe their applications.

6. Describe the procedures used when hoisting.

7. Describe the procedures used to inspect, maintain hoisting equipment.

Practical Requirements:

1. Use hoist safely.

2. Raise vehicles by means of a floor jack and place on safety stands.

3. Demonstrate various pieces of shop equipment, their application and procedures for use.

4. Prepare a shop equipment maintenance plan.

SV1187 Fasteners, Tubing and Fittings

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select and use common fasteners, different types of tubing, hoses, fittings, and flaring tools.

Duration: 6 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Describe the procedures to select and use fasteners.
   - i. types of fasteners
     - bolts
     - nuts
     - studs
     - washers
       - flat
       - lock
       - external spring
       - internal spring
     - screws
       - cap screws
       - machine screws
       - sheet metal screws
       - self-tapping screws
     - keys and pins
       - woodruff keys
       - square keys
       - cotter pins
       - spring pins
       - tapered pins
       - clevis pins
     - locking devices (functions and types)

- compounds
  - liquid compounds
  - lock-type compounds
  - anti-seizure compounds

ii. thread classification (metric and imperial)
iii. grade markings
iv. theory of torquing
- torque pattern
- torque charts

2. Describe the procedures to select and use different types of tubing and hoses.
   i. types of tubing
   - steel
   - copper
   - non-metallic
   - rubber

   ii. recognition of sizes

3. Describe the procedures to select and use different types of fittings.
   i. types of low pressure fittings
   ii. types of flares (metric and imperial)
   iii. types of threads
   iv. torque limitation of fittings
   v. thread sealers

4. Identify various types of flaring tools.
   i. flaring tool kit
   ii. ISO flaring
   iii. tubing cutter
   iv. deburring tool
   v. tubing bender
   vi. tubing wrenches

5. Describe the procedures to use flaring tools.
   i. cutting
   ii. bending
   iii. flaring

Practical Requirements:

1. Install compression fittings.

2. Cut, flare, bend and connect tubing.
   i. bubble flare(ISO)
   ii. double flare(SAE)
   iii. cut and bend tubing

SV1157 Service Information Systems and Trade Related Documents

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select and use various types of service information systems.
- Demonstrate knowledge of trade related documents and their use.
- Demonstrate knowledge of the procedures used to prepare and complete documentation.

Duration: 12 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify types of trade related documents and describe their applications.
   i. estimates
   ii. industry standard labour guides
   iii. manufacturers' specifications
   iv. codes and standards
   v. company policies
   vi. pre-delivery inspections (PDI)
   vii. preventative maintenance
   viii. schedules

2. Explain how to use an operator's manual and how to interpret its sections.

3. Explain how to decode motor vehicle serial numbers for identification purposes through use of appropriate service manual.
   i. make
   ii. model
   iii. year

4. Explain how to use paper and electronic copies of various manuals.
    i. maintenance and lubrication manual
    ii. service manual
    iii. parts manual
    iv. operator/owner
    v. special bulletins
        - purpose
        - TSB

2. Explain how to use computerized information systems.
    i. introduction to computers
        - computerized parts information
        - computerized service and repair information
    ii. work orders
    iii. warranty claims
    iv. time tickets
    v. vehicle service tracking
    vi. electronic service

Practical Requirements:

1. Using manuals and several different vehicles, identify the model and year for each vehicle.

2. Complete a work order, document findings and recommendations.

3. Use manuals, to locate removal and installation procedures.

4. Use diagnostic charts to troubleshoot a problem.

5. Use electronic data retrieval systems to locate service information.

SV1217 Tires, Wheels and Hubs

Learning Outcomes:

- Demonstrate knowledge of tires, wheels and hubs, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair tires, wheels and hubs.

Duration: 24 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with tires, wheels and hubs.

2. Identify hazards and describe safe work practices pertaining to tires and wheels.
   i. tire inflation
      - under inflation
      - over inflation
      - misalignment
      - improper balance
   ii. tire sizing

3. Interpret tire codes and sidewall markings.

4. Identify tools and equipment relating to tires, wheels and hubs and describe their applications and procedures for use.

5. Identify types of tires and describe their construction.

6. Describe the importance of tire rotation and maintenance.

7. Identify types of wheels and describe their components and operation.

8. Identify types of hubs and bearing assemblies and describe their components and operation.

9. Identify types of tire pressure monitoring systems and describe their applications.

10. Identify types of lubricants and describe their applications and procedures for use.

11. Describe the relationship between the suspension system and wheel assemblies.
    i. worn suspension
    ii. ply steer / radial drag
    iii. improper load distribution

12. Describe the procedures used to diagnose tires, wheels and hubs.

13. Describe the procedures used to repair and/or replace tires and wheel hub assemblies.

14. Describe the procedures used to adjust, repair and/or replace hubs and bearings.

Practical Requirements:

1. Perform radial and lateral run-out check.

2. Perform a tire puncture repair using recommended procedures.

3. Dismount and mount a tire on a wheel with and without a TPMS sensor.

1. Balance a wheel and tire assembly.

2. Service a tapered wheel bearing.

WD1301 Oxy-Fuel Welding/Cutting

Learning Outcomes:

- Demonstrate knowledge of the procedures used to operate oxy-fuel heating and cutting equipment to industrial safety standards for the removal and/or installation of parts.
- Demonstrate knowledge of the procedures used to perform braze welding and flame cutting using oxy-fuel equipment.

Duration: 30 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Describe procedures to operate oxy-fuel heating and cutting equipment to industrial safety standards for the removal and/or installation of parts.
   - i. following safety precautions
     - safety apparel
     - storage and handling of welding gases
     - pre-operational inspection
   - ii. setting up equipment
     - cylinders
     - gauges
     - regulators
     - valves-flame arrestor
     - torches and tips
     - hoses
     - testing for leaks
   - iii. operating the torch
     - lighting procedures
     - types of flames and effect on materials
     - shutting down procedures

2. Describe procedures to perform braze welding using oxy-acetylene equipment.

3. Describe procedures to perform flame cutting with oxy-acetylene equipment.
   i. selecting cutting torch and tips
   ii. using cutting torch

Practical Requirements:

1. Assemble, test, light and adjust oxy-fuel welding and cutting equipment.

2. Perform braze welding on sheet metal using oxy-fuel equipment.

3. Perform flame cutting with oxy-fuel equipment.

4. Perform proper shut down procedures.

SV1710 Gas Metal Arc Welding (GMAW [MIG])

Learning Outcomes:

- Demonstrate knowledge of gas metal arc welding equipment, their applications, maintenance and procedure for use.
- Demonstrate knowledge of weld defects, their causes and the procedures to prevent and correct them.

Duration: 30 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with gas metal arc welding GMAW (MIG).

2. Identify hazards and describe safe work practices pertaining to GMAW (MIG).
   i. personal
   ii. shop/facility
   iii. equipment

3. Identify GMAW (MIG) equipment and accessories and describe their applications.
   i. equipment
   ii. shielding gases
   iii. filler wire

4. Identify types of GMAW (MIG) processes and describe their characteristics and applications.

5. Describe the procedures used to set-up, adjust and shut-down GMAW (MIG) equipment to industrial standards as needed for various motorized equipment.

6. Describe the procedures used to operate GMAW (MIG) equipment.

7. Describe the procedures used to inspect, maintain and store GMAW (MIG) equipment.

8. Identify types of weld defects and describe their causes.

9. Describe the procedures used to prevent and correct weld defects.

Practical Requirements:

1. Weld using MIG equipment.

2. Perform set up and shut down procedures.

SV1642 Braking Systems I (Non-ABS)

Learning Outcomes:

- Demonstrate knowledge of braking systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair braking systems.

Duration: 60 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with braking systems.

2. Identify hazards and describe safe work practices pertaining to braking systems.
   i. hydraulic pressure

3. Explain the fundamentals of braking systems.

4. Explain hydraulic principles related to braking systems.

5. Explain hydraulic systems safety switches and valves.

6. Identify tools and equipment relating to braking systems and describe their applications and procedures for use.

7. Identify types of braking systems and describe their components and operation.
   i. disc
   ii. drum
   iii. parking

8. Identify types of power assists and describe their components and operation.
   i. vacuum
   ii. hydraulic
   iii. electric

9. Identify types of fluids and describe their applications and procedures for use.

10. Identify types of fittings, flaring, tubing and hoses and describe their applications and procedures for use.

11. Describe the procedures used to diagnose braking systems.

12. Describe the procedures used to flush and bleed hydraulic brakes.

13. Describe the procedures used to measure and machine components.

14. Describe the procedures used to adjust, repair and/or replace braking system components.

Practical Requirements:

1. Inspect, test and repair drum brakes.

2. Inspect, test and repair disc brakes.

3. Inspect, test and repair hydraulic brake components.

4. Inspect, remove and diagnose power brake system components.

5. Machine drums and disc rotors.

SV1690 Accessory Drive Systems

Learning Outcomes:

- Demonstrate knowledge of accessory drive systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair accessory drive systems.

Duration: 18 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with accessory drive systems.

2. Identify hazards and describe safe work practices pertaining to accessory drive systems.

3. Identify tools and equipment relating to accessory drive systems and describe their applications and procedures for use.

4. Identify types of accessory drive systems and describe their components and operation.
   i. belt tension/tensioners
   ii. belts
   iii. drives
      - electric
      - hydraulic
      - gear

5. Describe the procedures used to diagnose accessory drive systems.

6. Describe the procedures used to adjust, repair and/or replace accessory drive system components.

Practical Requirements:

None

SV1551 Body Components and Trim

Learning Outcomes:

- Demonstrate knowledge of body components and trim and their applications.
- Demonstrate knowledge of the procedures used to diagnose and repair body components and trim.

Duration: 18 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to body components and trim.
   i. restraint systems

2. Identify body components and accessories and describe their purpose and operation.
   i. interior
      - doors
      - seats
      - dashes
   ii. exterior
      - bumpers
      - mirrors
      - add-on accessories
      - mounts

3. Identify types of electrical/electronic systems and describe their components and operation.
   i. locks
   ii. latches
   iii. windows
   iv. remote entry

4. Explain the principles of basic aerodynamics related to body design.

5. Identify types and sources of noise, vibration and harshness (NVH).
   i. chuckles / loose lumber
   ii. rattles
   iii. knocks and whines
   iv. offensive noises

6. Identify materials used to dampen or interrupt vibration.
   i. tapes
   ii. adhesives
   iii. insulators

7. Identify types and sources of wind and water leaks.

8. Identify types of seals, adhesives, cleaners and sealing materials and describe their applications and procedures for use.

