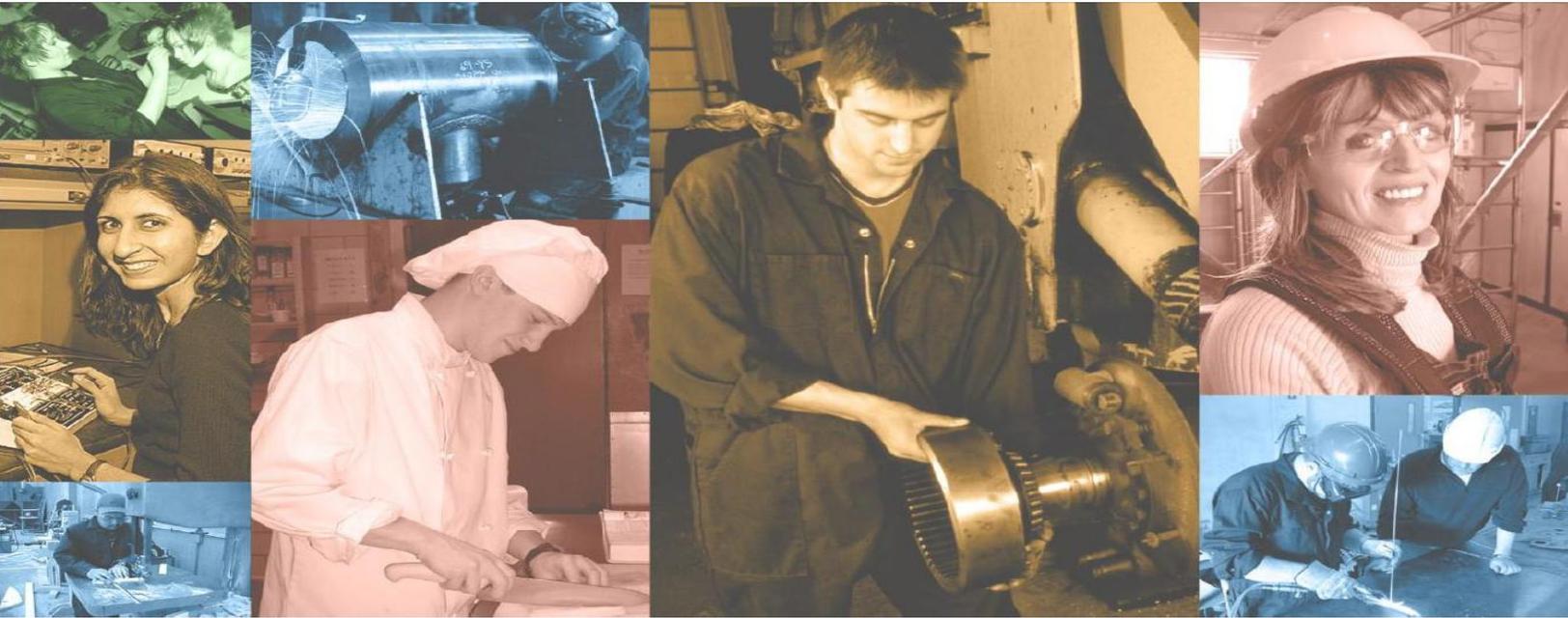

Plan of Training

Automotive Service Technician



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

March 2019

PLAN OF TRAINING

Automotive Service Technician

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

Approved by:

A handwritten signature in blue ink, appearing to read "D. Wells".

Chairperson, Provincial Apprenticeship and Certification Board

Date: March 20, 2019

Preface

This curriculum standard is based on the 2016 edition of the Red Seal Occupational Standard (RSOS) and the 2019 Atlantic Apprenticeship Curriculum Standard (AACS) for the Automotive Service Technician trade. It describes the curriculum content for the Automotive Service Technician apprenticeship training program.

Acknowledgements

The Provincial Trade Advisory Committee (PTAC), industry representatives, instructors and apprenticeship staff provided valuable input to the development of this provincial plan of training. Without their dedication to quality apprenticeship training, this document could not have been produced.

We offer a sincere thank you.

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| Document Status | Date Approved | Mandatory Implementation Dates | Comments |
|-----------------|---------------|---------------------------------|--|
| New | March 2019 | September 2019 – Pre-Employment | Pre-Employment harmonized with AACS Level I. Advanced levels replaced by AACS content. |
| | | September 2020 – Level II | |
| | | September 2021 – Level III | |
| | | September 2022 – Level IV | |

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A. RSOS Comparison Chart

| 2016 RSOS Sub-task | | 2019 POT | |
|---|---|----------|---|
| TASK A-1 – Performs Safety-Related Functions | | | |
| 1.01 | Maintains safe work environment | SV1105 | Safety in the Shop |
| 1.02 | Uses personal protective equipment (PPE) and safety equipment | SV1105 | Safety in the Shop |
| | | SV1177 | Shop Tools and Equipment |
| TASK A-2 – Uses Tools, Equipment and Documentation | | | |
| 2.01 | Uses tools and equipment | SV1165 | Hand Tools |
| | | WD1301 | Oxy-Fuel Welding/Cutting |
| | | SV1710 | Gas Metal Arc Welding |
| 2.02 | Uses fasteners, tubing, hoses and fittings | SV1188 | Fasteners, Tubing and Fittings |
| 2.03 | Uses hoisting and lifting equipment | SV1177 | Shop Tools and Equipment |
| 2.04 | Uses technical information | SV1158 | Service Information Systems and Trade Related Documents |
| TASK A-3 – Uses Communication and Mentoring Techniques | | | |
| 3.01 | Uses communication techniques | CM2161 | Communication Essentials |
| 3.02 | Uses mentoring techniques | AST-400 | Mentoring |
| TASK B-4 – Diagnoses Engine Systems | | | |
| 4.01 | Diagnoses cooling systems | SV1311 | Introduction to Cooling Systems |
| | | AST-200 | Cooling Systems |
| 4.02 | Diagnoses lubricating systems | SV1197 | Lubrication and Fluids Servicing |
| | | AST-205 | Engine Lubrication Systems |
| 4.03 | Diagnoses engine assembly | AST-215 | Engine Repair |
| | | SV1306 | Engine Principles (Gasoline and Diesel) |
| 4.04 | Diagnoses accessory drive systems | SV1691 | Introduction to Accessory Drive Systems |
| | | AST-210 | Accessory Drive Systems |
| TASK B-5 – Repairs Engine Systems | | | |
| 5.01 | Repairs cooling systems | SV1311 | Introduction to Cooling Systems |
| | | AST-200 | Cooling Systems |
| 5.02 | Repairs lubricating systems | SV1197 | Lubrication and Fluids Servicing |
| | | AST-205 | Engine Lubrication Systems |
| 5.03 | Repairs engine assembly | AST-215 | Engine Repair |
| | | SV1306 | Engine Principles (Gasoline and Diesel) |
| 5.04 | Repairs accessory drive systems | SV1691 | Introduction to Accessory Drive Systems |

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| 2016 RSOS Sub-task | | 2019 POT | |
|---|--|----------|--|
| | | AST-210 | Accessory Drive Systems |
| TASK B-6 – Diagnoses Gasoline Engine Support Systems | | | |
| 6.01 | Diagnoses gasoline fuel delivery and injection systems | AST-305 | Gasoline Fuel Delivery and Injection Systems |
| 6.02 | Diagnoses gasoline ignition systems | SV1600 | Ignition Systems |
| | | AST-310 | Gasoline Ignition Systems |
| 6.03 | Diagnoses gasoline intake/exhaust systems | AST-325 | Gasoline Intake and Exhaust Systems |
| 6.04 | Diagnoses gasoline emission control systems | AST-320 | Gasoline Emission Control Systems |
| TASK B-7 – Repairs Gasoline Engine Support Systems | | | |
| 7.01 | Repairs gasoline fuel delivery and injection systems | AST-305 | Gasoline Fuel Delivery and Injection Systems |
| 7.02 | Repairs gasoline ignition systems | SV1600 | Ignition Systems |
| | | AST-310 | Gasoline Ignition Systems |
| 7.03 | Repairs gasoline intake/exhaust systems | AST-325 | Gasoline Intake and Exhaust Systems |
| 7.04 | Repairs gasoline emission control systems | AST-320 | Gasoline Emission Control Systems |
| TASK B-8 – Diagnoses Diesel Engine Support Systems | | | |
| 8.01 | Diagnoses diesel fuel delivery and injection systems | AST-405 | Diesel Fuel Delivery and Injection Systems |
| 8.02 | Diagnoses diesel intake/exhaust systems | AST-325 | Gasoline Intake and Exhaust Systems |
| 8.03 | Diagnoses diesel emission control systems | AST-410 | Diesel Emission Control Systems |
| TASK B-9 – Repairs Diesel Engine Support Systems | | | |
| 9.01 | Repairs diesel fuel delivery and injection systems | AST-405 | Diesel Fuel Delivery and Injection Systems |
| 9.02 | Repairs diesel intake/exhaust systems | AST-415 | Diesel Intake and Exhaust Systems |
| 9.03 | Repairs diesel emission control systems | AST-410 | Diesel Emission Control Systems |
| TASK C-10 – Diagnoses Vehicle Networking Systems | | | |
| 10.01 | Reads diagnostic trouble codes (DTCs) | AST-315 | Vehicle Networking Systems |
| 10.02 | Monitors data | | |
| 10.03 | Interprets test results | | |
| 10.04 | Tests system circuitry and components | | |
| TASK C-11 – Repairs Vehicle Networking Systems | | | |
| 11.01 | Updates component software | AST-315 | Vehicle Networking Systems |

Plan of Training - Automotive Service Technician

| 2016 RSOS Sub-task | | 2019 POT | |
|--|--|----------|--|
| 11.02 | Replaces components | | |
| 11.03 | Verifies vehicle module communications system repair | | |
| TASK D-12 – Diagnoses Driveline Systems | | | |
| 12.01 | Diagnoses drive shafts and axles | SV1287 | Drive Shafts and Axle Shafts |
| 12.02 | Diagnoses manual transmissions/transaxles | AST-250 | Manual Transmissions and Transaxles |
| 12.03 | Diagnoses automatic transmissions/transaxles | AST-435 | Automatic Transmissions and Transaxles |
| 12.04 | Diagnoses clutches | AST-255 | Clutches |
| 12.05 | Diagnoses transfer cases | AST-300 | Transfer Cases |
| 12.06 | Diagnoses final drive assemblies | AST-260 | Final Drive Assemblies |
| TASK D-13 – Repairs Driveline Systems | | | |
| 13.01 | Repairs manual transmissions/transaxles | SV1287 | Drive Shafts and Axle Shafts |
| 13.02 | Repairs manual transmissions/transaxles | AST-250 | Manual Transmissions and Transaxles |
| 13.03 | Repairs automatic transmissions/transaxles | AST-435 | Automatic Transmissions and Transaxles |
| 13.04 | Repairs clutches | AST-255 | Clutches |
| 13.05 | Repairs transfer cases | AST-300 | Transfer Cases |
| 13.06 | Repairs final drive assemblies | AST-260 | Final Drive Assemblies |
| Task E-14 – Diagnoses Electrical Systems and Components | | | |
| 14.01 | Diagnoses basic wiring and electrical systems | SV1132 | Introduction to Electrical and Electronic Principles |
| 14.02 | Diagnoses starting/charging systems and batteries | SV1132 | Introduction to Electrical and Electronic Principles |
| | | SV1377 | Batteries |
| | | SV1387 | Introduction to Starting Systems |
| | | AST-220 | Starting Systems |
| | | SV1396 | Introduction to Charging Systems |
| | | AST-225 | Charging Systems |
| 14.03 | Diagnoses lighting and wiper systems | AST-230 | Lighting and Wiper Systems |
| 14.04 | Diagnoses entertainment systems | AST-420 | Entertainment Systems |
| 14.05 | Diagnoses electrical options | AST-330 | Electrical Options and Accessories |
| 14.06 | Diagnoses instrumentation and information displays | AST-425 | Instrumentation and Information Displays |
| 14.07 | Diagnoses electrical accessories | AST-330 | Electrical Options and Accessories |

