

COURSE ASA3400: BASIC TOOLS & MATERIALS

Level: First Period Apprenticeship, Group A

Prerequisite: None

Description: Students develop knowledge, skills and attitudes in the practice of workshop safety, communication and the use of specialty hand tools, measuring tools and fasteners.

Parameters: Access to a materials work centre, complete with basic measuring tools, specialty hand tools and fastening devices, and to instruction from an individual with specialized training and/or an automotive service technician.

ILM Resources: Communication – Part A 090101aA, Communication – Part B 090101aB, Measuring Tools 090101b, Specialty Hand Tools 090101c, Fastening Devices 090101d, Safety 090101e

Outcomes: The student will:

1. practise workshop safety at all times

- 1.1 identify key areas of responsibility that an employee has in regard to safety
- 1.2 demonstrate safe work habits related to:
 - 1.2.1 housekeeping
 - 1.2.2 electrical tools and rotating machinery
 - 1.2.3 flammable liquids and gases
 - 1.2.4 fire safety
 - 1.2.5 compressed air
 - 1.2.6 jacking and hoisting
- 1.3 demonstrate correct procedures for working with exhaust gases including:
 - 1.3.1 ventilation procedures
 - 1.3.2 emergencies
 - 1.3.3 wellness

2. communicate with customers and related tradespeople, using industry standard terms and units for parts and operations

- 2.1 name standard terms and units of measure for components and operations including:
 - 2.1.1 benefits
 - 2.1.2 common measurement terms
- 2.2 effectively communicate trade-related information with customers, e.g., difficult customers, suppliers and other tradespeople; use telephone communication

3. demonstrate the correct use of hand tools common to the trade

- 3.1 perform double and ISO tube flaring
- 3.2 demonstrate the following knowledge of drills and reamers:
 - 3.2.1 twist drills
 - 3.2.2 drill problems
 - 3.2.3 reamers
- 3.3 demonstrate correct use of taps and dies
- 3.4 demonstrate thread repair and broken fastener removal using:
 - 3.4.1 thread repair techniques
 - 3.4.2 broken stud and bolt removal

- 4. measure components, using measuring tools that are common to the trade**
 - 4.1 convert numbers between decimals and fractions by:
 - 4.1.1 converting fractions to decimals
 - 4.1.2 converting decimals to fractions
 - 4.2 perform linear measurements in imperial and SI units using:
 - 4.2.1 linear measurement
 - 4.2.2 calibrated measuring tools
 - 4.2.3 slide callipers
 - 4.2.4 transfer gauges
 - 4.3 demonstrate correct care and use of measuring tools including:
 - 4.3.1 basic care
 - 4.3.2 adjusting and calibrating vernier-type tools
 - 4.3.3 adjusting and calibrating micrometer-type tools
 - 4.4 perform torque measurements in imperial and SI units; e.g., measure torque
- 5. assemble components, using a variety of fasteners, adhesives and sealers common to the trade**
 - 5.1 identify and demonstrate fastening and torquing procedures using threaded fasteners:
 - 5.1.1 terminology
 - 5.1.2 types of threaded fasteners
 - 5.1.3 bolt grades/property classes
 - 5.1.4 bolt identification
 - 5.1.5 studs
 - 5.1.6 machine screws
 - 5.1.7 self-threading screws
 - 5.1.8 nuts
 - 5.1.9 washers
 - 5.1.10 use of torque wrenches
 - 5.2 demonstrate the use of other retaining devices including:
 - 5.2.1 snap rings and clips
 - 5.2.2 set screws
 - 5.2.3 keys
 - 5.2.4 splines
 - 5.2.5 pins
 - 5.3 demonstrate the use of sealers and adhesives common to the trade
- 6. demonstrate basic competencies**
 - 6.1 demonstrate fundamental skills to:
 - 6.1.1 communicate
 - 6.1.2 manage information
 - 6.1.3 use numbers
 - 6.1.4 think and solve problems
 - 6.2 demonstrate personal management skills to:
 - 6.2.1 demonstrate positive attitudes and behaviours
 - 6.2.2 be responsible
 - 6.2.3 be adaptable
 - 6.2.4 learn continuously
 - 6.2.5 work safely
 - 6.3 demonstrate teamwork skills to:
 - 6.3.1 work with others
 - 6.3.2 participate in projects and tasks
- 7. create a transitional strategy to accommodate personal changes and build personal values**
 - 7.1 identify short-term and long-term goals
 - 7.2 identify steps to achieve goals

COURSE ASA3405: ELECTRICAL FUNDAMENTALS

Level: First Period Apprenticeship, Group D

Prerequisite: ASA3400: Basic Tools & Materials

Description: Students identify and describe the operating principles and applications of electricity.

Parameters: Access to a materials work centre, complete with related battery tools, test equipment and electrical supplies, and to instruction from an individual with journey person certification as an automotive service technician.