9. Identify specialized tools and equipment and describe their applications and procedures for use.

10. Describe the procedures used to diagnose body components and trim.
    i. verify complaint
    ii. visually inspect
    iii. special considerations for paint on sensors and tint on windows.
    iv. retrieve diagnostic codes
    v. access service information
    vi. conduct tests and measurements
    vii. isolate problem and root cause
    viii. special considerations for paint on sensors and tint on windows.

11. Describe the procedures used to adjust, repair and/or replace body components and trim.
    i. perform repair
    ii. verify repair

Practical Requirements.

None.

SV1130 Electrical and Electronic Principles

Learning Outcomes:

- Demonstrate knowledge of using instruments to test components of series, parallel and series-parallel circuits to determine cause of malfunctions in an electrical circuit.

Duration: 90 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify and explain basic electrical principles.
   - i. safety practices and procedures when working with electrical equipment
   - ii. terminology – abbreviations and glossary of electrical terms
   - iii. sources of electricity
     - generation of electricity
     - use of chemical, magnetic, heat, light, mechanical and DC power supply, crystals, AC circuits
   - iv. theories and laws
     - electricity
     - magnetism and inductance
     - Ohm's law (volts, ohms and amperes, power)
   - v. symbols and schematics
     - common automotive symbols
     - how to read schematics/wiring diagrams

2. Explain electrical principles using Ohm's law to calculate volts, ohms and amperes, and power.
   - i. application of Ohm's law to electrical circuits
     - series circuit
     - parallel circuit
     - series and parallel circuit

3. Explain the use of instruments to test components of series, parallel and series-parallel circuits to determine cause of malfunctions in an electrical circuit.
   - i. circuit testing devices
     - scan tools
     - multi-meters
       - volt
       - ohm
       - current
       - duty cycle
       - frequency
       - pulse width
       - meter ranges
       - correct hook-up of meters
     - test lights
       - analog
       - digital
     - short finder
   - ii. circuit problems and testing problems
     - short, open, ground, and high resistance
     - diagnostic troubleshooting procedures
     - testing procedures and equipment

4. Identify electronic components.
   - i. wires and terminals
     - types and sizes
     - terminals and connectors
     - conductors, semi-conductors, and insulators
   - ii. fibre optics (basics)
   - iii. capacitors
     - construction
     - purpose
     - uses
   - iv. resistors
     - identification
     - purpose
     - uses
   - v. transistors
     - identification
     - purpose

- uses

vi. diodes
- identification
- purpose
- uses

vii. piezoelectric crystal

viii. hall effect switches

ix. permanent magnet sensors/switches

x. circuit protectors
- fuses
- fuse links
- circuit breakers

xi. relays

5. Describe the procedures used to replace electrical components.
   i. crimping
   ii. soldering
   iii. terminal replacement
   iv. splicing

Practical Requirements:

1. Read schematics and wiring diagrams.

2. Use circuit testing devices.
   i. ampmeter
   ii. ohmmeter
   iii. voltmeter
   iv. test lights

3. Apply Ohms Law to electrical circuit.

4. Demonstrate wire and terminal repair.
   i. demonstrate back probing
   ii. solder and solderless repair.

5. Test electronic circuits.

SV1377 Batteries

Learning Outcomes:

- Demonstrate knowledge of the procedures used to diagnose battery problems.
- Demonstrate knowledge of the procedures used to service batteries.

Duration: 18 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Explain the principles of batteries.
   - i. safety rules when working with batteries
   - ii. storage of batteries
   - iii. battery construction
     - positive plates
     - negative plates
     - separators
     - electrolytes
     - chemical action
     - terminals
   - iv. chemical action when discharging
   - v. chemical action when charging
   - vi. sulfated batteries
   - vii. maintenance-free batteries
   - viii. temperature effects on batteries
   - ix. battery polarity
   - x. battery ratings
     - cold cranking amps
     - reserve capacity rating
   - xi. battery selection
   - xii. terminal pullers
   - xiii. hold-down clamp

xiv. battery maintenance
- procedures to clean batteries
- battery inspection
- electrolyte level

2. Describe the procedures to remove and install batteries and battery cables.

3. Identify battery connections.
   i. parallel circuits
   ii. series circuits
   iii. series-parallel circuits

4. Identify and explain the function of equipment used to perform battery tests.
   i. hydrometer
   ii. refractometer
   iii. built-in hydrometer

5. Describe procedures to test batteries.
   i. testing electrolyte levels
   ii. testing batteries
   - specific gravity variation (correcting specific gravity readings to allow for temperature)
   - parasitic draw
   - light-load test
   - high-discharge test
   - cold-cranking test
   - reserve capacity test

6. Identify and describe methods used to recharge batteries and explain the precautions to take when recharging a battery.
   i. methods
   - slow charge method
   - fast charge method
   - trickle charging

   ii. precautions
   - battery temperature precautions
   - importance of good ventilation

- safety precautions with highly explosive gases

7. Identify types of cable terminals and explain how to select the proper cable size.
   i. types of cable terminals
   ii. cable size selection

8. Describe procedures to replace battery cables and/or terminals.
   i. fastening terminals to cable (soldered and crimped)
   ii. installing corrosion inhibitor over terminals (importance)

9. Identify precautions to consider when starting engines with a booster battery.
   i. importance of proper booster cables
   ii. proper polarity and connections
   iii. series connections
   iv. protective glasses
   v. safety precautions

10. Describe procedures to start engines with a booster battery.

11. Identify causes of battery problems.
   i. effects on battery life
      - electrolyte level
      - overcharging
      - undercharging
      - cycling
   ii. battery hold-down loose or too tight
   iii. corroded terminals
   iv. frayed or broken cables
   v. cracked case
   vi. damaged battery trays and covers
   vii. causes of battery discharge

12. Describe the procedure to diagnose battery problems (voltage drop test).

Practical Requirements:

1. Perform a parasitic draw test.

2. Remove and replace a battery.

3. Perform a voltage drop test.

4. Test batteries.
   i. load test
   ii. specific gravity

5. Charge battery.
   i. slow
   ii. fast

SV1256 Suspension I

Learning Outcomes:

- Demonstrate knowledge of suspension components and their purpose.
- Demonstrate knowledge of the procedures used to remove, replace and/or adjust suspension components.
- Demonstrate knowledge of the procedures used to diagnose and repair computer-controlled active suspension systems.

Duration: 48 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify and describe suspension systems and components and their purpose(s).
   - i. design of suspension
   - ii. associated terminology
     - sprung
     - unsprung
     - spring rate
   - iii. types of suspension systems (front and rear)
     - independent
     - solid axle
     - twin beam
     - McPherson strut
     - flex axle
     - air
   - iv. frames
     - types
     - purpose
   - v. bumpers
     - energy absorbing bumpers
     - energy absorbing bumper shocks
   - vi. front and rear suspension components and systems

vii. operation of SLA, strut and wish-bone suspensions

2. Describe the procedures to inspect suspension systems.

3. Identify types of shock absorbers and their purpose.

4. Describe procedures to remove and replace shock absorbers.
   i. checking for serviceability
   ii. removing and replacing

5. Identify types of stabilizer bars and their purpose.

6. Describe procedures to inspect, remove and replace stabilizer bars.

7. Identify types of ball joints and tie rod ends and their purpose.

8. Describe procedures to inspect, remove, replace and service ball joints and tie rod ends.

9. Identify types of struts and their purpose.

10. Describe procedures to inspect, remove, replace and service struts.

11. Identify types of coil springs and control arms and their purpose.

12. Describe procedures to inspect, remove, replace and service coil springs and control arms.

13. Identify types of leaf springs and their purpose.

14. Describe procedures to inspect, remove, replace and service leaf springs.

15. Identify types of torsion bars and their purpose.

16. Describe procedures to inspect, remove, replace and adjust torsion bars.

17. Identify types of air ride systems and their purpose.
   i. active suspension
   ii. computer-controlled active suspension system

18. Identify air ride system components.
    i. height sensor
    ii. control module
    iii. air control solenoids

19. Describe procedures to inspect, remove, replace and adjust air ride systems.

20. Describe procedures to diagnose and repair computer-controlled active suspension systems.
    i. obtaining diagnosis
    ii. repairing system

Practical Requirements:

1. Remove and replace shock absorbers.

2. Remove and replace stabilizer bars.

3. Remove and replace ball joint.

4. Remove and replace struts.

5. Remove and replace coil springs and control arms.

6. Remove and replace leaf spring.

7. Remove, replace and adjust torsion bars.

SV1680 Preventative Maintenance Inspections (PMI)

Learning Outcomes:

- Demonstrate knowledge of the procedures to perform a preventative maintenance - inspection.
- Demonstrate knowledge of the procedures to replace minor components.

Duration: 18 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Explain the background and rationale for designing a preventative maintenance schedule.
   i. background on preventative maintenance inspections
   ii. reasons for performing a PM inspection
      - prevent expensive breakdowns
      - prevent small problems from becoming large ones
      - establish regular service patterns and help scheduling
      - provide better feedback on operating costs
   iii. example of PM inspection form
   iv. levels of PM inspection (e.g., minor inspection vs. major inspection)

2. Describe the procedures to design a preventative maintenance schedule.
   i. methods used to arrive at PM schedules and forms

3. Describe the procedures to perform a preventative maintenance inspection.
   i. procedures to be followed when performing a PM inspection
      - inspection only
      - inspection plus scheduled replacement of some items
      - same as above plus repairs up to a certain dollar figure

ii. inspection during maintenance
- air filter
- battery electrolyte level
- battery connections
- cooling liquid level
- cooling liquid concentration
- automatic transmission fluid level
- manual transmission fluid level
- transfer case fluid level
- rear axle fluid level
- front axle fluid level (4x4)
- oil leaks
- windshield washer fluid level
- power steering fluid level
- brake fluid level
- belts (condition)
- constant velocity boots (visual inspection)
- exhaust system (visual inspection)
- shock absorbers and struts (visual inspection)
- tires (visual inspection)
- gas tanks (visual inspection)
- transmission filters
- brake fluid flush
- timing belt
- spark plugs
- fuel injection cleaning
- lighting
- wiper blades

Practical Requirements:

1. Locate pm inspection lists, vehicle owner's manuals and vehicle manufacturer's manuals.

2. Perform a pm inspection.

3. Repair or replace minor components such as:
    i. wiper blades
    ii. light bulbs
    iii. accessory belts

SV1700 Hybrid Systems I

Learning Outcomes:

- Demonstrate knowledge of hybrid systems, their components and operation.