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| 2016 RSOS Sub-task | | 2019 POT | |
|---|--|----------|---|
| Task E-15 – Repairs Electrical Systems and Components | | | |
| 15.01 | Repairs basic wiring and electrical systems | SV1132 | Electrical and Electronic Principles |
| 15.02 | Repairs starting/charging systems and batteries | SV1132 | Electrical and Electronic Principles |
| | | SV1377 | Batteries |
| | | SV1387 | Introduction to Starting Systems |
| | | AST-220 | Starting Systems |
| | | SV1396 | Introduction to Charging Systems |
| | | AST-225 | Charging Systems |
| 15.03 | Repairs lighting and wiper systems | AST-230 | Lighting and Wiper Systems |
| 15.04 | Repairs entertainment systems | AST-420 | Entertainment Systems |
| 15.05 | Repairs electrical options | AST-330 | Electrical Options and Accessories |
| 15.06 | Repairs instrumentation and information displays | AST-425 | Instrumentation and Information Displays |
| 15.07 | Installs electrical accessories | AST-330 | Electrical Options and Accessories |
| 15.08 | Repairs electrical accessories | | |
| Task E-16 – Diagnoses Heating, Ventilation and Air Conditioning (HVAC) and Comfort Control Systems | | | |
| 16.01 | Diagnoses air flow control systems | AST-440 | Heating, Ventilation and Air Conditioning Systems |
| 16.02 | Diagnoses refrigerant systems | | |
| 16.03 | Diagnoses heating systems | | |
| Task E-17 – Repairs Heating, Ventilation and Air Conditioning (HVAC) and Comfort Control Systems | | | |
| 17.01 | Repairs air flow control systems | AST-440 | Heating, Ventilation and Air Conditioning Systems |
| 17.02 | Repairs refrigerant systems | | |
| 17.03 | Repairs heating systems | | |
| Task F-18 – Diagnoses Steering and Suspension, Braking, Control Systems, Tires, Wheels, Hubs and Wheel Bearings | | | |
| 18.01 | Diagnoses steering, suspension and control systems | SV1256 | Suspension I |
| | | AST-240 | Suspension Systems II |
| | | SV1228 | Steering Systems |
| | | AST-235 | Steering Systems II |
| 18.02 | Diagnoses braking and control systems | SV1642 | Braking Systems I (Non-ABS) |
| | | AST-245 | Braking Systems II |
| 18.03 | Diagnoses tires, wheels, hubs and wheel bearings | SV1217 | Tires, Wheels and Hubs |

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| 2016 RSOS Sub-task | | 2019 POT | |
|---|--|----------|---------------------------------------|
| Task F-19 – Repairs Steering and Suspension, Braking, Control Systems, Tires, Wheels, Hubs and Wheel Bearings | | | |
| 19.01 | Repairs steering, suspension and control systems | SV1256 | Suspension I |
| | | SV1228 | Steering Systems |
| | | AST-240 | Suspension Systems II |
| | | AST-235 | Steering Systems II |
| 19.02 | Repairs braking and control systems | SV1642 | Braking Systems I (Non-ABS) |
| | | AST-245 | Braking Systems II |
| 19.03 | Repairs tires, wheels, hubs and wheel bearings | SV1217 | Tires, Wheels and Hubs |
| Task G-20 – Diagnoses Restraint Systems, Body Components, Accessories and Trim | | | |
| 20.01 | Diagnoses restraint systems | AST-430 | Restraint Systems |
| 20.02 | Diagnoses wind noises, rattles and water leaks | SV1552 | Body Components, Accessories and Trim |
| 20.03 | Diagnoses interior and exterior components, accessories and trim | | |
| 20.04 | Diagnoses latches, locks and movable glass | | |
| Task G-21 – Repairs Restraint Systems, Body Components, Accessories and Trim | | | |
| 21.01 | Repairs restraint systems | AST-430 | Restraint Systems |
| 21.02 | Repairs wind noises, rattles and water leaks | SV1552 | Body Components, Accessories and Trim |
| 21.03 | Repairs interior and exterior components, accessories and trim | | |
| 21.04 | Repairs latches, locks and movable glass | | |
| Task H-22 – Diagnoses Hybrid and Electric Vehicles (EV) | | | |
| 22.01 | Implements specific safety protocols for hybrid and electric vehicles (EV) | SV1105 | Safety in the Shop |
| | | SV1700 | Hybrid Systems I |
| | | AST-445 | Hybrid and Electric Vehicle Systems |
| 22.02 | Diagnoses hybrid and electric vehicle (EV) systems | AST-445 | Hybrid and Electric Vehicle Systems |
| Task H-23 – Repairs Hybrid and Electric Vehicles (EV) | | | |
| 23.01 | Repairs hybrid vehicle systems | AST-445 | Hybrid and Electric Vehicle Systems |
| 23.02 | Repairs electric vehicles (EV) systems | | |

B. 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 as documented on an official transcript.

The order of course delivery within each level can be determined by the training institution, 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.

| Pre-Employment | | | | |
|-----------------------|--------------------|---|--------------|-------------------------|
| Course No. | AACS No. | Course Name | Hours | Pre-Requisite(s) |
| TS1510 | AST-100 | Occupational Health and Safety | 6 | None |
| TS1520 | AST-100 | WHMIS | 6 | None |
| TS1530 | - | Standard First Aid | 14 | None |
| SV1105 | AST-100 | Safety in the Shop | 12 | None |
| SV1165 | AST-105 AST-130 | Hand Tools | 30 | SV1105 |
| SV1177 | AST-105 AST-115 | Shop Tools and Equipment | 24 | SV1165 |
| SV1188 | AST-110 | Fasteners, Tubing and Fittings | 14 | SV1177 |
| SV1158 | AST-125 AST-165 | Service Information Systems and Trade Related Documents | 16 | SV1177 |
| SV1217 | AST-130 | Tires, Wheels and Hubs | 24 | SV1177 SV1642 |
| SV1552 | AST-155 AST-170 | Body Components, Accessories and Trim | 20 | SV1177 |
| SV1256 | AST-145 | Suspension I | 48 | SV1177 |
| SV1228 | AST-150 | Steering Systems | 64 | SV1177 |
| SV1642 | AST-160 | Braking Systems I (Non-ABS) | 60 | SV1177 |
| SV1132 | AST-165 | Introduction to Electrical and Electronic Principles | 90 | SV1177 |

Plan of Training - Automotive Service Technician

| Pre-Employment | | | | |
|-----------------------------------|--------------------|--|--------------|-------------------------|
| Course No. | AACS No. | Course Name | Hours | Pre-Requisite(s) |
| SV1377 | AST-165 | Batteries | 18 | SV1177 |
| SV1287 | AST-155 | Drive Shafts and Axle Shafts | 30 | SV1177 |
| SV1306 | AST-175 | Engine Principles (Gasoline and Diesel) | 90 | SV1177 |
| SV1600 | - | Ignition Systems | 30 | SV1377 |
| SV1387 | - | Introduction to Starting Systems | 30 | SV1377 |
| SV1396 | - | Introduction to Charging Systems | 30 | SV1377 |
| SV1311 | - | Introduction to Cooling Systems | 30 | SV1177 |
| SV1197 | - | Lubrication and Fluids Servicing | 24 | SV1177 |
| SV1691 | - | Introduction to Accessory Drive Systems | 18 | SV1177 |
| SV1681 | AST-125 AST-180 | Preventative Vehicle Maintenance Inspections (PMI) | 24 | SV1177 SV1197 |
| SV1700 | - | Hybrid Systems I | 24 | SV1177 SV1377 |
| SV1125 | - | Gaskets, Seals and Bearings | 30 | None |
| WD1301 | AST-105 AST-135 | Oxy-Fuel Welding/Cutting | 30 | SV1177 |
| SV1710 | AST-105 AST-140 | Gas Metal Arc Welding (GMAW [MIG]) | 30 | SV1177 |
| SV2282 | AST-185 | Pre-Delivery Inspection | 18 | SV1681 |
| AM1000 | - | Introduction to Essential Skills | 9 | None |
| AM1101 | - | Math Essentials | 42 | None |
| AM1221 | - | Automotive Service Math Fundamentals | 42 | AM1101 |
| CM2161 | - | Communication Essentials | 36 | None |
| SD1761 | - | Workplace Essentials | 24 | None |
| MC1062 | - | Computer Essentials | 15 | None |
| AP1102 | - | Introduction to Apprenticeship | 12 | None |
| Total Pre-Employment Hours | | | 1064 | |

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

*A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1101 - Math Essentials. Please check with your training institution.

| AACS Level II | | | |
|-----------------------------|-------------------------------------|--------------|--------------------------------------|
| Course No. | Course Name | Hours | Pre-Requisite(s) |
| AST-200 | Cooling Systems | 12 | Pre-Employment or AACS Level I |
| AST-205 | Engine Lubrication Systems | 12 | |
| AST-210 | Accessory Drive Systems | 12 | |
| AST 215 | Engine Repair | 42 | |
| AST-220 | Starting Systems | 12 | |
| AST-225 | Charging Systems | 12 | |
| AST-230 | Lighting and Wiper Systems | 18 | |
| AST-235 | Steering Systems II | 12 | |
| AST-240 | Suspension Systems II | 24 | |
| AST-245 | Braking Systems II | 24 | |
| AST-250 | Manual Transmissions and Transaxles | 36 | |
| AST-255 | Clutches | 6 | |
| AST-260 | Final Drive Assemblies | 18 | |
| Total Level II Hours | | 240 | |

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

| AACS Level III | | | |
|------------------------------|--|--------------|-------------------------|
| Course No. | Course Name | Hours | Pre-Requisite(s) |
| AST-300 | Transfer Cases | 24 | Level II |
| AST-305 | Gasoline Fuel Delivery and Injection Systems | 24 | Level II |
| AST-310 | Gasoline Ignition Systems | 24 | Level II |
| AST-315 | Vehicle Networking Systems | 60 | Level II |
| AST-320 | Gasoline Emission Control Systems | 24 | Level II |
| AST-325 | Gasoline Intake and Exhaust Systems | 18 | Level II |
| AST-330 | Electrical Options and Accessories | 30 | Level II |
| AST-335 | Motor Vehicle Inspection | 6 | Level II |
| Total Level III Hours | | 210 | |

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

| AACS Level IV | | | |
|-----------------------------|---|--------------|-------------------------|
| Course No. | Course Name | Hours | Pre-Requisite(s) |
| AST-400 | Mentoring | 6 | Level III |
| AST-405 | Diesel Fuel Delivery and Injection Systems | 18 | Level III |
| AST-410 | Diesel Emission Control Systems | 18 | Level III |
| AST-415 | Diesel Intake and Exhaust Systems | 6 | Level III |
| AST-420 | Entertainment Systems | 15 | Level III |
| AST-425 | Instrumentation and Information Displays | 15 | Level III |
| AST-430 | Restraints Systems | 24 | Level III |
| AST-435 | Automatic Transmissions and Transaxles | 48 | Level III |
| AST-440 | Heating, Ventilation and Air Conditioning Systems | 30 | Level III |
| AST-445 | Hybrid and Electric Vehicle Systems | 30 | Level III |
| AST-450 | Program Review | 30 | Level III |
| Total Level IV Hours | | 240 | |

| | |
|----------------------------------|-------------|
| Total Course Credit Hours | 1754 |
|----------------------------------|-------------|

Pre-Employment

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. rationale 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.