Duration: 24 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with hybrid systems.

2. Identify hazards and describe safe work practices pertaining to hybrid systems.
   i. PPE
   ii. high voltage
   iii. extreme cold temperatures

3. Identify tools and equipment relating to hybrid vehicles and describe their applications and procedures for use.

4. Identify types of hybrid vehicles and their related components.
   i. series
   ii. parallel
   iii. series-parallel
   iv. plug-in

5. Describe high voltage vehicle disconnect procedures.

Practical Requirements:

None

SV1306 Engine Principles (Gasoline and Diesel)

Learning Outcomes:

- Demonstrate knowledge of engine theory.
- Demonstrate knowledge of engines, their components and operation.

Duration: 90 Hours

Pre-Requisites: SV1177

Objectives and Content:

1. Define terminology associated with engines.
   i. gasoline
   ii. diesel

2. Explain internal combustion principles.
   i. gasoline
   ii. diesel

3. Identify types of engine classifications.
   i. fuel
      - diesel
      - gasoline
      - alternate fuels
   ii. stroke

4. Identify types of engine configurations and describe their construction.

5. Identify types of valve train configurations and describe their construction.
   i. push rod
   ii. overhead cam
   iii. multi-valve
   iv. variable valve lift, variable valve timing

6. Identify engine components and describe their design, purpose and operation.
   i. block assembly
   ii. cylinder head assembly
   iii. timing
      - gears
      - belts
      - chains
      - variable
   iv. mounts

7. Identify types of fasteners, gaskets, seals and sealants and describe their applications and procedures for use.

8. Calculate engine displacement, compression ratios, horsepower, area and volume.

9. Identify oil clasifications.
   i. diesel
   ii. gasoline

Practical Requirements:

1. Disassemble an engine, identify various components and reassemble.

SV1310 Cooling Systems

Learning Outcomes:

- Demonstrate knowledge of the purpose and operation of all major parts of cooling systems.

Duration: 30 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify and describe cooling systems.
   - i. function
   - ii. types
     - air cooled
     - liquid cooled
   - iii. recovery system
     - pressurized
     - non-pressurized

2. Identify and describe components of an engine cooling system and their purpose/function.
   - i. radiator
     - types
       - cross flow
       - down flow
     - construction
       - metal
       - plastic
       - aluminum
   - ii. radiator cap
   - iii. radiator and heater hoses
     - types
     - hose clamp

- thermostat

iv. water pump
- drives

v. fan assembly
- types of drive
  - clutch
  - electric
  - hydraulic
- shroud
- controls

vi. coolant
- types
  - gasoline
  - diesel
- mixing
- additives

vii. block heater
- types
  - in block
  - in line
  - metal heating element

viii. warning systems and indicators
- lights
- gauges
- audible

3. Describe procedures to inspect, test and replace the following engine cooling system components.
   i. radiator
   ii. heater core assembly
   iii. radiator cap
   iv. radiator hoses
   v. heater hoses
   vi. water pump
   vii. mechanical/electric driven fan
   viii. coolant

4. Describe procedures to diagnose the following problems with cooling systems.
   i. overheating
   ii. overcooling
   iii. leaks
5. Describe procedures to bleed air from cooling systems.

6. Identify types of antifreeze.

7. Describe procedures to mix, install and recycle antifreeze.
   i. mixing
   ii. testing
   iii. adding additives

8. Describe procedures to drain, clean and refill cooling systems.

Practical Requirements:

1. Diagnose problems with a cooling system.

2. Drain and flush a coolant system.

3. Mix, install and recycle antifreeze.

SV1197 Lubrication and Fluids Servicing

Learning Outcomes:

- Demonstrate knowledge of the procedures used to change engine oil and filter, and lubricate a vehicle's chassis.

Duration: 24 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify different types of oil and describe procedures to select and use them based on the following criteria.
   - i. oil classification
     - API
     - SAE
     - synthetic
   - ii. oil viscosity
   - iii. oil additives
   - iv. function of the oil
   - v. contamination (recognition of contaminated fluid)
   - vi. oil selection
     - hydraulic oil (transmission and steering)
       - function
       - classification
     - gear oil
       - function
       - classification

2. Describe procedures to change engine oil.
   - i. draining the oil
   - ii. handling hot oil
   - iii. cleaning and inspecting drain plug and gasket for serviceability

iv. filling
v. checking oil level
vi. properly torquing drain plug
vii. storing used oil
viii. following precautions after performing an oil change
ix. install/record service date and reminder
x. service intervals
xi. super/turbocharger precautions

3. Describe procedures to change engine oil filters.
   i. selecting filter
      - construction of filter
      - types of filters
   ii) removing oil filter
   iii) installing/replacing oil filter seals
   iv) ensuring cleanliness
   v) analyzing filter failure
      - physical filter failure
        - filter case expanded
        - filter leaking at seams

4. Describe procedures to start and run engines.
   ii. inspecting for oil leaks
   ii. checking engine oil pressure
   iii. checking oil level
   iv. check warning indicators
   v. audible
   vi. gauges
   vii. lights
   viii. operating and resetting engine monitoring system according to manufacturer's specifications

5. Identify different types of grease and the criteria for selecting and using them.
   i. types of grease
      - wheel bearing grease
      - chassis grease
      - high temperature grease
      - multipurpose grease

- extreme pressure grease

ii. properties
iii. function
iv. classification

6. Identify equipment used to lubricate a vehicle's chassis.
   i. grease gun (hand and pneumatic
   ii. grease fitting
   iii. grease gun adapters

7. Describe procedures to lubricate vehicle's chassis.
   i. refilling the grease gun
   ii. storing and handling grease
   iii. interpreting lubricating charts

8. Identify issues surrounding the disposal of used lubricants.
   i. environmental issues
   ii. health issues
   iii. filter crushers
   iv. proper disposal procedures

9. Describe the procedures used to perform oil analysis.
   i. collecting specimen
   ii. determining contamination of sample
   iii. identifying contaminants in sample
   iv. interpreting analysis

10. Identify types of warning systems and indicators and describe their purpose and operation.

Practical Requirements:

1. Lubricate a chassis following the manufacturer's recommendations.

2. Change engine oil and filter(s).

SV1385 Starting Systems

Learning Outcomes:

- Demonstrate knowledge of the purpose and operation of all major parts of the starting system.
- Demonstrate knowledge of the procedures to diagnose and repair starting systems.

Duration: 30 Hours

Pre-Requisite(s): SV1377

Objectives and Content:

1. Identify types of starter systems.
   i. direct drive
   ii. gear reduction
   iii. permanent magnet

2. Identify the components of a starting system and their operation.
   i. starter switches
   ii. starter relays
   iii. starter solenoids

3. Identify types of starting control systems and describe their components and operation.
   i. anti-theft
   ii. safety
   iii. keyless start/stop

4. Describe procedures to diagnose starting problems.
   i. following safety procedures
   ii. using test meters
      - meters/equipment
   iii. performing starting system diagnosis
      - battery

- cables and grounds
- ring gear and flywheel
- starter damage
- neutral and clutch safety switches
- theft deterrents

iv. testing starter
- current test
- circuit voltage drop
- load test / no load test
- torque test

v. testing starter (internal)
- armature
- commutator
- field windings
- solenoids
- relays
- brushes
- bushings

5. Describe the procedures to test, and repair or replace starting systems and components.
   i. testing system
   ii. servicing starter
   iii. replacing bushing
   iv. replacing brush

Practical Requirements:

1. Diagnose starting problems.

2. Repair/replace starting systems on vehicle.

3. Remove and replace starter.

4. Perform a starter test (internal).

SV1395 Charging Systems

Learning Outcomes:

- Demonstrate knowledge of the procedures used to test and service charging systems and components.
- Demonstrate knowledge of the procedures used to diagnose charging system problems.

Duration: 30 Hours

Pre-Requisite(s): SV1377

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to charging systems.

2. Identify and describe AC generators and components and explain their principles of operation.
   - i. basic charging systems
   - ii. operating principles of AC generators
   - iii. identification of parts
     - stator
     - rotor
     - diodes
     - rectifier bridge
     - brushes
   - iv. types and functions of regulators
     - transistorized regulator
     - remote mounted regulator
     - integral type regulator
     - computer controlled regulator
   - v. types of AC generators
     - brushless AC generator
     - 12 volt AC generator
     - 12/24 volt AC generator

3. Describe procedures to disassemble, test, repair and reassemble AC generators.
   - i. disassembling AC generators
     - internal circuitry
   - ii. testing AC generator components
     - stator
     - rotor
     - diodes
     - regulator
   - iii. testing AC generator performance
     - AC generator output test
       - voltage
       - amperage
       - appropriate testing equipment
   - iv. checking bearing condition
   - v. checking slip ring condition
   - vi. cleaning
   - vii. reassembling

4. Describe procedures to diagnose the following charging system problems.
   - i. no AC generator output
   - ii. low AC generator output
   - iii. high AC generator output
   - iv. noisy AC generator
   - v. battery uses excessive electrolyte

Practical Requirements:

1. Perform charging system tests using equipment recommended by manufacturer.

2. Make adjustments and repairs to charging system components.

3. Diagnose charging system components.

4. Remove and replace generator.

5. Generator and regulator test (internal).

SV1600 Ignition Systems

Learning Outcomes:

- Demonstrate knowledge of the procedures used to test and service ignition systems.
- Demonstrate knowledge of the procedures used to diagnose repair ignition system problems.