Duration: 14 Hours

Pre-Requisite(s): None

Objectives and Content:

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

SV1105 Safety in the Shop

Learning Outcomes:

- Demonstrate knowledge of various types of shop hazards.
- Demonstrate knowledge of safe work practices
- Demonstrate knowledge of regulatory requirements pertaining to safety.
- Demonstrate knowledge of PPE their applications, limitations and procedures for use.
- Demonstrate knowledge of safety equipment their applications and procedures for use.
- Demonstrate knowledge of safety protocols for hybrid and electric vehicles (EV).

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
 - refrigerants
 - carbon monoxide
 - ventilation
 - storage and handling of batteries
2. Identify types of PPE and describe their applications and limitations for use.
3. Describe the care and maintenance of PPE.
4. Identify types of shop safety equipment and describe their applications.
5. Describe the care and maintenance of shop safety equipment.

6. Describe safe work practices to maintain a safe work environment.
 - i. personal
 - ii. shop/facility
 - fire
 - explosion
 - gases
 - iii. environmental awareness
 - iv. vehicle
 - refrigerant systems
 - restraint systems
 - high voltage systems (hybrid and EV systems)
 - high pressure fuel systems
7. Identify and describe jurisdictional requirements for handling and disposing of hazardous materials.
8. 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.

SV1165 Hand Tools

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select, use and maintain various cutting and non-cutting hand tools.
- Demonstrate knowledge of measuring and testing devices, their applications, maintenance and procedures for use.

Duration: 30 Hours

Pre-Requisite(s): SV1105

Objectives and Content:

1. Describe safe operating procedures for hand tools.
2. Describe the procedures to select, use, maintain and store-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)

3. Describe the procedures to select, use, maintain and store 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
4. Describe the procedures to recondition cutting and non-cutting hand tools.
 - i. screwdrivers
 - ii. chisels
 - iii. screw starters
 - iv. punches
5. Identify types of scan tools and digital voltage ohmmeters (DVOM) and describe their applications.

6. Describe the procedures to select, use, maintain and store 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

7. Describe the procedures to select, use, maintain and store 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 shop tools and equipment, their applications, maintenance and procedures for use
- Demonstrate knowledge of vehicle hoisting and lifting equipment, their applications and procedures for use.
- Demonstrate knowledge of shop lifting equipment, their applications and procedures for use

Duration: 24 Hours

Pre-Requisite(s): SV1165

Objectives and Content:

1. Identify safety considerations pertaining to vehicle hoisting and lifting.
2. Describe the procedures to select, inspect, store, use and maintain 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
3. Describe the procedures to select, inspect, store, use and maintain shop tools.

- i. air tools (pneumatic)
 - ii. electric tools
 - iii. torque multipliers
4. Describe procedures to select, inspect, store, use and maintain vehicle protective equipment.
 - i. seat covers
 - ii. fender covers
 - iii. floor mats
5. Identify types of hoisting and lifting equipment and accessories and describe their applications.
6. Interpret information pertaining to hoisting and lifting found on drawings and specifications.
7. Describe the procedures used when hoisting and lifting.
8. Describe the procedures used to inspect, maintain hoisting and lifting 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.

SV1188 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: 14 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

SV1158 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, interpret, and complete documentation.

Duration: 16 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify and interpret types of trade related documents and describe their applications.
 - i. estimates
 - ii. industry standard labour guides
 - iii. manufacturers' specifications
 - iv. standards
 - v. company policies
 - vi. pre-delivery inspections (PDI)
 - vii. preventative maintenance
 - viii. schedules
2. Locate and interpret service information related to identification codes found on the vehicle and vehicle components.
3. Describe the procedures used to prepare and complete documentation.
 - i. work orders
 - ii. estimates
 - iii. pre-delivery inspection reports
 - iv. preventative maintenance reports
4. Explain how to use an operator's manual and how to interpret its sections.

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

6. 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

7. 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, SV1642

Objectives and Content:

1. Define terminology associated with tires, wheels and hubs.
2. Identify hazards and safety considerations 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, balance, pressure 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 and wheel bearings.
 - i. verify concern
 - ii. performs sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - vii. verify the repair
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.
4. Balance a wheel and tire assembly.
5. Service a tapered wheel bearing.

SV1552 Body Components, Accessories and Trim

Learning Outcomes:

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

Duration: 20 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify hazards, safety considerations and describe safe work practices pertaining to body components, accessories and trim.
 - i. interior
 - restraint systems
 - ii. exterior
2. Identify body components, accessories and trim and describe their purpose and operation.
 - i. interior
 - doors
 - seats
 - dashes
 - ii. exterior
 - bumpers
 - mirrors
 - add-on accessories
 - mounts
3. Identify flaws related to interior and exterior components, accessories and trim.
4. Describe the procedures used to diagnose interior and exterior components, accessories and trim.

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

6. Identify types and sources of wind and water leaks and their causes.
 - i. missing sealant and adhesive
 - ii. loose fasteners
 - iii. panel misalignment
 - iv. incorrect clearances
 - v. exterior accessories

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

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

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

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

11. Identify diagnostic tools and equipment for interior and exterior components, accessories and trim and describe their applications and procedures for use.

12. Describe the procedures used to diagnose body components, accessories 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.

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

Practical Requirements.

None.

SV1256 Suspension I

Learning Outcomes:

- Demonstrate knowledge of suspension systems and their components and operation.
- 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 safety considerations pertaining to conventional suspension systems.
 - i. loaded components
 - ball joints
 - springs

2. Identify and describe suspension systems and components and their operation.
 - 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

3. Describe the procedures to inspect suspension systems.
4. Identify types of dampers and describe their components and operation.
5. Describe procedures to remove and replace dampers.
 - i. checking for serviceability
 - ii. removing and replacing
6. Identify types of stabilizer bars and their operation.
7. Describe procedures to inspect, remove and replace stabilizer bars.
8. Identify types of ball joints and tie rod ends and their operation.
9. Describe procedures to inspect, remove, replace and service ball joints and tie rod ends.
10. Identify types of struts and their operation.
11. Describe procedures to inspect, remove, replace and service struts.
12. Identify types of coil springs and control arms and their operation.
13. Describe procedures to inspect, remove, replace and service coil springs and control arms.
14. Identify types of leaf springs and their operation.
15. Describe procedures to inspect, remove, replace and service leaf springs.
16. Identify types of torsion bars and their operation.
17. Describe procedures to inspect, remove, replace and adjust torsion bars.
18. Identify types of air ride systems and their operation.
 - i. active suspension
 - ii. computer-controlled active suspension system
19. Identify air ride system components.
 - i. height sensor
 - ii. control module
 - iii. air control solenoids
20. Describe procedures to inspect, remove, replace and adjust air ride systems.

21. Describe the procedures used to diagnose conventional suspension systems.
 - i. verify concern
 - ii. performs sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - vii. verify the repair

Practical Requirements:

1. Remove and replace shock absorbers (dampers).
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.

SV1228 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: 64 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. Introduce steering geometry.
7. Identify types of steering gears and describe their components and operation.
 - i. recirculating ball
 - ii. rack-and-pinion

8. Identify types of assist systems and describe their components and operation.
 - i. electric
 - ii. hydraulic
 - iii. variable
9. Identify types of power steering pumps and describe their components and operation.
10. Identify types of fluids and lubricants, fasteners, tubing, hoses, gaskets and seals and describe their applications.
11. Describe the procedures used to disarm passive restraints.
12. Describe the procedures used to diagnose conventional steering systems.
 - i. verify concern
 - ii. performs sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - vii. verify the repair
13. 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.

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 brake 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. Identify types of trailer brakes and controls and describe their components and operation.
12. Describe the procedures used to diagnose braking systems.
 - i. verify concern
 - ii. performs sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - vii. verify the repair
13. Describe the procedures used to flush and bleed hydraulic brakes.
14. Describe the procedures used to measure and machine components.
15. 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.

SV1132 Introduction to Electrical and Electronic Principles

Learning Outcomes:

- Demonstrate knowledge of basic electrical and electronic principles.
- Demonstrate knowledge of electrical circuits, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose electrical circuits and components.

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. Interpret electrical schematics.

4. Identify and explain the types of diagnostic tools and equipment used to test components of series, parallel and series-parallel circuits.
 - 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

5. Describe the procedures used to diagnose electrical circuits and components.
 - i. verify concern
 - ii. performs inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - opens
 - shorts to voltage
 - shorts to ground
 - high resistance
 - vii. verify the repair

6. Identify types of electronic/electrical components and describe their characteristics, composition and applications.
 - 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
- 7. Explain basic computer operation.
- 8. 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 battery construction and operation.
- 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. Identify safety considerations pertaining to batteries.
2. Identify types of batteries, and describe their components and operation.
3. Describe relationship of batteries to the vehicle electrical system.
4. Identify warning indicators.
5. Explain the principles of batteries.
 - i. storage of batteries
 - ii. battery construction
 - positive plates
 - negative plates
 - separators
 - electrolytes
 - chemical action
 - terminals
 - iii. chemical action when discharging
 - iv. chemical action when charging
 - v. sulfated batteries
 - vi. maintenance-free batteries
 - vii. temperature effects on batteries
 - viii. battery polarity
 - ix. battery ratings
 - cold cranking amps
 - reserve capacity rating
 - x. battery selection
 - xi. terminal pullers

- xii. hold-down clamp
 - xiii. battery maintenance
 - procedures to clean batteries
 - battery inspection
 - electrolyte level
6. Describe the procedures to remove and install batteries and battery cables.
7. Identify battery connections.
- i. parallel circuits
 - ii. series circuits
 - iii. series-parallel circuits
8. Identify and explain the function of equipment used to perform battery tests.
- i. hydrometer
 - ii. refractometer
 - iii. built-in hydrometer
9. 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
10. 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

11. Identify types of cable terminals and explain how to select the proper cable size.
 - i. types of cable terminals
 - ii. cable size selection
12. Describe procedures to replace battery cables and/or terminals.
 - i. fastening terminals to cable (soldered and crimped)
 - ii. installing corrosion inhibitor over terminals (importance)
13. 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
14. Describe procedures to start engines with a booster battery.
15. 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
16. 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

SV1287 Drive Shafts and Axle Shafts

Learning Outcomes:

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

Duration: 30 Hours

Pre-Requisite(s): SV1177

Objectives and Content:

1. Identify types of drive shafts and axles and describe their composition.
2. Identify safety considerations pertaining to drive shafts and axles.
3. Identify tools and equipment used with drive shafts and axles and describe their applications and procedures for use.
4. Identify rear wheel drive 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
5. Describe and explain operation of front-wheel drive axle shafts.
 - i. axle retainers, fasteners and shafts
 - ii. support bearing
 - iii. steering knuckles
 - iv. axle disconnects
 - v. locking hubs
 - vi. constant velocity joints
 - vii. bearings
 - viii. lubricants
 - ix. gaskets, seals and sealants

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

7. Describe procedures to inspect, diagnose, remove, service and install drive shaft systems on rear drive vehicles.
 - i. removing
 - ii. rear-end torquing
 - iii. balancing (causes of unbalance and effects)
 - iv. phasing
 - v. installing
 - vi. angles
 - vii. indexing

8. Describe the procedures used to diagnose drive shafts and axle shaft systems.
 - i. verify concern
 - ii. performs sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 - vii. verify the repair

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

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

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

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.

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, and describe their construction.
 - i. fuel
 - diesel
 - gasoline
 - alternate fuels
 - ii. stroke
 - iii. cooling systems
 - air
 - liquid
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 related components and describe their relationship to engine assembly.
 - i. engine oil coolers
 - ii. lines
 - iii. hoses
 - iv. pulleys
8. Identify types of fasteners, gaskets, seals and sealants and describe their applications and procedures for use.
9. Describe and calculate engine displacement, compression ratios, horsepower, torque area and volume.
10. Identify oil classifications.
 - i. diesel
 - ii. gasoline

Practical Requirements:

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

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.

SV1387 Introduction to 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).

SV1396 Introduction to 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).

SV1311 Introduction to 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.
- i. 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).

SV1691 Introduction to 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.

SV1681 Preventative Vehicle Maintenance Inspections (PMI)

Learning Outcomes:

- Demonstrate knowledge of the procedures to perform a preventative vehicle maintenance inspection.
- Demonstrate knowledge of the procedures to replace minor components.
- Demonstrate knowledge of vehicle maintenance inspections and their purpose.

Duration: 24 Hours

Pre-Requisite(s): SV1177, SV1197

Objectives and Content:

1. Explain the background and rationale for designing a preventative maintenance schedule.
 - i. background on preventative maintenance inspections
 - ii. importance of 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 vehicle 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 filters
 - battery electrolyte level
 - battery connections
 - brakes
 - 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
 - steering linkage
4. Identify tools and equipment used to perform vehicle maintenance inspections.

Practical Requirements:

1. Locate PM inspection lists, vehicle owner's manuals and vehicle manufacturer's manuals.
2. Perform a PMI.
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, SV1377

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
 - iv. braking systems
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.

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

5. 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

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

7. Identify causes of oil seal failure.

8. 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

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

10. Identify causes of gasket failure.
11. Describe procedures to remove and install gaskets.
 - i. removing and installing
 - ii. cleaning (knowing the importance of cleanliness)
 - iii. torquing bolts
12. Identify and describe sealing compounds.
 - i. types
 - ii. purpose
13. Identify causes of sealing compound failure.
14. 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.

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. Define and explain terminology associated with oxy-acetylene heating and cutting equipment.
2. 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
3. Identify oxy-acetylene heating and cutting equipment and accessories, and describe their applications.
4. Describe the procedures used to inspect, store and maintain oxy-acetylene

equipment.

5. Describe procedures to perform braze welding using oxy-acetylene equipment.
6. 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 flame cutting with oxy-fuel equipment.
3. 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 and explain 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 weld GMAW (MIG) equipment.
7. Describe the procedures used to inspect, maintain and store GMAW (MIG) equipment.
8. Identify and describe types of weld defects, their causes and the procedures used to prevent and correct them.

Practical Requirements:

1. Weld using MIG equipment.
2. Perform set up and shut down procedures.

SV2282 Pre-Delivery Inspection

Learning Outcomes:

- Demonstrate knowledge of the procedures used to perform pre-delivery inspections.

Duration: 18 Hours

Pre-Requisites: SV1681

Objectives and Content:

1. Explain the purpose of a pre-delivery inspection.
2. Identify pre-delivery inspection procedures and requirements.
3. Describe the procedures used to perform pre-delivery inspections.

Practical Objectives:

1. Perform vehicle operational checks.

AM1000 Introduction to Essential Skills

Learning Outcomes:

- Demonstrate knowledge of the nine nationally recognized essential skills.
- Demonstrate knowledge of the essential skills levels of complexity.
- Demonstrate knowledge of the essential skills required for the learners chosen trade.
- Demonstrate an awareness of essential skills assessments.

Duration: 9 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify and describe the essential skills recognized by the Government of Canada through the Office of Literacy and Essential Skills (OLES).
 - i. reading
 - ii. document use
 - iii. numeracy
 - iv. writing
 - v. oral communication
 - vi. working with others
 - vii. thinking
 - viii. computer use
 - ix. continuous learning
2. Describe the Levels of Complexity measurement assigned to essential skills.
3. Identify the essential skills, along with their complexity level, identified as necessary for the learner's trade.
 - i. RSOS / NOA content¹
 - ii. OLES Essential Skills Profiles²
 - iii. OLES tools and support for apprentices and tradespersons³
4. Describe the nature and purpose of essential skills assessment.
 - i. self-assessment & formal assessment tools
 - ii. indicators of deficiencies
 - iii. suggestions for improvement

5. Describe the benefits of essential skills improvement.
 - i. confidence at work
 - ii. employability
 - iii. success in apprenticeship
 - iv. wage & job advancement

Practical Requirements:

1. Complete an essential skills self-assessment addressing numeracy, document use and reading. The online **Government of Canada Essential Skills Indicator⁴** and **Essential Skills self-assessment for the trades⁵** are to be used unless the instructor provides a similar assessment tool or tools.
2. Participate in a group discussion about the impact of gaps in essential skills that may be revealed by the self-assessments completed, and the value of improving essential skills.

Students are graded complete or incomplete on this practical work, no grade is permitted for self-assessment performance. However, completion of the practical requirements is mandatory for completion of this unit.

Resources:

All footnotes are in the companion document “Resources for Introduction to Essential Skills” which is available online from Apprenticeship and Trade Certification.

AM1101 Math Essentials

Note: It is recommended that AM1101 be delivered in the first semester of the Pre-Employment program.

Learning Outcomes:

- Demonstrate knowledge of essential numeracy skills.
- 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: 42 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. Describe whole number operations.
 - i. read, write, count, round off, add, subtract, multiply and divide whole numbers
2. Describe the application of the order of operations in math problems.
3. Describe fraction and mixed number operations.
 - i. read, write, add, subtract, multiply and divide fractions
4. Describe decimal operations.
 - i. read, write, round off, add, subtract, multiply and divide decimals

5. Describe percent/decimal/fraction conversion and comparison.
 - i. convert between fractions, decimals and percents
6. Identify percentage operations.
 - i. read and write percentages
 - ii. calculate base, rates and percentages
7. Identify ratio and proportion operations.
 - i. use a ratio comparing two quantities with the same units
 - ii. use a proportion comparing two ratios
8. Describe the use of the imperial measurement system in math problems.
 - i. identify units of measurement
 - length
 - mass
 - area
 - volume
 - capacity
9. Describe the use of the metric measurement system in math problems.
 - i. identify units of measurement
 - length
 - mass
 - area
 - volume
 - capacity
10. Identify angles, lines and geometric shapes.
 - i. use a protractor to measure angles
 - ii. determine whether an angle is right, acute or obtuse
 - iii. identify parallel, perpendicular, horizontal and vertical lines
 - iv. identify types of triangles, quadrilaterals, and 3-dimensional shapes
11. Describe estimation strategies.
 - i. estimate a linear measure using a referent
 - ii. estimate length, area and volume of objects in metric and imperial systems
12. Describe problem solving that involves linear measurement using instruments such as rulers or tape measures, in the metric and imperial systems.

Practical Requirements:

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

AM1221 Automotive Service 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.
- Solve 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: 42 Hours

Pre-Requisite(s): AM1101

Objectives and Content:

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

1. Describe percent/decimal/fraction conversions and comparisons in trade specific situations.
2. Describe ratios and proportions as they relate to trade specific problems.
3. Describe the use of the Imperial and Metric measurement systems in trade specific applications.
4. Describe Imperial and Metric conversions in trade specific situations.
 - i. convert between imperial and metric measurements
 - ii. convert to another unit within the same measurement system
5. Describe how to manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems.
 - i. right angle triangles
 - ii. area
 - iii. volume
 - iv. perimeter
 - v. density

6. Identify calculations involving geometry that are relevant to the trade.
 - i. angle calculations
 - ii. circle calculations

7. Identify math processes used 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 is **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. Apprentice transfers under Provincial / Territorial Mobility agreements may be exempt from this requirement.

CM2161 Communication Essentials

Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing and oral communication skills in the workplace.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of the purpose of various types of workplace documentation and workplace meetings.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.
- Demonstrate knowledge of effective job search techniques

Duration: 36 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. Define communications terminology used in the trade.
2. Identify the principles of effective workplace writing.
 - i. grammar, punctuation, mechanics
 - ii. sentence and paragraph construction
 - iii. tone, language, and word choice
 - iv. the writing process
 - planning
 - writing
 - editing/revising
3. Identify sources of information used to communicate in the workplace.
 - i. regulations
 - ii. codes
 - iii. OH&S requirements
 - iv. prints, drawings and specifications
 - v. company and client documentation

4. Identify types and purposes of informal workplace documents.
 - i. reports
 - incident
 - process
 - progress
 - ii. common trade specific forms
 - iii. primary and secondary methods of information gathering
 - iv. accuracy and completeness in reports and forms

5. Demonstrate an understanding of interpersonal communications in the workplace.
 - i. recognize group dynamics
 - ii. contribute information and expertise
 - iii. individual learning styles
 - audible
 - visual
 - experiential
 - theoretical
 - iv. recognize respectful and open communication
 - v. accept and provide feedback
 - vi. interpret non-verbal communication cues
 - body language
 - signals

6. Demonstrate an understanding of effective oral communication skills.
 - i. listening
 - receiving, understanding, remembering, reflecting, evaluating, paraphrasing, and responding
 - ii. speaking
 - using clear and proper words
 - tone, style, and vocabulary
 - brevity
 - iii. common workplace oral communication situations
 - introducing self and others
 - telephone conversations
 - tool box/safety talks
 - face-to-face conversations
 - communicating with co-workers, supervisors, clients, and other trades people

7. Identify common practices related to workplace meetings.
 - i. meeting formats
 - ii. meeting preparation
 - iii. agendas and minutes
 - iv. roles, responsibilities, and etiquette of meeting participants

8. Identify acceptable workplace use of communication technologies.
 - i. cell / smart phone etiquette
 - ii. voice mail
 - iii. e-mail
 - iv. texting / messaging through social media
 - v. teleconferencing / videoconferencing for meetings and interviews
 - vi. social networking
 - vii. other emerging technologies

9. Demonstrate an understanding of effective job search techniques.
 - i. employment trends, opportunities, and sources of employment
 - ii. job ads and the importance of fitting qualifications to job requirements
 - iii. resumes
 - characteristics of effective resumes
 - types of resumes
 - principles of resume formatting
 - iv. effective cover letters
 - v. job interview process
 - pre-interview preparation
 - interview conduct
 - post-interview follow up

Practical Requirements:

1. Write a well-developed, coherent, unified paragraph.
2. Complete a trade-related form.
3. Prepare an agenda for a toolbox safety talk.
4. Participate in a simulated oral workplace communication situation.
5. Prepare a resume.

SD1761 Workplace Essentials

Note: It is recommended that SD1761 be delivered in the second half of Pre-Employment training.

Learning Outcomes:

- Demonstrate a knowledge of workplace requirements in the areas of personal responsibility, unions, workers compensation, workers' rights, and human rights.
- Demonstrate a knowledge of quality customer service.

Duration: 24 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 personal responsibilities and attitudes that contribute to on-the-job success.
 - i. asking questions
 - ii. working safely
 - iii. accepting constructive feedback
 - iv. time management & punctuality
 - v. respect for authority
 - vi. stewardship of materials, tools and properties
2. Define unions and identify their role in the workplace.
 - i. purpose of unions
 - ii. common union structure
 - iii. unions in this trade
3. Demonstrate an understanding of the Worker's Compensation process.
 - i. aims, objectives, and benefits of the Workplace Health, Safety and Compensation Commission
 - ii. role of the workers advisor
 - iii. internal review process

4. Demonstrate an understanding of worker's rights.
 - i. labour standards
 - ii. 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. awareness of the Human Rights Code and the role of the Human Rights Commission
 - ii. categories of discrimination and strategies for prevention
 - direct
 - systemic
 - adverse effect
 - iii. types of discrimination
 - race
 - ethnic origin
 - colour
 - religion
 - age
 - gender identify
 - sexual orientation
 - marital status
 - family status
 - disability
 - criminal conviction that has been pardoned
 - iv. conduct that constitutes harassment and discrimination
 - objectionable conduct
 - comments or displays made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient
 - v. the value of diversity in the workplace
 - culture
 - gender identify
 - sexual orientation

6. Demonstrate an understanding of quality customer service.
 - i. importance of quality service
 - ii. barriers to quality service
 - physical and physiological
 - cultural
 - technological
 - iii. customer needs & common methods for meeting them
 - iv. characteristics & importance of a positive attitude
 - v. interactions with challenging customers
 - vi. addressing complaints and resolve conflict

Practical Requirements:

None.