Duration: 30 Hours

Pre-Requisite(s): SV1377

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to ignition systems.
   i. high voltage

2. Identify and describe electronic ignition systems and components and their operation.
   i. principles of operation of ignition systems
      - distributor type
      - distributor-less type
   ii. components
      - triggering devices
        - optical
        - hall effect switches
        - magnetic generators
        - ignition points
      - reluctor
      - control unit
      - distributor assembly
      - rotor
      - coil

3. Describe procedures to check and test the condition of components of electronic ignition systems.
   i. pick-up coil
   ii. control unit
   iii. ignition coil
   iv. distributor cap
   v. rotor
   vi. wires

4. Identify and describe spark plugs.
   i. construction of spark plugs
   ii. types
   iii. heat range

5. Describe procedures to remove, service and install spark plugs.
   i. removing
   ii. inspecting
   iii. gapping
   iv. testing
   v. installing/torqueing

6. Describe procedures to diagnose the following ignition system problems on conventional and distributor less systems.
   i. no spark at plugs
   ii. weak or intermittent spark at plugs
   iii. missing at idle or low speed
   iv. missing during acceleration
   v. missing at all speeds
   vi. coil failure
   vii. short spark plug life
   viii. pre-ignition problems
   ix. detonation problems
   x. backfiring in intake manifold
   xi. backfiring in exhaust manifold
   xii. incorrect timing

Practical Requirements:

1. Check and adjust ignition timing.

2. Perform a coil output test.

3. Check and adjust spark plug gap.

4. Perform a secondary wire resistance test.

5. Use specialized diagnostic equipment.

SV1287 Drive Shafts and Axle Shafts

Learning Outcomes:

- Demonstrate knowledge of the operation of major drive line components.

Duration: 30 Hours

Pre-Requisite(s): SV1377

Objectives and Content:

1. Identify drive line components and explain their function.
   - i. types of drive lines
     - hotchkiss
     - torque tube
     - insulated
     - two-piece
   - ii. types of universal joints
     - cross and roller
     - constant velocity

2. Describe procedures to inspect, diagnose, remove, service and install axle shaft components.
   - i. constant velocity(CV) joint
   - ii. drive axle joint boots and clamps
   - iii. steering knuckles
   - iv. wheel bearings and seals
   - v. support bearings

3. Describe procedures to remove, service and install drive shafts on rear drive vehicles.
   - i. removing
   - ii. rear-end torqueing
   - iii. balancing (causes of unbalance and effects)
   - iv. phasing

v. installing

4. Describe procedures to service universal joints on rear drive vehicles.
   i. inspecting
   ii. lubricating

5. Describe procedures to check drive line angles on rear drive vehicles and explain the purpose of doing so.

6. Describe procedures to adjust drive line angles on rear drive vehicles.
   i. transmission
   ii. rear axle
   iii. drive shaft

7. Explain operation of front-wheel drive axle shafts.
   i. axle retainers and shafts
   ii. support bearing
   iii. steering knuckles
   iv. constant velocity joints
   v. bearings and seals
   vi. lubricants

Practical Requirements:

1. Perform service on drive shafts/axle shafts and related components rear wheel front wheel

2. Remove, dismantle, inspect, lubricate and reassemble universal joints.

3. Check and adjust drive line angles on rear drive vehicles.

4. Balance drive shaft and check installation phase and angles of rear wheel drive shaft.

SV1227 Steering Systems

Learning Outcomes:

- Demonstrate knowledge of steering systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair steering systems.

Duration: 60 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Define terminology associated with steering systems.

2. Identify hazards and describe safe work practices pertaining to steering systems.
   i. passive restraints
      - air bags
      - clock springs
      - procedures used to disarm
   ii. collapsible columns

3. Identify tools and equipment relating to steering systems and describe their applications and procedures for use.

4. Identify types of steering columns and describe their components and operation.
   i. tilt
   ii. telescopic
   iii. collapsible

5. Identify types of steering systems and describe their components and operation.
   i. linkage
   ii. rack-and-pinion
   iii. four-wheel steering

6. Identify types of steering gears and describe their components and operation.
   i. recirculating ball
   ii. rack-and-pinion

7. Identify types of assist systems and describe their components and operation.
   i. electric
   ii. hydraulic
   iii. variable

8. Identify types of power steering pumps and describe their components and operation.

9. Identify types of fluids and lubricants, fasteners, tubing, hoses, gaskets and seals and describe their applications.

10. Describe the procedures used to diagnose steering systems.

11. Describe the procedures used to adjust, repair and/or replace steering system components.

Practical Requirements:

1. Remove and install a steering gear assembly.

2. Diagnose power steering systems.

3. Remove, disassemble and reassemble a steering column.

AP1101 Introduction to Apprenticeship

Learning Outcomes:

- Demonstrate knowledge of how to become a registered apprentice.
- Demonstrate knowledge of the steps to complete an apprenticeship program.
- Demonstrate knowledge of various stakeholders in the apprenticeship process.
- Demonstrate knowledge of the Red Seal Program.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define the following terms:
   - i. apprenticeship
   - ii. apprentice vs. registered apprentice
   - iii. Journeyperson vs. Certified Journeyperson
   - iv. Certificate of Apprenticeship
   - v. Certificate of Qualification
   - vi. Recognition of Prior Learning
   - vii. dual certification

2. Explain the apprenticeship system in Newfoundland and Labrador and the roles and responsibilities of those involved.
   - i. registered apprentice
   - ii. training institution
   - iii. employer
   - iv. Journeyperson
   - v. Department of Advanced Education and Skills
     - Industrial Training Section
     - Standards and Curriculum Section
   - vi. Provincial Trade Advisory Committees
   - vii. Provincial Apprenticeship and Certification Board

3. Identify the Conditions Governing Apprenticeship.

4. Describe the training and educational requirements.
   i. pre-employment (entry level) training
   ii. block release
   iii. on-the-job

5. Explain the steps in the registered apprenticeship process.
   i. criteria for eligibility
      - entrance requirements as per Conditions of Apprenticeship
      - employment
   ii. registration process
      - application requirements
   iii. Memorandum of Understanding
      - probation period
      - cancellation
   iv. Record of Occupational Progress (Logbook)
      - signing off skills
      - recording hours
      - updating PDO on progress
   v. class calls
      - schedule
      - EI Eligibility
      - Direct Entry
      - advanced level
   vi. Block Exams
   vii. progression
      - schedule
      - wage rates
   viii. cancellation of apprenticeship
   ix. Practical Examinations
   x. Provincial and Interprovincial examinations
   xi. certification
      - Certification of Apprenticeship
      - Certification of Qualification
      - Provincial certification
      - Interprovincial Red Seal endorsement

6. Explain the Interprovincial Standards Red Seal Program.
   i. designated Red Seal trade
   ii. the National Occupational Analysis (NOA)
   iii. Interprovincial (IP) Red Seal Endorsement Examination
   iv. relationship of NOA to IP Examination
   v. qualification recognition and mobility

7. Identify the current financial incentives available to apprentices.

8. Explain the NL apprenticeship and trades certification division's out-of- province apprenticeship policy.

Practical Requirements:

1. Use the Provincial Apprenticeship and Trades Certification web site at www.gov.nl.ca/app to:
   i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
   ii. locate, download, and complete the Out of Province registration forms
      - Application for Apprenticeship (out of province)
      - Letter of Understanding (LOU)
      - Acceptance of Conditions Letter
   iii. locate, download, and complete the Work Experience Credits form
   iv. identify the locations of all Industrial Training offices
   v. locate and review the following learning resources relevant to the trade:
      - Study Guide
      - Exam Preparation Guide
      - Plan of Training

2. Use a logbook for this trade to:
   i. identify the hours for the trade (in-school and on-the-job)
   ii. identify the number of blocks
   iii. identify the courses in each block
   iv. identify the workplace skills to be completed and verified

3. Use the Red Seal Web site, http://www.red-seal.ca to retrieve the National Occupational Analyses (NOA) for this trade.
   i. identify the following components of the NOA:
      - Trends
      - Scope
      - Key Competencies
      - Blocks
      - Tasks
      - Subtasks
      - Pie Charts
      - Table of Specifications

AM1100 Math Essentials

Note: It is recommended that AM1100 be delivered in the first semester of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of the numeracy skills required to begin the 2nd level math course.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of mathematical principles in trade problem solving situations.
- Demonstrate the ability to solve simple mathematical word problems.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor should use trade specific examples to reinforce the course objectives

1. Use multiplication tables from memory.

2. Perform whole number operations.
   i. read, write, count, round off, add, subtract, multiply and divide whole numbers

3. Apply the order of operations in math problems.

4. Perform fraction and mixed number operations.
   i. read, write, add, subtract, multiply and divide fractions

5. Perform decimal operations.
   i. read, write, round off, add, subtract, multiply and divide decimals

6. Perform percent/decimal/fraction conversion and comparison.
   i. convert between fractions, decimals and percents

7. Perform percentage operations.
   i. read and write percentages
   ii. calculate base, rates and percentages

8. Perform ratio and proportion operations.
   i. use a ratio comparing two quantities with the same units
   ii. use a proportion comparing two ratios

9. Use the imperial measurement system in math problems.
   i. identify units of measurement for:
      - length
      - mass
      - area
      - volume
      - capacity

10. Use the metric measurement system in math problems.
    i. identify units of measurement for:
       - length
       - mass
       - area
       - volume
       - capacity

Practical Requirements:

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

AM1220 Mechanical Math Fundamentals

Learning Outcomes:

- Demonstrate knowledge of mathematical concepts in the performance of trade practices.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of solving mathematical word problems.
- Demonstrate knowledge of mathematical principles for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

Duration: 30 Hours

Pre-Requisite(s): AM1100

Objectives and Content:

The instructor is required to use trade specific examples to reinforce the course objectives.