MC1062 Computer Essentials

Learning Outcomes:

- Demonstrate knowledge of desktop/laptop and mobile computers and their operation.
- Demonstrate knowledge of word processing and spreadsheet software, internet browsers and their applications.
- Demonstrate knowledge of e-mail applications and procedures.
- Demonstrate an awareness of security issues related to computers.
- Demonstrate an awareness of online learning using computers.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

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

1. Identify computer types used in the workplace, and the characteristics of each.
 - i. desktop/laptop computers
 - ii. tablets
 - iii. smartphones
2. Identify common desktop and mobile operating systems.
 - i. Windows
 - ii. Mac OS
 - iii. iOS
 - iv. Android
3. Describe the use of Windows operating system software.
 - i. start and end a program
 - ii. use the help function
 - iii. use the find function
 - iv. maximize and minimize a window
 - v. open and scroll through multiple windows
 - vi. use the task bar
 - vii. adjust desktop settings such as screen savers, screen resolution, and backgrounds
 - viii. shut down a computer

4. Identify the skills necessary to perform file management commands.
create folders
 - i. copy files and folders
 - ii. move files and folders
 - iii. rename files and folders
 - iv. delete files and folders

5. Describe the use of word processing software to create documents.
 - i. enter & edit text
 - ii. indent and tab text
 - iii. change text attributes
 - bold
 - underline
 - font
 - iv. change layout format
 - margins
 - alignment
 - line spacing
 - v. spell check and proofread
 - vi. save, close & reopen a document
 - vii. print document

6. Describe the use of spreadsheet software to create documents.
 - i. enter data in cells
 - ii. format data in cells
 - iii. create formulas to add, subtract, multiply and divide
 - iv. save, close & reopen a spreadsheet
 - v. print spreadsheet

7. Describe the use of the internet in the workplace.
 - i. web browsers
 - ii. search engines
 - iii. security issues
 - iv. personal responsibility for internet use at work

8. Describe the role of e-mail.
 - i. e-mail etiquette
 - grammar and punctuation
 - privacy issues when sharing and forwarding e-mail
 - work appropriate content
 - awareness of employer policies
 - ii. managing e-mail
 - using folders
 - deleting, forwarding, replying
 - iii. adding attachments to e-mail

- iv. view e-mail attachments
 - v. printing e-mail
9. Describe computer use for online learning.
- i. online training
 - ii. level exams
 - iii. study guides
 - iv. practice exams

Practical Requirements:

1. Create, save and print a document using word processing software.
2. Create, save and print a document using spreadsheet software.
3. Send and receive an e-mail with an attachment.

AP1102 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: 12 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with apprenticeship.
 - i. apprentice
 - ii. registered apprentice
 - iii. trade qualifier
 - iv. journey person
 - v. certified journey person
 - vi. Certificate of Apprenticeship
 - vii. Certificate of Qualification
 - viii. dual certification
 - ix. compulsory trades

2. Explain the roles and responsibilities of those involved in the apprenticeship system in Newfoundland and Labrador.
 - i. registered apprentice
 - ii. training institution
 - iii. employer
 - iv. journey person
 - v. mentor
 - vi. Department of Advanced Education, Skills and Labour
 - Industrial Training section
 - Standards and Curriculum section
 - vii. Provincial Trade Advisory Committees (PTAC)
 - viii. Provincial Apprenticeship and Certification Board (PACB)

3. Describe the training components of an apprenticeship.
 - i. in-school
 - Pre-Employment / Level I

- advanced levels
 - ii. workplace experience
4. Explain the steps in the registered apprenticeship process.
- i. meet entrance requirements
 - education
 - employment
 - Recognition of Prior Learning (RPL) - if applicable
 - ii. complete the registration process
 - application
 - required documents
 - iii. complete the Memorandum of Understanding (MOU)
 - contract responsibilities
 - probation period
 - cancellation
 - iv. maintain Record of Occupational Progress (Logbook)
 - sign off skills
 - record hours
 - update Apprenticeship Program Officer (APO) on progress
 - v. class calls
 - hour requirements
 - EI eligibility
 - training schedule
 - vi. level examinations - if applicable
 - vii. progression schedule
 - apprenticeship level
 - wage rates
 - viii. certification examinations
 - Provincial
 - Interprovincial
 - written
 - practical - if applicable
 - ix. certification
 - Certificate of Apprenticeship
 - Certificate of Qualification
 - Provincial journeyperson - Blue Seal
 - Interprovincial journeyperson - Red Seal endorsement (RSE)
5. Identify the Conditions Governing Apprenticeship.
6. Discuss cancellation of apprenticeship.
- i. failure to notify of address change
 - ii. extended periods of unemployment
 - iii. lack of contact with an APO for an extended period
 - iv. failure to respond to class calls

- v. declining of multiple class calls
7. Explain the Interprovincial Standards Red Seal program.
 - i. designated Red Seal trades
 - ii. the Red Seal Occupational Standard (RSOS)
 - iii. relationship of RSOS to IP examination
 - iv. national qualification recognition and mobility
 8. Identify the current financial incentives available to apprentices.
 - i. Federal
 - ii. Provincial
 9. Explain the Provincial / Territorial Apprentice Mobility Guidelines.
 - i. temporary mobility
 - ii. permanent mobility
 10. Describe Atlantic and National Harmonization initiatives.

Practical Requirements:

1. Use the Provincial Apprenticeship and Trades Certification website at www.gov.nl.ca/atcd.
 - i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
 - ii. locate the address of the Industrial Training office closest to this campus
 - iii. locate the training schedule and identify the start date of the next class call for this trade
 - iv. locate and review the learning resources applicable to this trade
 - Study Guide
 - Exam Preparation Guide
 - Plan of Training
2. Use the Plan of Training applicable to this trade.
 - i. locate the hours for the trade
 - total in-school
 - total required for certification
 - ii. locate the number of levels
 - iii. locate the courses in each level
 - iv. locate the hours required for progression to a Level II apprentice and the wage percentage of that level

Level II

AST-200 Cooling Systems

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify types of cooling systems, and describe their purpose, characteristics and applications.
 - i. liquid
 - ii. air cooled
2. Identify cooling system components, and describe their purpose and operation.
 - i. radiators
 - ii. hoses
 - iii. thermostats
 - iv. water pumps
3. Identify warning systems and indicators, and describe their purpose and operation.
 - i. lights
 - ii. gauges
 - iii. audible
4. Identify types of fan systems, and describe their components and operation.
 - i. mechanical
 - ii. electric
 - iii. hydraulic
5. Identify related systems, and describe their relationship to cooling systems.
 - i. heating, ventilation and air conditioning (HVAC)
 - ii. coolers and auxiliary coolers
 - iii. coolant heaters
6. Identify types of coolants and chemical additives, and describe their

- characteristics and applications.
7. Describe the procedures used to bleed, flush and dispose of coolants according to jurisdictional regulations.
 8. Identify types of hoses, tubing, belts, gaskets, seals and sealants, and describe their applications.
 9. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - pressure testers
 - coolant strength testers
 - infrared temperature guns
 - scan tools
 - ii. repair
 - automated refill devices
 - tension gauges
 10. Describe the procedures used to diagnose and repair cooling systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
 11. Describe the procedures used to remove and reinstall cooling system components.
 12. Describe the procedures used repair cooling systems.
 13. Describe the procedures used to verify the repair.

Practical Requirement(s):

1. Perform a coolant system pressure test.

AST-205 Engine Lubrication Systems

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisites(s): Pre-Employment or AACCS Level I

Objectives and Content:

1. Identify types of engine lubricants, and describe their characteristics and applications.
 - i. grades and classifications
 - ii. synthetics
 - iii. additives
2. Identify types of oil pumps, and describe their purpose and operation.
 - i. rotor
 - ii. vane
 - iii. gear
3. Identify types of oil coolers, and describe their purpose and operation.
 - i. oil-to-air
 - ii. oil-to-coolant
4. Identify types of hoses, tubing, gaskets, seals and sealants and describe their applications.
5. Describe oil flow, filtration and pressure regulation.
6. Identify types of warning systems and indicators, and describe their purpose and operation.
 - i. lights
 - ii. gauges
 - iii. audible
7. Identify testing procedures for checking oil contaminants.

8. Identify lubrication requirements related to superchargers and turbochargers.
9. Identify related systems and describe the relationship to lubrication systems.
 - i. engine assembly
 - ii. galleries and clearances
10. Describe the procedures used to diagnose engine lubrication systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
11. Describe the procedures used to repair engine lubrication systems.
12. Describe the procedures used to verify the repair.

Practical Requirement(s):

None.

AST-210 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: 12 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify types of accessory drive systems, and describe their components and operation.
 - i. belt tension/tensioners
 - ii. belts
 - iii. drives
 - electric
 - hydraulic
 - gear
 - pulley
2. Identify related components, and describe their relationship to accessory drive systems.
 - i. water pumps
 - ii. alternators
 - iii. AC compressors
 - iv. power steering pumps
 - v. supercharger

3. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - pyrometer
 - laser alignment
 - straight edges
 - electronic vibration analyzers
 - stethoscopes
 - ii. repair
 - tension relief devices
 - pullers
 - belt installers

4. Describe the procedures used to diagnose and repair accessory drive systems and components.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause

5. Describe the procedures used to reinstall and adjust accessory drive systems and their components.

6. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-215 Engine Repair

Learning Outcomes:

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

Duration: 42 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to engine repair.
2. Identify types and sources of engine problems.
 - i. low power
 - ii. smoke
 - iii. oil consumption
 - iv. fluid contamination
 - v. rough running
 - vi. internal/external leaks
 - vii. noises
 - viii. vibrations
3. Identify types of engine mounts, and describe their construction and applications.
4. Identify types of fasteners, gaskets, seals and sealants, and describe their applications and procedures for use.
5. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - vacuum gauges
 - compression gauges
 - straight edges
 - stethoscopes
 - scan tools
 - plastic precision clearance gauges
 - ii. repair
 - torque angle gauge

6. Describe the procedures used to diagnose engine problems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
7. Describe the procedures used to remove, repair and reassemble engines.
8. Describe the procedures used to adjust, repair and/or replace engine components.
9. Describe the procedures used to verify the repair.

Practical Requirements:

1. Diagnose mechanical engine problems.

AST-220 Starting Systems

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to starting systems.
 - i. battery explosions
 - ii. corrosive materials
 - iii. high voltage
2. Identify types of starting systems, and describe their components and operation.
3. Identify types of control systems, and describe their components and operation.
 - i. anti-theft/immobilizer
 - ii. safety interlock devices
4. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
5. Describe the procedures used to diagnose starting systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
6. Describe the procedures used to remove and reinstall starting system components.

7. Describe the procedures used to adjust, repair and/or replace starting system components.
8. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-225 Charging Systems

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisite(s): Pre-Employment or AACCS Level I

Objectives and Content:

1. Identify safety considerations pertaining to charging systems.
2. Identify types of charging systems, and describe their components and operation.
3. Identify types of control systems, and describe their components and operation.
4. Identify warning indicators.
5. Describe the relationship of charging system to the vehicle networking system.
6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
7. Describe the procedures used to diagnose charging systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
8. Describe the procedures used to remove and reinstall charging system components.
9. Describe the procedures used to adjust, repair and/or replace charging system

components.

10. Describe the procedures used to verify the repair.

Practical Requirements:

1. Perform a charging system test.

AST-230 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: 18 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to lighting and wiper systems.
 - i. lamps (high intensity discharge (HID))
 - ii. pinch points
2. Identify jurisdictional requirements pertaining to lighting and wiper systems.
3. Identify types of lighting systems, and describe their components and operation.
 - i. electrically-controlled
 - ii. electronically-controlled
4. Identify types of wiper systems, and describe their components and operation.
 - i. electrically-controlled
 - ii. electronically-controlled
5. Describe the relationship of lighting and wiper systems to the vehicle networking system.
6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - digital multimeters
 - scan tools
 - circuit testers
 - ii. repair
 - reprogramming equipment

7. Describe the procedures used to diagnose lighting and wiper systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
8. Describe the procedures used to remove and reinstall lighting and wiper system components.
9. Describe the procedures used to adjust, repair and/or replace lighting and wiper system components.
10. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-235 Steering Systems II

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to electronically-controlled steering systems.
 - i. accidental deployment of passive restraints
 - air bags
 - clock springs
 - ii. collapsible columns
2. Identify types of electronic control steering systems, and describe their components and operation.
3. Identify related systems, and describe their relationship to steering systems.
 - i. lane departures
 - ii. park-assist
 - iii. collision avoidance
4. Identify types of variable-assist steering systems, and describe their components and operation.
5. Describe steering geometry.
 - i. alignment angles
 - ii. Ackerman principle
6. Describe the procedures used to diagnose and perform wheel alignment.
7. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.

8. Describe the procedures used to diagnose electronically-controlled steering systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
9. Describe the procedures used to remove and reinstall electronically-controlled steering system components.
10. Describe the procedures used to adjust, repair and/or replace electronically-controlled steering system components.
11. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-240 Suspension Systems II

Learning Outcomes:

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

Duration: 24 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify types of electronically-controlled suspension systems, and describe their components and operation.
 - i. ride control
 - ii. height control
2. Describe suspension geometry.
 - i. alignment angles
 - ii. Ackerman principle
3. Describe the procedures used to diagnose electronically-controlled suspension systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
4. Describe the procedures used to diagnose wheel alignment.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes

5. Describe the procedures used to remove and reinstall electronically-controlled suspension systems components.
6. Describe the procedures used to adjust, repair and/or replace electronically-controlled suspension systems components.
7. Describe the procedures used to perform wheel alignment
8. Describe the procedures used to reset steering sensors.
9. Describe the procedures used to verify the repair.

Practical Requirements:

1. Perform a wheel alignment.

AST-245 Braking Systems II

Learning Outcomes:

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

Duration: 24 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to anti-lock braking systems and their components.
 - i. hydraulic pressure
 - ii. airborne contaminants
 - iii. high voltage systems
2. Identify types of anti-lock braking systems, and describe their components and operation.
3. Identify types of braking systems in hybrid and electric vehicles (EV).
4. Identify types of trailer brakes and controls, and describe their components and operation.
 - i. surge
 - ii. electric
 - iii. electric-hydraulic
5. Identify types of control systems, and describe their components and operation.
 - i. traction control system (TCS)
 - ii. anti-lock brake system (ABS)
 - iii. stability control
 - iv. adaptive cruise control
6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.

7. Describe the procedures used to diagnose anti-lock braking systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
8. Describe the procedures used to flush and bleed anti-lock brakes.
9. Describe the procedures used to adjust, repair and/or replace anti-lock braking system components.
10. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-250 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: 36 Hours

Pre-Requisite(s): Pre-Employment or AACCS Level I

Objectives and Content:

1. Identify safety considerations pertaining to manual transmissions and transaxles.
 - i. exposed rotating parts
 - ii. pinch points
 - iii. lifting and support procedures
2. Identify types of manual transmissions and transaxles and describe their components and operation.
3. Explain manual transmissions/transaxles power flow.
4. Describe gear ratios, their purpose and calculation.
5. Identify types of lubricants, fasteners, gaskets, seals and sealants, and describe their applications.
6. Identify types of engine and driveline mounts, their construction and applications.
7. Identify related systems, and describe their relationship to manual transmissions and transaxles.
 - i. clutches
 - ii. flywheels
 - single mass
 - dual mass
 - iii. mounts

8. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - chassis ears
 - stethoscopes
 - scan tools
 - ii. repair
 - measuring tools
 - presses
 - pullers
 - lifting and support equipment
9. Describe the procedures used to diagnose manual transmissions and transaxles.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
10. Describe the procedures used to remove and reinstall manual transmissions and transaxles.
11. Describe the procedures used to replace engine and driveline mounts.
12. Describe the procedures used to adjust, repair and/or replace manual transmissions and transaxles and their related components.
13. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-255 Clutches

Learning Outcomes:

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

Duration: 6 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to clutch systems.
 - i. airborne contaminants
 - ii. pinch points
 - iii. exposed rotating parts
 - iv. lifting and support procedures
2. Identify types of clutches, and describe their components and operation.
3. Identify types of flywheels, and describe their components and operation.
4. Identify mechanical and hydraulic clutch actuating systems, and describe their components and operation.
5. Identify types of fluids, fasteners, tubing, hoses and seals, and describe their applications.
6. Describe clutch system power flow.
7. Identify related systems, and describe their relationship to clutch systems.
 - i. engine
 - ii. manual transmission
 - iii. drive shaft and axles

8. Identify diagnostic and repair tools and equipment and describe their applications and procedures for use.
 - i. diagnostic
 - measuring tools
 - ii. repair
 - alignment
 - pullers
 - lifting and support equipment

9. Describe the procedures used to diagnose clutches.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause

10. Describe the procedures used to remove and reinstall clutches.

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

12. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-260 Final Drive Assemblies

Learning Outcomes:

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

Duration: 18 Hours

Pre-Requisite(s): Pre-Employment or AACS Level I

Objectives and Content:

1. Identify safety considerations pertaining to final drive assemblies.
 - i. exposed rotating parts
 - ii. pinch points
 - iii. lifting and supporting procedures
2. Identify types of final drive assemblies, and describe their components and operation.
 - i. locking
 - ii. all wheel drive
 - iii. integral
 - iv. removable
 - v. limited slip
 - vi. torque distribution
3. Identify related systems, and describe their relationship to final drive assembly.
 - i. transmissions
 - ii. drivelines
 - iii. mounts
4. Identify types of control systems, and describe their components and operation.
 - i. electronically-controlled/electric
 - ii. vacuum
 - iii. mechanical
5. Describe final drive assembly power flow.
6. Describe gear ratios, their purpose and calculations.

7. Identify types of lubricants, fasteners, gaskets, seals and sealants, and describe their applications.
8. Identify diagnostic and repair tools and equipment pertaining to final drive assemblies, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - measuring tools
 - chassis ears
 - ii. repair
 - presses
 - pullers
 - lifting and support equipment
 - gear marking compound
9. Describe the procedures used to diagnose final drive assembly.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
10. Identify tests used to diagnose final drive assembly.
 - i. road test
 - ii. sensory inspection
 - iii. bearing inspection
 - iv. gear tooth patterns
 - v. backlash
11. Describe the procedures used to remove and reinstall final drive assemblies.
12. Describe the procedures used to adjust, repair and/or replace final drive assemblies and their related components.
13. Describe the procedures used to verify the repair.

Practical Requirements:

None.

Level III

AST-300 Transfer Cases

Learning Outcomes:

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

Duration: 24 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify safety considerations pertaining to transfer cases.
 - i. pinch points
 - ii. exposed rotating components
 - iii. lifting and support procedures
2. Identify types of transfer cases/power transfer unit, and describe their components and operation.
 - i. part-time
 - ii. full-time
 - iii. automatic
3. Identify types of all-wheel drive (AWD) systems, their components and operation.
4. Identify related systems, and describe their relationship to transfer cases.
 - i. transmissions
 - ii. locking hubs
 - iii. axle disconnects
5. Identify types of control systems, and describe their components and operation.
 - i. vacuum
 - ii. manual
 - iii. electronic
6. Describe transfer case power flow .
7. Describe gear ratios, their purpose and calculations.

8. Identify types of lubricants, fasteners, gaskets, seals and sealants, and describe their applications.
9. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
10. Describe the procedures used to diagnose transfer cases.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
11. Describe the procedures used to remove and reinstall transfer cases.
12. Describe the procedures used to adjust, repair and/or replace transfer cases and their related components.
13. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-305 Gasoline Fuel Delivery and Injection Systems

Learning Outcomes:

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

Duration: 24 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify safety precautions pertaining to gasoline fuel delivery and injection systems.
 - i. high pressure
 - ii. flammability
2. Identify the types of gasoline fuel delivery and injection systems, and describe their components and operation.
 - i. fuel pumps and supply systems
 - ii. gasoline direct injection
 - iii. port injection systems
3. Identify types of tubing, hoses, gaskets, seals and sealants, and describe their applications.
4. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - fuel pressure gauges
 - scan tools
 - vacuum gauges
 - DMMs
 - oscilloscope
 - ii. repair
 - fuel transfer and storage equipment
 - fuel injector cleaning equipment

5. Describe the procedures used to diagnose and repair gasoline fuel delivery and injection systems and their components.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
6. Describe the procedures used to remove and reinstall gasoline fuel delivery and injection system components.
7. Describe the procedures used to adjust, calibrate, repair and/or replace gasoline fuel delivery and injection system components.
8. Describe the procedures used to verify the repair.

Practical Requirements:

1. Perform fuel pressure check.

AST-310 Gasoline Ignition Systems

Learning Outcomes:

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

Duration: 24 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify safety considerations pertaining to ignition systems.
 - i. high voltage
 - ii. high temperature
2. Identify types of ignition systems, and describe their components and operation.
 - i. distributor
 - ii. distributor-less
3. Identify the types of ignition circuits, and describe their purpose and operation.
 - i. primary
 - ii. secondary
 - iii. control
4. Identify related systems, and describe their relationship to ignition systems and their components.
 - i. fuel
 - ii. exhaust
 - iii. air intake
 - iv. engine
5. Identify warning systems and indicators.
 - i. check engine light
 - ii. driver information centre (DICs)
6. Identify ignition concerns.
 - i. hesitation
 - ii. misfire
 - iii. lag
 - iv. timing

- v. detonation
 - vi. pre-ignition
7. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
- i. diagnostic
 - oscilloscopes
 - digital multimeters (DMMs)
 - scan tools
 - spark testers
 - ii. repair
 - scan tools
 - gauges
 - timing light
8. Describe the procedures used to diagnose and repair ignition systems.
- i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
9. Describe the procedures used to remove and reinstall ignition system components.
10. Describe the procedures used to adjust, calibrate, repair and/or replace ignition system components.
11. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-315 Vehicle Networking Systems

Learning Outcomes:

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

Duration: 60 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Explain basic computer operation and its relationship to vehicle networking systems.
2. Identify on-board diagnostic (OBD) systems and describe their components and operation.
3. Identify types of network protocols and describe their purpose.
 - i. International Standards Organization (ISO)
 - ii. high speed (HS)
 - iii. controller area network (CAN)
4. Describe the networking of modules and multiplexing.
 - i. wiring designs
 - ii. wireless
5. Identify and interpret data.
 - i. inputs
 - ii. processing
 - iii. outputs
6. Identify and interpret diagnostic trouble codes (DTC).
7. Identify the parameters of inputs and outputs, and describe their relationships.