1. Employ percent/decimal/fraction conversion and comparison in trade specific situations.

2. Apply ratios and proportions to trade specific problems.

3. Use the Imperial Measurement system in trade specific applications.

4. Use the Metric Measurement system in trade specific applications.

5. Complete Imperial/Metric conversions in trade specific situations.
   i. convert between imperial and metric measurements
   ii. convert to another unit within the same measurement system

6. Manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems, such as:
   i. right angle triangles
   ii. area
   iii. volume
   iv. perimeter

7. Perform calculations involving geometry that are relevant to the trade, such as:
   i. angle calculations
   ii. circle calculations

8. Use practical math skills to complete administrative trade tasks.
   i. material estimation
   ii. material costing
   iii. time & labour estimates
   iv. taxes & surcharges
   v. markup & projecting revenue

Practical Requirements:

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

Note:

This course has been designated as NON-TRANSFERABLE to other trades programs, and NOT ELIGIBLE FOR PRIOR LEARNING ASSESSMENT. Students completing training in this trade program are required to complete this math course.

CM2160 Communication Essentials

Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing skills in the workplace and in career development.
- Demonstrate knowledge of the purpose of various types of workplace correspondence.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of standard formats for letters and memos.
- Demonstrate knowledge of principles related to writing effective letters and memos.
- Demonstrate the ability to prepare and deliver an oral presentation.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify the principles for writing clear, concise, complete sentences and paragraphs which adhere to the conventions of grammar, punctuation, and mechanics.

2. Identify the principles of effective workplace writing.
   i. describe the value of well-developed writing skills to career success
   ii. discuss the importance of tone, and language or word choice in workplace communication, regardless of the circumstances
   iii. demonstrate an awareness of cultural differences when preparing workplace correspondence
   iv. describe the writing process as it applies to workplace communication

- planning
- writing
- editing/revising

v. identify the parts of a business letter and memo, and when each should be used in the workplace

vi. identify the standard formats for business letters and memos

vii. identify guidelines for writing sample letters and memos which convey:

- acknowledgment
- routine request
- routine response
- complaint
- refusal
- persuasive request
- letters of appeal

3. Identify types of informal workplace documents.

i. identify types & purposes of reports

- incident
- process
- progress

ii. identify common trade specific forms

iii. describe primary and secondary methods used to gather information

iv. discuss the importance of accuracy and completeness in reports and forms

4. Identify the elements of presentations used in the workplace.

i. identify presentation types

- impromptu
- informative
- demonstration
- persuasive

ii. identify the components of an effective presentation

- eye contact
- body language
- vocal qualities
- audience analysis
- multimedia tools
- keeping on topic

5. Demonstrate an understanding of interpersonal communications in the workplace.
   i. identify listening techniques
   ii. demonstrate an understanding of group dynamics
   iii. describe the importance of contributing information and expertise in the workplace
   iv. describe the importance of respectful and open communication in the workplace
   v. identify methods to accept and provide feedback in a constructive and considerate manner
   vi. explain the role of conflict in a group to reach solutions

6. Identify acceptable workplace uses of communication technologies.
   i. cell / Smart Phone etiquette
   ii. voice mail
   iii. e-mail
   iv. teleconferencing / videoconferencing for meetings and interviews
   v. social networking
   vi. other emerging technologies

Practical Requirements:

1. Write well-developed, coherent, unified paragraphs.

2. Write sample letters and memos.

3. Write one short informal report.

4. Complete a selection of at least 3 trade-related forms.

5. Deliver an effective oral presentation.

SD1760 Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of workplace essentials in the areas of meetings, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of good customer service practices.
- Demonstrate knowledge of effective job search techniques.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify common practices related to workplace meetings.
   i. identify and discuss meeting format and preparation required for a meeting
   ii. explain the purpose of an agenda
   iii. explain the expected roles, responsibilities, and etiquette of meeting participants

2. Define unions and identify their role in the workplace.
   i. identify the purpose of unions
   ii. identify a common union structure
   iii. identify the function of unions in this trade

3. Demonstrate an understanding of the Worker's Compensation process.
   i. describe the aims, objectives, regulations and benefits of the Workplace Health, Safety and Compensation Commission

ii. explain the role of the Workers Advisor
iii. explain the internal review process

4. Demonstrate an understanding of workers' rights.
   i. define labour standards
   ii. identify regulations, including:
      - hours of work & overtime
      - termination of employment
      - minimum wages & allowable deductions
      - statutory holidays, vacation time, and vacation pay

5. Demonstrate an understanding of Human Rights issues.
   i. examine the Human Rights Code and explain the role of the Human Rights Commission
   ii. define harassment in various forms and identify strategies for prevention
      - direct
      - systemic
      - adverse effect
   iii. identify gender and stereotyping issues in the workplace
   iv. define basic concepts and terms related to workplace diversity including age, race, culture, religion, socio-economic status, and sexual orientation

6. Demonstrate an understanding of quality customer service.
   i. explain why quality service is important
   ii. identify barriers to quality customer service
   iii. identify customer needs & common methods for meeting them
   iv. identify and discuss the characteristics & importance of a positive attitude
   v. identify the importance of demonstrating good communication skills including body language, listening, questioning, and when using electronic communication devices
   vi. identify techniques for interacting with challenging customers to address complaints and resolve conflict

7. Demonstrate an understanding of effective job search techniques.
   i. identify and explain employment trends, opportunities, and sources of employment
   ii. identify and discuss essential skills for the trades as outlined by Human Resources and Skills Development Canada

iii. review job ads and identify the importance of fitting qualifications to job requirements
iv. identify the characteristics of effective resumes, the types of resumes, and principles of resume formatting
v. identify the characteristics of an effective cover letter
vi. identify the components of a portfolio, and discuss the value of establishing and maintaining a personal portfolio
vii. identify the common characteristics of the job interview process:
- pre-interview preparation
- interview conduct
- post-interview follow up

Practical Requirements:

1. Create a resume.

2. Create a cover letter.

3. Participate in a mock job interview.

MC1060 Computer Essentials

Learning Outcomes:

- Demonstrate knowledge of computer systems and their operation.
- Demonstrate knowledge of popular software packages and their applications.
- Demonstrate knowledge of security issues related to computers.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

- Identify the major external components of a microcomputer system.
  i. input devices
  ii. output devices
  iii. central control unit

- Use operating system software.
  i. start and quit a program
  ii. use the help function
  iii. use the find function
  iv. maximize and minimize a window
  v. use the task bar
  vi. adjust desktop settings such as screen savers, screen resolution, and backgrounds
  vii. shut down a computer

- Perform file management commands.
  i. create folders
  ii. copy files and folders
  iii. move files and folders

iv. rename files and folders
v. delete files and folders

- Use word processing software to create documents.
  i. enter text
  ii. indent and tab text
  iii. change text attributes (bold, underline, font, etc.)
  iv. change layout format (margins, alignment, line spacing)
  v. spell check and proofread
  vi. edit text
  vii. save document
  viii. print document
  ix. close document
  x. retrieve documents

- Use spreadsheet software to create spreadsheets.
  i. enter data in cells
  ii. create formulas to add, subtract, multiply and divide
  iii. save spreadsheet
  iv. print spreadsheet
  v. close spreadsheet
  vi. retrieve spreadsheet

- Access the Internet.
  i. access websites using the world wide web(www)
  ii. identify examples of web browsers
  iii. use search engines with common searching techniques
  iv. describe security issues

- Use electronic mail.
  i. describe e-mail etiquette
     - grammar and punctuation
     - privacy and legal issues when sharing and forwarding e-mail
     - work appropriate content
     - awareness of employer policies
  ii. manage e-mail using the inbox, sent, and deleted folders
  iii. send an e-mail message with attachment(s)
  iv. print e-mail

Practical Requirements:

None.

BLOCK II

SV2870 Lighting and Wiper Systems

Learning Outcomes:

- Demonstrate knowledge of lighting and wiper systems, their components and operation.
- Demonstrate knowledge of the procedures to diagnose and repair lighting and wiper systems.

Duration: 30 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Describe types of lighting systems associated with a vehicle.
   - i. exterior lighting and circuits
     - bulb identification
     - headlights and circuits
     - park lights and circuits
     - brake lights and circuits
     - signal lights and circuits
     - emergency flashers and circuits
     - LED lighting
     - Fibre optic lighting
     - High intensity discharge(HID)
   - ii. interior lighting and circuits
     - dome lights
     - dash lights
     - glove compartment lights
     - courtesy lights
     - illuminated entry
   - iii. accessory lighting and circuits
     - trailer lights

- roof lights
- fog lights

iv. daytime running lights and circuits

2. Describe procedures to use test equipment to locate opens, shorts and grounds in lighting systems.

3. Describe procedures to replace various lighting components.

4. Describe various procedures that apply to lighting systems.
   i. wiring harness
   ii. replacing bulbs, fuses or circuit breakers using wiring diagrams to locate circuits and components of circuits
   iii. using meters and test lights
   iv. removing trim components using special tools
   v. using aiming equipment

5. Describe procedures to diagnose motor vehicle lighting system problems.
   i. using wiring diagrams
   ii. using wire and terminal connection

6. Define terminology associated with wiper systems.

7. Identify types of wiper systems and describe their components and operation.

8. Describe the procedures used to diagnose wiper systems.

9. Describe the procedures used to adjust, repair and/or replace wiper system components.

Practical Requirements:

1. Aim vehicle headlights.

2. Diagnose and repair lighting and wiper systems.

SV2850 Fuel Delivery Systems

Learning Outcomes:

- Demonstrate knowledge of fuel delivery systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair fuel delivery systems.

Duration: 18 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with fuel delivery systems.

2. Identify hazards and describe safe work practices pertaining to fuel delivery systems.
   i. handling, disposal and storage of fuels
   ii. depressurize fuel systems and fuel recovery
   iii. alternate fuel high pressure and flammability

3. Identify types of fuels and describe their characteristics and properties.
   i. gasoline
   ii. diesel
   iii. flex/E85
   iv. hydrogen
   v. bio-diesel
   vi. LPG
   vii. CNG

4. Identify types of fuel delivery systems and describe their components and operation.
   i. mechanical
   ii. electrical
   iii. fuel gauges
      - types
      - low fuel level sensor

5. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants and describe their applications.

6. Describe the procedures used to diagnose fuel delivery systems and their components.
   i. gasoline
   ii. diesel

7. Describe the procedures used to adjust, repair and/or replace fuel delivery systems and their components.
   i. gasoline
   ii. diesel

Practical Requirements:

1. Check fuel system delivery and operation while observing safety precautions.

2. Perform fuel injection cleaning.

SV2236 Gasoline Fuel Systems

Learning Outcomes:

- Demonstrate knowledge of gasoline fuel systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair gasoline fuel systems.

Duration: 42 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with gasoline fuel systems.

2. Identify hazards and describe safe work practices pertaining to gasoline fuel systems.
   i. high pressure
   ii. flammability

3. Identify tools and equipment relating to gasoline fuel systems and describe their applications and procedures for use.

4. Identify types of gasoline fuel injection systems and describe their components and operation.
   i. electronic injection
   ii. direct injection

5. Identify types of tubing, hoses, gaskets, seals and sealants and describe their applications.

6. Describe the procedures used to diagnose gasoline fuel injection systems.

7. Describe the procedures used to adjust, repair and/or replace gasoline fuel injection system components.

Practical Requirements:

1. Perform fuel pressure test.

2. Perform an injector balance test.

3. Perform an injector test.

SV2018 Vehicle Management Systems

Learning Outcomes:

- Demonstrate knowledge of vehicle management systems, their components and operation.
- Demonstrate knowledge of reprogramming software.
- Demonstrate knowledge of the procedures used to diagnose and repair vehicle management system components.

Duration: 48 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with vehicle management systems.

2. Explain basic computer operation and its relationship to vehicle management systems.

3. Identify tools and equipment used to diagnose network and electronic circuitry and describe their applications and procedures for use.
   i. digital volt ohmmeter (DVOM)
   ii. scopes
   iii. probes
   iv. break out boxes
   v. scan tools

4. Identify on-board diagnostic (OBD) systems and describe their components and operation.
   i. OBD I
      - diagnostic trouble codes (DTC)
   ii. OBD II
      - drive cycles and monitors
      - DTC

5. Identify types of network protocols and describe their purpose.

6. Describe the networking of modules and multi-plexing.
   i. wiring designs
   ii. wireless

7. Identify the parameters of inputs and outputs and describe their relationships.

8. Describe the procedures used to diagnose vehicle management systems.

9. Identify methods used to access/transfer and reprogram software and describe their associated procedures.

10. Describe the procedures used to repair and/or replace vehicle management system components.

Practical Requirements:

1. Diagnose and repair OBD II systems.

SV2221 Emission Control Systems

Learning Outcomes:

- Demonstrate knowledge of emission control systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair emission control systems.

Duration: 30 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with emission control systems.

2. Identify hazards and describe safe work practices pertaining to emission control systems.

3. Identify tools and equipment relating to emission control systems and describe their applications and procedures for use.

4. Identify types of on-board diagnostic systems and describe their applications.
   i. OBD I
   ii. OBD II

5. Identify types of emission gases.
   i. CO
   ii. CO^2
   iii. NOx
   iv. HC
   v. O^2

6. Identify emission control systems and describe their components and operation.
   i. exhaust gas recirculation (EGR)
   ii. evaporative emission control systems (EVAP)

iii. secondary air injection
iv. exhaust system
v. positive crankcase ventilation (PCV)
vi. induction system
vii. variable cam-timing (VCT)
viii. particulate filter
ix. diesel exhaust fluid (DEF)

7. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants and describe their applications.

8. Describe the procedures used to diagnose emission control systems and their components.
   i. gasoline
   ii. diesel

9. Describe the procedures used to adjust, repair and/or replace emission control systems and their components.
   i. gasoline
   ii. diesel

Practical Requirements:

1. Diagnose and repair emission systems while maintaining industry standards.

SV2156 Body Electrical, Options and Accessories

Learning Outcomes:

- Demonstrate knowledge of body, electrical options and accessories, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair body, electrical options and accessories.
- Demonstrate knowledge of the procedures used to install body, electrical options and accessories.

Duration: 48 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with body, electrical options and accessories.

2. Identify hazards and describe safe work practices pertaining to body, electrical options and accessories.

3. Identify tools and equipment relating to body electrical, options and accessories and describe their applications and procedures for use.

4. Identify types of body electrical, options and accessories and describe their components and operation.
   i. accessories
   ii. theft deterrents
   iii. audio/video
   iv. navigation
   v. remote starter

5. Describe the procedures used to diagnose body, electrical options and accessories.

6. Describe the procedures used to adjust, repair and/or replace body, electrical options and accessories and their related components.

Practical Requirements:

1. Diagnose and repair body electrical, options and accessories.

SV2860 Instrumentation and Information Displays

Learning Outcomes:

- Demonstrate knowledge of instrumentation and information displays, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair instrumentation and information displays.

Duration: 12 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with instrumentation and information displays.

2. Identify hazards and describe safe work practices pertaining to instrumentation and information displays.

3. Identify tools and equipment relating to instrumentation and information displays and describe their applications and procedures for use.

4. Identify types of instrumentation systems and describe their components and operation.
   i. gauges
   ii. warning indicators

5. Identify types of information displays and describe their purpose and operation.

6. Describe the procedures used to diagnose instrumentation and information displays.

7. Describe the procedures used to adjust, repair and/or replace instrumentation and information displays and their related components.

Practical Requirements:

None

SV2880 Hybrid Systems II

Learning Outcomes:

- Demonstrate knowledge of the procedures used to diagnose and repair hybrid systems.

Duration: 12 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Describe electrical concepts and components.
   - i. DC/DC converters
   - ii. AC/DC inverters
   - iii. capacitors
   - iv. snubbers
   - v. 3 phase electricity

2. Describe electric motors and concepts.
   - i. magnetic principles
     - induction
     - generation
   - ii. brushless motors
     - AC induction motors
     - AC synchronous motors

3. Describe hybrid vehicle components.
   - i. gasoline engine
   - ii. wiring and cables
   - iii. hybrid control modules
   - iv. driver information center/instrument panel

4. Describe modes of operation.
   - i. idle shut off
   - ii. lean burn
   - iii. acceleration assist
   - iv. full electric
   - v. high voltage battery charging
   - vi. vehicle towing

5. Describe regenerative braking.
   - i. advantages and disadvantages
   - ii. types of regeneration
     - series
     - parallel
   - iii. brake electronic control unit operation
     - pressure sensors
     - travel sensors
   - iv. engine cylinder shut off
   - v. safety procedures
     - disabling self-test before pad replacement

6. Describe high voltage battery operation.

   - i. dual-voltage system
   - ii. disconnect procedures for different manufacturers
   - iii. re-connect procedures for different manufacturers
   - iv. high voltage interrupt relays
   - v. state of charge
   - vi. battery cooling
     - fans
     - temperature sensors
   - vii. testing
   - viii. battery control module
   - ix. charging procedures
   - x. boosting procedures

7. Describe transmission operation and design.
   - i. constant variable transmissions
     - power-split system
     - belt and pulley system
   - ii. motor/generators
   - iii. auxiliary transmission fluid pump
   - iv. driving modes

8. Describe HVAC system components and operation.
   - i. motor generator cooling
   - ii. ECU cooling
   - iii. electric water pump
   - iv. coolant heater storage system
   - v. PTC heaters
   - vi. A/C electric compressor
     - POE oil to prevent loss of high voltage isolation
     - preventing oil cross-contamination
   - vii. A/C modes
   - viii. auxiliary A/C for battery cooling

9. Describe electric power steering operation and components.
   - i. electric motor
   - ii. torque sensor
   - iii. reduction gear
   - iv. intermediate voltage

Practical Requirements:

None

BLOCK III

SV3010 Manual Transmissions and Transaxles

Learning Outcomes:

- Demonstrate knowledge of manual transmissions and transaxles, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair manual transmissions and transaxles.

Duration: 48 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with manual transmissions and transaxles.

2. Identify hazards and describe safe work practices pertaining to manual transmissions and transaxles.

3. Identify tools and equipment relating to manual transmissions and transaxles and describe their applications and procedures for use.

4. Identify types of manual transmissions and transaxles and describe their components and operation.

5. Explain power flow as it relates to manual transmissions and transaxles.

6. Describe gear ratios, their purpose and calculation.

7. Identify types of lubricants, fasteners, gaskets, seals and sealants and describe their applications.

8. Describe the procedures used to diagnose manual transmissions and transaxles.

9. Describe the procedures used to adjust, repair and/or replace manual transmissions and transaxles and their related components.

Practical Requirements:

1. Disassemble, inspect and re-assemble a manual transmission or transaxle as per manufactures specifications.

SV3020 Clutches

Learning Outcomes:

- Demonstrate knowledge of clutches and flywheels, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair clutches and flywheels.

Duration: 30 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with clutches and flywheels.

2. Identify hazards and describe safe work practices pertaining to clutches and flywheels.

3. Identify tools and equipment relating to clutches and flywheels and describe their applications and procedures for use.

4. Identify types of clutches and describe their components and operation.

5. Identify types of flywheels and describe their components and operation.

6. Identify mechanical and hydraulic clutch operating systems and describe their components and operation.

7. Identify types of fluids, fasteners, tubing, hoses and seals and describe their applications.

8. Describe the procedures used to diagnose clutches and flywheels.

9. Describe the procedures used to adjust, repair and/or replace clutches and flywheels and their related components.

Practical Requirements:

1. Diagnose, adjust and repair a clutch.

SV3030 Transfer Cases and Four-Wheel Drive/All-Wheel Drive (4WD/AWD) Systems

Learning Outcomes:

- Demonstrate knowledge of transfer cases, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair transfer cases.

Duration: 30 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with transfer cases and four-wheel drive/all-wheel drive (4WD/AWD) systems.

2. Identify types of transfer cases and 4WD/AWD systems and describe their components and operation.

3. Describe the relationship between transfer cases, locking hubs, and axle disconnects.

4. Identify tools and equipment relating to transfer cases and 4WD/AWD systems and describe their applications and procedures for use.