8. Identify methods used to access, transfer and reprogram software, and describe their associated procedures.
 - i. CD/DVD
 - ii. internet
 - iii. scan tool
 - iv. programmable read only memory (PROM)

9. Identify types of diagnostic and repair tools and equipment used to diagnose network and electronic circuitry, and describe their applications and procedures for use.
 - i. digital multimeters (DMM)
 - ii. scopes
 - iii. probes
 - iv. break out boxes
 - v. scan tools

10. Describe the procedures used to diagnose vehicle networking systems and components.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause

11. Describe the procedures used to repair and/or replace vehicle networking systems and their components.

12. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-320 Gasoline 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: 24 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify types of on-board diagnostic systems and describe their applications.
2. Identify types of emission gases and how they are formed.
 - i. carbon monoxide (CO)
 - ii. carbon dioxide (CO²)
 - iii. oxides of nitrogen (NO_x)
 - iv. hydro carbon (HC)
 - v. oxygen (O²)
3. 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. engine temperature (thermostat)
4. Identify emission control system monitors, and describe their components and operation.

5. Identify related systems, and describe their relationship to emission control systems.
 - i. exhaust
 - ii. intake
 - iii. fuel
6. Identify warning systems and indicators.
 - i. check engine light
 - ii. driver information centre (DIC)
7. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
8. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - smoke generators
 - EVAP leak detectors
 - gas analyzers
 - digital multimeters (DMM)
 - ii. repair
 - cleaning and service tools
 - reprogramming equipment
9. Describe the procedures used to diagnose emission control systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
10. Describe the procedures used to repair and service emission control systems.
11. Describe the procedures used to remove and reinstall emission control system components.
12. Describe the procedures used to adjust, repair and/or replace emission control system components.
13. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-325 Gasoline Intake and Exhaust Systems

Learning Outcomes:

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

Duration: 18 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify safety considerations related to intake and exhaust systems.
2. Identify types of intake air systems, and describe their components and operation.
 - i. forced air
 - ii. naturally aspirated (NA)
3. Identify the types of exhaust systems, and describe their components and operation.
 - i. single
 - ii. dual
4. Identify types and sources of intake and exhaust system problems.
 - i. leaks
 - ii. blockages
 - iii. noise
 - iv. vibration
5. Identify the types of fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
6. Identify related systems, and describe their relationship to intake and exhaust systems.
 - i. emissions
 - ii. lubricating
 - iii. fuel delivery

7. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - vacuum gauges
 - exhaust back pressure gauges
 - smoke generators
 - gas analyzers
 - ii. repair
 - torches
 - welders
 - timing light

8. Describe the procedures used to diagnose and repair intake and exhaust systems and their components.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause

9. Describe the procedures used to remove and reinstall intake and exhaust system components.

10. Describe the procedures used to adjust/calibrate, repair and/or replace intake and exhaust system components.

11. Describe the procedures used to perform oil changes and clean supercharger and turbocharger systems.

12. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-330 Electrical Options and Accessories

Learning Outcomes:

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

Duration: 30 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Identify safety considerations pertaining to electrical options and accessories.
2. Identify types of electrical options and accessories, and describe their components and operation.
 - i. power options
 - windows
 - mirrors
 - seats
 - door locks
 - ii. theft deterrents
 - iii. remote starter
 - iv. seat heating and/or cooling
 - v. cruise control
3. Describe the relationship of vehicle options to the vehicle networking system.
4. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
5. Describe the procedures used to diagnose electrical options and accessories.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and root cause

6. Describe the procedures used to install, adjust, calibrate, repair and/or replace electrical options and accessories.
7. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-335 Motor Vehicle Inspection

Learning Outcomes:

- Demonstrate knowledge of jurisdictional motor vehicle inspections and their purpose.
- Demonstrate knowledge of the procedures used to perform provincial motor vehicle inspections.

Duration: 6 Hours

Pre-Requisite(s): Level II

Objectives and Content:

1. Explain the purpose of a provincial motor vehicle inspection.
2. Identify individuals and authorities involved with provincial motor vehicle inspections, and explain their role, responsibilities and liabilities.
 - i. vehicle owner
 - ii. journey person
 - iii. shop owner
 - iv. government
3. Identify jurisdictional requirements pertaining to motor vehicle inspections.
 - i. inspection instructions
 - ii. specifications and tolerances
 - iii. documentation
 - inspection forms
 - rejection stickers
 - inspection stickers
4. Describe the procedures used to perform a provincial motor vehicle inspection.
 - i. vehicles
 - ii. trailers

Practical Requirements:

None.

Level IV

AST-400 Mentoring

Learning Outcomes:

- Identify, explain and demonstrate strategies for learning skills in the workplace.
- Identify, explain and demonstrate strategies for teaching workplace skills.

Duration: 6 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Describe the importance of individual experience.
2. Describe the shared responsibilities for workplace learning.
3. Identify different ways of learning and determine one's own learning preferences, and explain how these relate to learning new skills.
4. Describe the importance of different types of skills in the workplace.
5. Describe the importance of essential skills in the workplace.
6. Identify different ways of learning.
7. Identify different learning needs and strategies to meet learning needs.
 - i. learning disabilities
 - ii. learning preferences
 - iii. language proficiency
8. Identify strategies to assist in learning a skill.
 - i. understanding the basic principles of instruction
 - ii. developing coaching skills
 - iii. being mature and patient
 - iv. providing feedback
9. Identify different roles played by a workplace mentor.
10. Describe the steps involved in teaching skills.

11. Explain the importance of identifying the point of a lesson.
12. Identify how to choose the effective time to present a lesson.
13. Explain the importance of linking the lessons.
14. Identify the components of the skill (the context).
15. Describe considerations in setting up opportunities for skill practice.
16. Explain the importance of providing feedback.
17. Identify techniques for giving effective feedback.
18. Describe a skills assessment.
19. Identify methods of assessing progress.
20. Explain how to adjust a lesson to different situations.

Practical Requirements:

None.

AST-405 Diesel Fuel Delivery and Injection Systems

Learning Outcomes:

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

Duration: 18 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations pertaining to diesel fuel delivery systems.
 - i. high pressure fuel
 - ii. high injector voltage
 - iii. diesel fuel contamination (bacteria)
2. Identify types of diesel fuel delivery and injection systems, and describe their components and operation.
 - i. direct injection
 - ii. indirect injection
 - iii. mechanical
 - iv. hydraulic
 - v. electronic
 - vi. common rail systems
3. Explain hydraulic principles related to diesel fuel injection systems.
 - i. Pascal's Law
4. Identify types of tubing, hoses, gaskets, seals and sealants, and describe their applications.
5. Identify the types of starting aids, and describe their purpose and operation.
 - i. glow plugs
 - ii. intake heaters
 - iii. coolant heaters
 - iv. fuel heaters
6. Identify methods to test fuel quality, and describe their associated procedures.

7. Identify related systems, and describe their relationship to diesel fuel delivery and injection systems.
8. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - fuel pressure gauges
 - scan tools
 - vacuum gauges
 - digital multimeters (DMM)
 - injector test bench
 - fuel pressure gauges
 - ii. repair
 - fuel transfer
 - storage equipment
 - reprogramming equipment
9. Describe the procedures used to diagnose and repair diesel fuel delivery and injection systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
10. Describe the procedures used to remove and reinstall diesel fuel delivery and injection system components.
11. Describe the procedures used to adjust, repair and/or replace diesel fuel delivery and injection system components.
12. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-410 Diesel Emission Control Systems

Learning Outcomes:

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

Duration: 18 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations related to diesel emission control systems.
 - i. corrosive diesel exhaust fluid
 - ii. high temperature
2. Identify diesel emissions and how they are formed.
 - i. carbon monoxide (CO)
 - ii. carbon dioxide (CO²)
 - iii. oxides of nitrogen (NO_x)
 - iv. hydro carbon (HC)
 - v. oxygen (O²)
 - vi. sulfur dioxide (SO₂)
 - vii. particulates
3. Identify warning systems and indicators.
 - i. check engine light
 - ii. air filter restriction indicator
 - iii. water in fuel light
 - iv. driver information centre

4. Identify diesel emission control systems, and describe their components and operation.
 - i. exhaust gas recirculation (EGR)
 - ii. evaporative emission control systems (EVAP)
 - iii. positive crankcase ventilation (PCV)
 - iv. variable cam-timing (VCT)
 - v. exhaust emissions
 - selective catalyst reduction (SCR)
 - diesel emission fluid (DEF)
 - diesel oxidation catalyst (DOC)
 - diesel particulate filter (DPF)
 - diesel regeneration process
5. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - manometer
 - smoke generators
 - leak detectors
 - digital multimeters (DMM)
 - opacity meter
 - refractometer
 - ii. repair
 - reprogramming equipment
7. Describe the procedures used to diagnose diesel emission control systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
8. Describe the procedures used to repair and service emission control systems.
9. Describe the procedures used to remove and reinstall diesel emission control system components.
10. Describe the procedures used to adjust, repair and/or replace diesel emission control system components.

11. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-415 Diesel Intake and Exhaust Systems

Learning Outcomes:

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

Duration: 6 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations related to diesel intake and exhaust systems.
 - i. extreme temperature
 - ii. exhaust fumes
2. Identify types of diesel intake and exhaust systems, and describe their components and operation.
 - i. turbocharged
 - ii. supercharged
3. Identify types and sources of intake and exhaust system problems.
 - i. leaks
 - ii. blockages
 - iii. noise
 - iv. vibration
4. Identify the types of fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
5. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - vacuum gauges
 - exhaust back pressure gauges
 - smoke generators
 - pyrometers
 - ii. repair
 - reprogramming equipment

6. Describe the procedures used to diagnose and repair diesel intake and exhaust systems and their components.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
7. Describe the procedures used to remove and reinstall diesel intake and exhaust system components.
8. Describe the procedures used to adjust, repair and/or replace diesel intake and exhaust system components.
9. Describe the procedures used to perform decarbonization of turbocharger systems.
10. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-420 Entertainment Systems

Learning Outcomes:

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

Duration: 15 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations pertaining to entertainment systems.
 - i. accidental restraint system deployment
 - ii. electro static discharge
2. Identify types of entertainment systems, and describe their components of operation.
 - i. audio
 - ii. video
 - iii. wireless/handsfree/bluetooth
3. Describe the relationship of the entertainment system to the vehicle networking system.
4. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - digital multimeters (DMM)
 - scan tools
 - circuit testers
 - ii. repair
 - scan tools
 - specialized tools
5. Describe the procedures used to diagnose entertainment systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes

- iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
6. Describe the procedures used to adjust, repair and/or replace entertainment systems.
7. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-425 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: 15 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations pertaining to instrumentation and information displays.
 - i. accidental restraint deployment
 - ii. electric static discharge
2. Identify jurisdictional requirements pertaining to instrumentation and information displays.
 - i. odometer servicing
3. Identify types of instrumentation displays, and describe their components and operation.
 - i. gauges
 - ii. warning indicators
 - iii. digital
 - iv. analogue
4. Identify types of information systems, and describe their purpose and operation.
 - i. back-up camera
 - ii. navigation systems
 - iii. driver information centre (DIC)
 - iv. heads-up display
 - v. adaptive cruise control
5. Describe the relationship of instrumentation and information displays to the vehicle networking system.

6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - digital multimeters
 - scan tools
 - circuit testers
 - ii. repair
 - reprogramming equipment
7. Describe the procedures used to diagnose instrumentation and information displays.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
8. Describe the procedures used to remove and reinstall instrumentation and information displays and their related components.
9. Describe the procedures used to adjust, repair and/or replace instrumentation and information displays and their related components.
10. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-430 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: 24 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations related to restraint systems.
 - i. handling
 - ii. storage
 - iii. disposal
 - iv. manufacturers' protocols
2. Identify jurisdictional requirements pertaining to restraint systems.
 - i. recycle and disposal
 - ii. repair
 - iii. motor vehicle inspection
3. Identify types of restraint systems, and describe their operation.
 - i. active
 - ii. passive
4. Identify restraint system components, and describe their purpose and operation.
 - i. seatbelts
 - ii. steering column (collapsible)
 - iii. clock spring
 - iv. occupant classification system (OCS)
 - v. airbags (pyrotechnic and hybrid)
 - vi. crash sensor
 - vii. control modules
 - viii. safing sensor (accelerometer)
 - ix. buckles
 - x. retractors
 - xi. pre-tensioner systems
 - xii. seat belt track
 - xiii. seat belt covers

5. Identify types of restraint system monitoring and warning systems and describe their purpose.
 - i. chimes
 - ii. lights
 - iii. driver information centre (DIC)

6. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tools
 - simulators
 - digital multimeters (DMM)
 - ii. repair
 - scan tools

7. Describe the procedures used to diagnose and repair restraint systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause

8. Describe the procedures to remove and reinstall restraint systems.

9. Describe the procedures to adjust, repair and/or replace restraint systems.

10. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-435 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: 48 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations pertaining to automatic transmissions/transaxles.
 - i. exposed rotating parts
 - ii. pinch points
 - iii. lifting and support procedures
2. Identify types of automatic transmissions and transaxles, and describe their components and operation.
3. Identify types of alternate transmissions and transaxle designs.
 - i. constant variable transmission (CVT)
 - ii. dual clutch transmission (DCT)
4. Explain hydraulic principles related to automatic transmissions and transaxles.
 - i. Pascal's law
5. Explain automatic transmissions and transaxles power flow.
6. Interpret electric and hydraulic schematics.
7. Describe gear ratios, their purpose and perform calculations.
8. Describe gear designs, and explain their purpose and operation.
 - i. simple planetary gear set
 - ii. compound planetary gear set

- 9 Identify types of lubricants, fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
10. Identify warning systems and indicators.
- i. driver information centre (DIC)
 - ii. instrument panel cluster (IPC)
 - iii. check engine light
 - iv. transmission control module light
11. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
- i. diagnostic
 - pressure gauges
 - scan tools
 - reprogramming equipment
 - measuring tools
 - ii. repair
 - reprogramming equipment
 - measuring tools
 - presses
 - pullers
 - lifting and support equipment
12. Describe the procedures used to diagnose automatic transmissions and transaxles.
- i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
13. Describe the procedures used to remove and reinstall automatic transmissions and transaxles.
14. Describe the procedures used to adjust, repair and/or replace automatic transmissions and transaxles and their related components.
15. Describe the procedures used to replace engine and driveline mounts.

16. Describe the procedures used to verify the repair.

Practical Requirements:

None.

AST-440 Heating, Ventilation and Air Conditioning Systems

Learning Outcomes:

- Demonstrate knowledge of air flow control systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair air flow control systems.
- Demonstrate knowledge of refrigerant systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair refrigerant systems.
- Demonstrate knowledge of heating systems, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair heating systems.

Duration: 30 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety considerations pertaining heating, ventilation, and air conditioning (HVAC) systems.
 - i. airborne contaminants
 - ii. mould spores
 - iii. handling of refrigerants
 - iv. pinch points
2. Identify jurisdictional requirements pertaining to refrigerants and lubricants.
 - i. handling and disposal
 - ii. storing and recycling
 - iii. heating
 - iv. Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) licensing and certification
3. Explain the principles of the refrigeration cycle.
4. Identify air flow control systems, their components and operation.
5. Identify types of refrigerants and lubricants, and describe their applications and procedures for use.

6. Identify refrigerant systems, and describe their components and operation.
 - i. orifice tube
 - ii. thermal expansion valve
7. Describe refrigerant systems specific to hybrid and electric vehicles.
8. Identify heating systems, and describe their components and operation.
9. Identify related systems, and describe their relationship to HVAC systems.
10. Identify types of fasteners, tubing, hoses, gaskets, seals and sealants, and describe their applications.
11. Identify types of diagnostic and repair tools and equipment, and describe their applications and procedures for use.
 - i. diagnostic
 - scan tool
 - manifold gauge set
 - charging station
 - pyrometer
 - ii. repair
 - reprogramming equipment
12. Describe the procedures used to identify, recover, recycle, evacuate and recharge refrigerant systems.
13. Describe the procedures used to diagnose HVAC systems.
 - i. verify concern
 - ii. perform sensory inspection
 - iii. retrieve diagnostic codes
 - iv. access service information
 - v. conduct tests and measurements
 - vi. isolate problem and identify root cause
14. Describe the procedures used to remove and reinstall air flow control system components.
15. Describe the procedures used to repair air flow control systems.
16. Describe the procedures used to remove and reinstall refrigerant system components.

17. Describe the procedures used to repair refrigerant systems.
18. Describe the procedures used to remove and reinstall heating system components.
19. Describe the procedures used to fill and bleed heating systems.
20. Describe the procedures used to repair heating systems.
21. Describe the procedures used to verify the repair.

Practical Requisites:

1. Conduct a performance test of an air conditioning (A/C) system.

AST-445 Hybrid and Electric Vehicle Systems

Learning Outcomes:

- Demonstrate knowledge of safety protocols for hybrid and electric vehicle systems.
- Demonstrate knowledge of operations of hybrid and electric vehicle systems.
- Demonstrate knowledge of diagnosing hybrid and electric vehicle systems.
- Demonstrates knowledge of repairing hybrid vehicle systems.
- Demonstrate knowledge of repairing electric vehicle systems.

Duration: 30 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Identify safety protocols pertaining to hybrid and EV systems.
 - i. high pressure
 - ii. flammability
 - iii. high voltage
 - iv. extreme cold temperatures

2. Identify types of alternate fuels and describe their characteristics and properties.
 - i. flex
 - ii. hydrogen
 - iii. bio-diesel
 - iv. liquid propane gas (LPG)
 - v. compressed natural gas (CNG)

3. Identify types of hybrid and alternate fuel vehicles and their related components.
 - i. hybrid
 - ii. electric
 - iii. fuel cell

5. Identify the function of hybrid and EV systems.

5. Identify methods for diagnosing hybrid and EV systems.

6. Identify methods for repairing hybrid vehicle systems.

7. Identify methods for repairing EV systems.

Practical Requirements:

None.

AST-450 Program Review

Learning Outcomes:

- Demonstrate knowledge of the Red Seal Occupational Standard (RSOS) and its relationship to the Interprovincial Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Examination.

Duration: 30 Hours

Pre-Requisite(s): Level III

Objectives and Content:

1. Define and explain terminology associated with an RSOS.
 - i. blocks
 - ii. tasks
 - iii. sub-tasks
2. Explain how an RSOS is developed and the link it has with the Interprovincial Red Seal Examination.
 - i. development
 - ii. validation
 - iii. block and task weighting
 - iv. examination breakdown (pie-chart)
3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Examination.
 - i. Red Seal website
 - ii. examination preparation guide
 - iii. sample questions
 - iv. examination counselling sheets
4. Explain the relationship between the RSOS and the Atlantic Apprenticeship Curriculum Standard (AACS).

5. Review common occupational skills for the Automotive Service Technician trade as identified in the RSOS.
 - i. safety
 - ii. tools and equipment
 - iii. fasteners, tubing, hoses and fittings
 - iv. hoisting and lifting
 - v. communication
 - vi. technical information
 - vii. communication and mentoring techniques
 - viii. vehicle maintenance inspection

6. Review process to diagnose and repair engine and engine support systems for the Automotive Service Technician trade as identified in the RSOS.
 - i. engines
 - ii. cooling systems
 - iii. engine lubrication systems
 - iv. accessory drive systems
 - v. gasoline and diesel fuel delivery and injection systems
 - vi. gasoline ignition systems
 - vii. gasoline and diesel emission control systems
 - viii. gasoline and diesel intake and exhaust systems

7. Review process to diagnose and repair vehicle module communications systems for the Automotive Service Technician trade as identified in the RSOS.
 - i. vehicle networking systems

8. Review process to diagnose and repair drive line systems for the Automotive Service Technician trade as identified in the RSOS.
 - i. drive shafts and axles
 - ii. manual transmissions and transaxles
 - iii. automatic transmissions and transaxles
 - iv. clutches and flywheels
 - v. final drive assemblies
 - vi. transfer cases

9. Review process to diagnose and repair electrical and comfort control systems for the Automotive Service Technician trade as identified in the RSOS.
 - i. electrical and electronic principles
 - ii. starting systems
 - iii. charging systems
 - iv. lighting and wiper systems
 - v. electrical options and accessories
 - vi. entertainment systems
 - vii. instrumentation and information displays
 - viii. heating, ventilation and air conditioning systems

10. Review process to diagnose and repair steering and suspension, braking, control systems, tires, hubs and wheel bearings for the Automotive Service Technician trade as identified in the RSOS.
 - i. tires, wheels, hubs and wheel bearings
 - ii. conventional and electronically-controlled steering systems
 - iii. conventional and electronically-controlled suspension systems
 - iv. ABS and non-ABS braking systems

11. Review process to diagnose and repair restraint systems, body components, accessories and trim for the Automotive Service Technician trade as identified in the RSOS.

12. Review process to diagnose and repair hybrid and electric vehicles (EV) for the Automotive Service Technician trade as identified in the RSOS.

Practical Requirements:

None.

C. 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 in Section 14.

5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria

Progression Schedule

| Automotive Service Technician-7200 Hours | | | |
|---|-----------|---|--------------------------|
| Apprenticeship Level and Wages | | | |
| Level | Wage Rate | Requirements for Progression to Next Level | Next Level |
| 1 st | 60 % | <ul style="list-style-type: none"> ▪ Completion of Pre-Employment training ▪ Registration as an apprentice ▪ Pass Level I exam* ▪ Minimum 1800 hours of combined relevant work experience and training | 2 nd Year |
| 2 nd | 70% | <ul style="list-style-type: none"> ▪ Completion of Level II training ▪ Pass Level II exam* ▪ Minimum 3600 hours of combined relevant work experience and training | 3 rd Year |
| 3 rd | 80% | <ul style="list-style-type: none"> ▪ Completion of Level III training ▪ Pass Level III exam* ▪ Minimum 5400 hours of combined relevant work experience and training | 4 th Year |
| 4 th | 90% | <ul style="list-style-type: none"> ▪ Completion of Level IV training ▪ Pass Level IV exam* ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam | Journeyman Certification |
| <p>Wage Rates</p> <ul style="list-style-type: none"> ▪ Rates are percentages of the prevailing journeyman'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. <p>*Level Exams This program may not currently contain level exams, in which case this requirement will be waived until such time as level exams are available.</p> | | | |

Automotive Service Technician-7200 Hours

| Class Calls (After Apprenticeship Registration) | | |
|---|--|--------------------------------------|
| Call Level | Requirements for Class Call | Hours awarded for In-School Training |
| Direct Entry Level I | <ul style="list-style-type: none"> ▪ Minimum of 1800 hours of relevant work experience ▪ Prior Learning Assessment (PLA) at designated college (if applicable) | 240 |
| Level II | <ul style="list-style-type: none"> ▪ Minimum of 3000 hours of relevant work experience and training | 240 |
| Level III | <ul style="list-style-type: none"> ▪ Minimum of 5000 hours of relevant work experience and training | 210 |
| Level IV | <ul style="list-style-type: none"> ▪ Minimum of 7000 hours of relevant work experience and training | 240 |

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 journeyman 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 journeyman supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyman 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, Skills and Labour within 30 days of the decision.

D. 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 10,800 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.

E. Roles and Responsibilities of Stakeholders in the Apprenticeship Process

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

The Apprentice:

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

The Employer:

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, 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, Skills and Labour.

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.