5. Identify types of transfer case and 4WD/AWD systems control systems and describe their components and operation.
   i. vacuum
   ii. manual
   iii. electronic

6. Explain power flow as it relates to transfer cases and 4WD/AWD systems.

7. Describe gear ratios, their purpose and calculations.

8. Identify types of lubricants, fasteners, gaskets, seals and sealants and describe their applications.

9. Describe the procedures used to diagnose transfer cases and 4WD/AWD systems.

10. Describe the procedures used to adjust, repair and/or replace transfer cases and 4WD/AWD systems and their related components.

Practical Requirements:

1. Diagnose an AWD/4WD system.

2. Dismantle, inspect, and reassemble a transfer case assembly as per manufactures specifications.

SV3040 Drive Axles, Differentials and Final Drive Assemblies

Learning Outcomes:

- Demonstrate knowledge of differentials and final drive assemblies, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair differentials and final drive assemblies.

Duration: 30 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with differentials and final drive assemblies.

2. Identify hazards and describe safe work practices pertaining to differentials and final drive assemblies.

3. Identify tools and equipment relating to differentials and final drive assemblies and describe their applications and procedures for use.

4. Identify types of differentials and final drive assemblies and describe their components and operation.
   i. locking
   ii. non-locking

5. Identify types of differential housings.
   i. non-integral

6. Identify types of differential control systems and final drive assemblies and describe their components and operation.
   i. electronically controlled/electric
   ii. vacuum
   iii. mechanical

7. Identify types of axles and rear axle bearings and retainers.
   i. types of axles
      - semi-floating
      - three-quarter floating
      - full-floating
   ii. types of rear axle bearings and retainers
      - straight roller type
      - tapered roller type
      - ball bearing type

8. Explain power flow as it relates to differentials and final drive assemblies.

9. Describe gear ratios, their purpose and calculations.

10. Identify types of lubricants, additives, fasteners, gaskets, seals and sealants and describe their applications.

11. Describe the procedures used to diagnose differentials, final drive assemblies and their related components.

12. Describe the procedures used to adjust, repair and/or replace differentials and final drive assemblies their related components.

Practical Requirements:

1. Dismantle, inspect, and reassemble a drive axle assembly as per manufactures specifications.

SV3000 Braking Systems II (ABS)

Learning Outcomes:

- Demonstrate knowledge of anti-lock braking systems (ABS), their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair ABS.

Duration: 30 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to ABS and their components.

2. Identify tools and equipment relating to ABS and describe their applications and procedures for use.

3. Identify types of ABS and describe their components and operation.

4. Describe ABS and their modes of operation.

5. Identify types of braking control systems and describe their components and operation.
   i. traction control system (TCS)
   ii. anti-lock brake system (ABS)
   iii. stability control
   iv. types of trailer brakes and controls

6. Describe the procedures used to diagnose ABS.

7. Describe the procedures used to flush and bleed ABS.

8. Describe the procedures used to adjust, repair and/or replace ABS components.

Practical Requirements:

1. Diagnose then repair ABS components.

SV3050 Automatic Transmissions and Transaxles

Learning Outcomes:

- Demonstrate knowledge of automatic transmissions and transaxles, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair automatic transmissions and transaxles.

Duration: 72 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with automatic transmissions and transaxles.

2. Identify hazards and describe safe work practices pertaining to automatic transmissions and transaxles.

3. Identify tools and equipment relating to automatic transmissions and transaxles and describe their applications and procedures for use.

4. Identify types of automatic transmissions and transaxles and describe their components and operation.
   i. electrically controlled
   ii. hydraulically controlled
   iii. continuously variable transmission (CVT)

5. Explain hydraulic principles related to automatic transmissions and transaxles.
   i. Pascal's law

6. Explain power flow as it relates to automatic transmissions and transaxles.

7. Interpret electric and hydraulic schematics.

8. Describe gear ratios, their purpose and calculation.

9. Identify types of lubricants, fasteners, tubing, hoses, gaskets, seals and sealants and describe their applications.

10. Describe the procedures used to diagnose automatic transmissions and transaxles.

11. Describe the procedures used to adjust, repair and/or replace automatic transmissions and transaxles and their related components.

Practical Requirements:

1. Diagnose problems in automatic transmissions or transaxles.

2. Dismantle, inspect, and reassemble automatic transmissions or transaxles as per manufactures specifications.

3. Diagnose and repair transmissions with electronic control systems.

BLOCK IV

SV4000 Engine Removal and Installation

Learning Outcomes:

- Demonstrate knowledge of procedures used to remove and reinstall engines to manufacturer's specifications.
- Demonstrate knowledge of procedures used to and inspect parts for wear.

Duration: 12 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Describe procedures to remove an engine.
   - i. draining systems
     - oil
     - coolant
   - ii. disconnecting and identifying electrical wires, hydraulic lines, and accessories hood
   - iii. disconnecting engine from transmission
   - iv. supporting the transmission
   - v. selecting suitable engine hoist
   - vi. removing engine from chassis
   - vii. following precautions
   - viii. following service manual recommendations
   - ix. removing and installing accessory drive belts

2. Describe procedures to inspect parts for wear.
   - i. inspecting engine mounts
   - ii. checking for loose or worn parts
   - iii. checking linkages operation

3. Describe procedures to install engines.
    i. installing procedures
    ii. aligning parts properly (knowing the importance)
    iii. using torque attaching fasteners
    iv. reconnecting all attaching components and accessories
    v. refilling system fluids

4. Describe procedures to test engine operation.
    i. starting engine
    ii. checking oil pressure
    iii. checking for leaks
    iv. checking for abnormal noise
    v. following manufacturer's recommendations

Practical Requirements:

None

SV4010 Engine Diagnostics and Repair

Learning Outcomes:

- Demonstrate knowledge of the procedures used to diagnose and repair engines.

Duration: 60 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with engine repair.
   i. gasoline
   ii. diesel

2. Identify hazards and describe safe work practices pertaining to gasoline/diesel engine repair.

3. Identify tools and equipment relating to gasoline/diesel engine repair and describe their applications and procedures for use.

4. Identify types and sources of gasoline/diesel engine problems.
   i. low power
   ii. smoke
   iii. oil consumption
   iv. fluid contamination
   v. rough running
   vi. internal/external leaks
   vii. noises

5. Describe the procedures used to diagnose mechanical engine problems.
   i. gasoline
   ii. diesel

6. Describe the procedures used to adjust, repair and/or replace engine components.
   i. gasoline
   ii. diesel

7. Describe the procedures to re-build engines.
   i. gasoline
   ii. diesel

8. Describe procedures to disassemble, inspect and service engines.
   i. cylinder head
   ii. cylinder block

9. Describe the procedures used to diagnose engine lubrication systems.

Practical Requirements:

1. Perform engine diagnostics using testing equipment.

2. Disassemble and inspect a cylinder head to manufactures specifications.

3. Disassemble and inspect a cylinder block to manufactures specifications

SV4020 Intake and Exhaust Systems

Learning Outcomes:

- Demonstrate knowledge of the operation and purpose of all major parts of intake systems.
- Demonstrate knowledge of the operation of all major parts of the exhaust system and their purpose.

Duration: 24 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to intake and exhaust systems.

2. Identify and describe air filters.
   i. principles
   ii. types: oil bath, paper or dry type, polyurethane

3. Describe the operating principles of intake manifolds.
   i. cold air
   ii. hot air
   iii. control
   iv. distribution
   v. tuning
   vi. variable induction

4. Identify and describe turbochargers and superchargers, their operation and use.

5. Describe induction systems and their relationship to turbochargers and superchargers.

6. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants and describe their applications.

7. Describe the operating principles and characteristics of intake and air charge systems and their components.
   i. design
   ii. intercoolers
   iii. volumetric efficiency

8. Describe the procedure to test and service components of intake and air filtration exhaust systems.

9. Describe the components of exhaust systems.
   i. manifolds
      - types
      - designs (combined, separate)
   ii. mufflers and resonators
      - types
      - purpose
   iii. catalytic converters
   iv. pipes, supports, clamps
   v. oxygen sensors
   vi. induction systems (turbochargers)

10. Describe the procedures to service components of intake and exhaust systems.
   i. selecting and using proper tools
   ii. aligning
   iii. removing and replacing
   iv. checking system for leaks and/or restrictions
      - noise
      - vibration
   v. following safety precautions (carbon monoxide)

Practical Requirements:

1. Inspect, test and repair intake system components

2. Inspect, test and replace exhaust system and related components.

SV4030 Diesel Fuel Systems Diagnostics and Repair

Learning Outcomes:

- Demonstrate knowledge of diesel engine systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair diesel engine systems.

Duration: 24 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with diesel engine systems.

2. Identify hazards and describe safe work practices pertaining to diesel fuel injection systems.
   i. high pressure
   ii. high amperage/voltage
   iii. starting fluids
   iv. emergency shut-off

3. Identify tools and equipment relating to diesel engine systems and describe their applications and procedures for use.
   i. fuel
   ii. intake
   iii. exhaust
   iv. electrical
   v. mechanical

4. Identify types of diesel fuel injection systems and describe their components and operation.
   i. electronic
   ii. mechanical

   Identify types of diesel intake and exhaust systems and their components and operation.

   Describe procedures to diagnose diesel engine problems.
   i. fuel
   ii. intake
   iii. exhaust
   iv. electrical
   v. mechanical

5. Identify types of tubing, hoses, gaskets, seals and sealants and describe their applications.

6. Identify types of cold start systems, such as pre-heaters, and describe their purpose and operation.

7. Identify methods to test fuel quality and describe their associated procedures.

8. Describe the procedures used to diagnose diesel fuel injection systems.

9. Describe the procedures used to adjust, repair and/or replace diesel fuel injection system components.

Practical Requirements:

1. Perform diagnostic procedures on a diesel engine.

SV4040 Suspension Systems II

Learning Outcomes:

- Demonstrate knowledge of wheel alignment and steering geometry.
- Demonstrate knowledge of electronically controlled suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair wheel alignment and electronically controlled suspension systems.

Duration: 30 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Explain steering geometry principles and their applications.
   i. alignment angles
   ii. Ackerman principle

2. Identify tools and equipment relating to electronically controlled suspension systems and describe their applications and procedures for use.

3. Identify types of electronically controlled suspension systems and describe their components and operation.
   i. ride control
   ii. height control

4. Describe the procedures used to diagnose wheel alignment and electronically controlled suspension systems.

5. Describe the procedures used to adjust, repair and/or replace electronically controlled suspension systems components.

6. Describe the procedures to perform wheel alignment.

7. Explain how to identify alignment problems.
   i. tire wear
   ii. handling problems

Practical Requirements:

1. Pre-inspect vehicle for wheel alignment.

2. Perform a four wheel alignment.

SV4050 Heating, Ventilation and Air Conditioning (HVAC) Systems

Learning Outcomes:

- Demonstrate knowledge of HVAC systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair HVAC systems.

Duration: 30 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with HVAC systems.

2. Identify hazards and describe safe work practices pertaining to HVAC systems.
   i. personal
   ii. shop/facility
   iii. environmental

3. Explain the principles of the refrigeration cycle.

4. Identify tools and equipment relating to HVAC systems and describe their applications and procedures for use.

5. Identify types of heating systems and describe their components and operation.

6. Identify types of refrigerants and lubricants and describe their applications and procedures for use.

7. Identify types of refrigeration systems and describe their components and operation.
   i. orifice tube
   ii. thermal expansion valve

8. Identify types of HVAC systems and describe their components and operation.
   i. manual
   ii. automatic

9. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants and describe their applications.

10. Describe the procedures used to retrofit A/C systems.

11. Describe the procedures used to identify, recover, evacuate and recharge refrigerant systems.

12. Describe the procedures used to diagnose HVAC systems.

13. Describe the procedures used to adjust, repair and/or replace HVAC system components.

Practical Requirements:

1. Check operation of heater and vent controls.

2. Diagnose and repair problems with A/C system controls.

3. Recover, recycle, vacuum and recharge an A/C system.

SV4060 Restraint Systems

Learning Outcomes:

- Demonstrate knowledge of restraint systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair restraint systems.

Duration: 30 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with restraint systems.

2. Identify hazards and describe safe work practices related to restraint systems.
   i. handling
   ii. disposal

3. Identify tools and equipment relating to restraint systems and describe their applications and procedures for use.

4. Identify types of restraint systems and describe their components and operation.
   i. active
   ii. passive

5. Identify types of restraint system warning indicators and describe their purpose.

6. Describe the procedures used to diagnose restraint systems.

7. Describe the procedures to adjust, repair and/or replace restraint system components.

Practical Requirements:

1. Diagnose and repair SIR system failure.

SV4070 Electronic Power Steering

Learning Outcomes:

- Demonstrate knowledge of the function of various electronic power steering components.
- Demonstrate knowledge of the procedures to diagnose service and/or replace electronic power steering systems.

Duration: 12 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Identify electronic power steering components and their functions, and explain their principles of operation.
   - i. components
   - ii. principles of operation
     - four wheel steering
     - computer
     - sensor inputs
     - outputs – control of hydraulics
     - operating modes

2. Describe procedures to test, service and/or replace electronic power steering systems.
   - i. diagnostic strategy
   - ii. quick tests and visual inspections
   - iii. trouble codes
   - iv. test equipment

Practical Requirements.

None.

SV1110 Ozone-Depletion Substances

Learning Outcomes:

Demonstrate knowledge of regulations on ozone-depleting substances.

Duration: 6 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Describe procedures for handling ozone-depletion substances (refrigerants) used in motor vehicles as per Regulations.

2. Identify the Act relating to ozone-depletion substances regulations.

NOTE: **Curriculum and certification supplied by HRAI are to be delivered by instructors who are certified to teach ODS courses for motive power occupations.**

Practical Requirements:

None.

SV4090 Provincial Government Inspections (MVI)

Learning Outcomes:

- Demonstrate knowledge of the procedures to perform provincial safety inspections.

Duration: 12 Hours

Pre-Requisites: Block III

Objectives and Content:

1. Explain the purpose of a provincial government safety inspection and its history.
   i. purpose of inspection
   ii. people or authorities involved in inspections
   iii. responsibilities of those involved

2. Describe provincial government safety inspection procedures.
   i. inspection instructions
   ii. specifications and tolerances
   iii. documentation of inspections
      - inspection forms
      - reject stickers
      - stickers used when vehicle passes inspection
      - liability – unsafe vehicles

Practical Requirements:

1. Perform government motor vehicle safety inspection.

D. Conditions Governing Apprenticeship Training

1.0 General

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

2.0 Entrance Requirements

2.1 Entry into the occupation as an apprentice requires:

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

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in a particular Plan of Training. Mature students, at the discretion of the Director of Apprenticeship and Trades Certification, 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 Apprenticeship and Trades Certification, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed along with a Memorandum of Understanding as applicable to be indentured into an Apprenticeship. The Memorandum of Understanding must contain signatures of an authorized employer representative, the apprentice and an official representing the Provincial Apprenticeship and Certification Board to be valid.

2.5 A new Memorandum of Understanding must be completed for each change in an employer during the apprenticeship term.

3.0 Probationary Period

The probationary period for each Memorandum of Understanding will be six months or 900 employment credit hours. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

4.0 Termination of a Memorandum of Understanding

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB, such as that stated inSection14.

5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria

Progression Schedule, Wage Rate and Advanced Training Criteria are stated in the specific occupational Plan of Training for each designated apprenticeship occupation.

Progression Schedule

Automotive Service Technician-7200 Hours			
APPRENTICESHIP LEVEL AND WAGES			
Year	Wage Rate At This Level	Requirements for progression to next level of apprenticeship	When requirements are met, the apprentice will progress to…
1st	60 %	▪ Completion of Block 1 training ▪ Pass block 1 exam ▪ Minimum 1800 hours of combined relevant work experience and training	2nd Year
2nd	70%	▪ Completion of Block 2training ▪ Pass block 2 exam ▪ Minimum 3600 hours of combined relevant work experience and training	3rd Year
3rd	80%	▪ Completion of Block 3 training ▪ Pass block 3 exam ▪ Minimum 5400 hours of combined relevant work experience and training	4th Year
4th	90%	▪ Completion of Block 4 training ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam	Journeyperson Certification

Wage Rates

- Rates are percentages of the prevailing journeyperson's wage rate in the place of employment of the apprentice.
- Rates must not be less than the wage rate established by the Labour Standards Act (1990), as now in force or as hereafter amended, or by other order, as amended from time to time replacing the first mentioned order.
- Rates must not be less than the wage rate established by any collective agreement which may be in force at the apprentice's workplace.
- Employers are free to pay wage rates above the minimums specified.

Block Exams

This program may **not** currently contain Block Exams, in which case this requirement will be waived until such time as Block Exams are available.

Automotive Service Technician-7200 Hours		
CLASS CALLS		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	▪ Minimum of 1000 hours of relevant work experience ▪ Prior Learning Assessment (PLA) at designated college (if applicable)	To be determined by the number of courses completed after each class call
Block 2	▪ Minimum of 2400 hours of relevant work experience and training	240
Block 3	▪ Minimum of 4000 hours of relevant work experience and training	240
Block 4	▪ Minimum of 5400 hours of relevant work experience and training	240

Direct Entry Apprentice

- Must complete Block 1 courses through PLA and / or in school training.
- Block 1 training is to be completed via class calls; up to 16 weeks of training per calendar year.
- Must attend in-school training until Block 1 is complete before attending Blocks 2 or higher.

Class calls at Minimum Hours

- Class calls may not always occur at the minimum hours indicated. Some variation is permitted to allow for the availability of training resources and apprentices.

6.0 Tools

Apprentices shall be required to obtain their own hand tools applicable for the designated occupation of registration or tools as specified by the PACB.

7.0 Periodic Examinations and Evaluation

7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her apprenticeship level and rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Apprenticeship and Trades Certification and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.

7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

7.4 Course credits may be granted through the use of a PACB approved matrix which identifies course equivalencies between designated trades and between current and historical Plans of Training for the same trade.

8.0 Granting of Certificates of Apprenticeship

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

9.0 Hours of Work

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

10.0 Copies of the Registration for Apprenticeship

The Director of Apprenticeship and Trades Certification shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 Ratio of Apprentices to Journeypersons

Under normal practice, the ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed. Other ratio arrangements would be determined and approved by the PACB.

12.0 Relationship to a Collective Bargaining Agreement

Where applicable in Section 5 of these conditions, Collective Agreements take precedence.

13.0 Amendments to a Plan of Apprenticeship Training

A Plan of Training may be amended at any time by the PACB.

14.0 Employment, Re-Employment and Training Requirements

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

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

14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. 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 qualifying to receive a class call to training as a registered Trade Qualifier. Cancellation must be mutually agreed upon by the employer and the apprentice.

14.5 An employer shall ensure that each apprentice is under the direct supervision of an approved journeyperson supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyperson with respect to the task, activity or function that is being supervised.

14.6 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.

14.7 The employer will permit each apprentice to attend training programs as prescribed by the PACB.

14.8 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 PACB authorized 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 Advanced Education and Skills within 30 days of the decision.

E. Requirements for Red Seal Endorsement

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.

2. Successful completion of all required courses in the program.

3. A combination of training from an approved training program and suitable work experience totaling 7200 hours.

   Or

   A total of 9000 hours of suitable work experience.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Apprenticeship and Trades Certification Division.

F. Roles and Responsibilities of Stakeholders in the Apprenticeship Process

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

The Apprentice:

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

The Employer:

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Apprenticeship and Trades Certification Division and apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ensures work experiences of the apprentice are documented.
- ensures a certified journeyperson is currently on staff in the same trade area as the apprentice and whose certification is recognized by the NL Department of Advanced Education and Skills.

The Training Institution:

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

The Apprenticeship and Trades Certification Division:

- establishes and maintains program advisory committees under the direction of the PACB.

- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.

- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.

- ensures all apprentices are appropriately registered and records are maintained as required.

- schedules all necessary technical training periods for apprentices to complete requirements for certification.

- administers block, provincial and interprovincial examinations.

The Provincial Apprenticeship and Certification Board:

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.

- ensures advisory and examination committees are established and maintained.

- accredits institutions to deliver apprenticeship training programs.

- designates occupations for apprenticeship training and/or certification.