ILM Resources: Electrical Fundamentals I 090106a, Fundamentals of Magnetism 090106c, Batteries 090106d

Outcomes: The student will:

1. apply scientific principles to explain basic electrical theory

- 1.1 explain the physical qualities of insulators, conductors and semi-conductors including:
 - 1.1.1 atoms and molecules
 - 1.1.2 conductors
 - 1.1.3 semi-conductors
 - 1.1.4 insulators
 - 1.1.5 conductor insulation
- 1.2 explain the following physical qualities and units of measure of electromotive force, current, resistance and power:
 - 1.2.1 voltage (electromotive force)
 - 1.2.2 resistance
 - 1.2.3 current (intensity of electron flow)
 - 1.2.4 electrical circuits
 - 1.2.5 electrical power
 - 1.2.6 electrical failures

2. apply scientific principles to explain the fundamentals of magnetism

- 2.1 explain magnetism and electromagnetism and their properties including:
 - 2.1.1 magnetism principles and properties
 - 2.1.2 magnetic fields
 - 2.1.3 permeability
 - 2.1.4 permanent magnetism
 - 2.1.5 electromagnetism
- 2.2 explain the construction and operation of electromagnetic coils including:
 - 2.2.1 electromagnets
 - 2.2.2 induction
 - 2.2.3 self-induction
 - 2.2.4 mutual induction
- 2.3 explain how magnetism or electromagnetism can be used to:
 - 2.3.1 change electrical energy into mechanical energy
 - 2.3.2 change mechanical energy into electrical energy

- 3. test, service and diagnose problems related to batteries**
 - 3.1 explain the purpose, construction, operation and ratings of batteries
 - 3.2 prepare, test and service batteries
 - 3.3 diagnose problems attributed to batteries
 - 3.4 perform battery charging and boosting operations
- 4. demonstrate basic competencies**
 - 4.1 demonstrate fundamental skills to:
 - 4.1.1 communicate
 - 4.1.2 manage information
 - 4.1.3 use numbers
 - 4.1.4 think and solve problems
 - 4.2 demonstrate personal management skills to:
 - 4.2.1 demonstrate positive attitudes and behaviours
 - 4.2.2 be responsible
 - 4.2.3 be adaptable
 - 4.2.4 learn continuously
 - 4.2.5 work safely
 - 4.3 demonstrate teamwork skills to:
 - 4.3.1 work with others
 - 4.3.2 participate in projects and tasks
- 5. create a transitional strategy to accommodate personal changes and build personal values**
 - 5.1 identify short-term and long-term goals
 - 5.2 identify steps to achieve goals

COURSE ASA3410: ELECTRICAL CIRCUITS & DIAGNOSIS

Level: First Period Apprenticeship, Group D

Prerequisites: ASA3400: Basic Tools & Materials
ASA3405: Electrical Fundamentals

Description: Students develop the necessary knowledge, skills and attitudes to identify the applications of electricity in circuits to solve electrical problems in a vehicle.

Parameters: Access to a materials work centre, complete with equipment, supplies and related resources, and to instruction from an individual with journey person certification as an automotive service technician.

ILM Resources: Electrical Circuits 090106b, Electrical Systems Diagnosis I 090106e, Introduction to Scan Tools 090107a

Outcomes: The student will:

1. solve problems related to automotive electrical systems

- 1.1 recognize common electrical symbols used in the trade
- 1.2 identify the three basic circuit types and their basic properties
- 1.3 identify and explain an open, shorted and grounded circuit
- 1.4 calculate, using Ohm's law, for any of its variables when two are known
- 1.5 apply Ohm's law to a circuit to calculate voltage, current and resistance, as well as determine the effects of circuit faults on a circuit:
 - 1.5.1 reading simple circuit diagrams
 - 1.5.2 calculating total resistance of circuits, parallel and series-parallel circuits
 - 1.5.3 applying Ohm's law to circuit diagrams
 - 1.5.4 diagnosing circuit faults
- 1.6 calculate electrical power and explain the implications of power requirements in circuit design
- 1.7 perform voltage drop and circuit resistance measurements, using a voltmeter to:
 - 1.7.1 test equipment
 - 1.7.2 check inputs
 - 1.7.3 measure voltage
- 1.8 perform parasitic drain and current draw tests, using an ammeter
- 1.9 measure electrical resistance, using an ohmmeter

2. test and repair simple electrical circuits

- 2.1 correctly use a voltmeter, an ammeter, an ohmmeter or a test light to identify a shorted, open or grounded electrical circuit by:
 - 2.1.1 testing devices
 - 2.1.2 determining the type of problem
 - 2.1.3 tracing circuit problems
- 2.2 perform a simple wire and connector circuit by:
 - 2.2.1 opening a wiring harness
 - 2.2.2 repairing wire
- 2.3 demonstrate an ability to master the hazards associated with electrostatic discharge and vehicle electronic systems

- 3. demonstrate a basic understanding of scan tools and their use**
 - 3.1 perform the basic functions of generic and original equipment manufacturer scan tools by:
 - 3.1.1 identifying a scan tool
 - 3.1.2 using a diagnostic connector
 - 3.1.3 connecting a scan tool
 - 3.1.4 entering vehicle information
 - 3.1.5 navigating menus
 - 3.1.6 using diagnostic trouble codes (DTC)
 - 3.1.7 erasing DTCs
 - 3.2 perform diagnostic and function tests on anti-lock brake systems (ABS) and restraint systems by using:
 - 3.2.1 a diagnostic approach
 - 3.2.2 service literature
 - 3.2.3 a supplemental inflatable restraint diagnosis
 - 3.2.4 an ABS diagnosis
- 4. demonstrate basic competencies**
 - 4.1 demonstrate fundamental skills to:
 - 4.1.1 communicate
 - 4.1.2 manage information
 - 4.1.3 use numbers
 - 4.1.4 think and solve problems
 - 4.2 demonstrate personal management skills to:
 - 4.2.1 demonstrate positive attitudes and behaviours
 - 4.2.2 be responsible
 - 4.2.3 be adaptable
 - 4.2.4 learn continuously
 - 4.2.5 work safely
 - 4.3 demonstrate teamwork skills to:
 - 4.3.1 work with others
 - 4.3.2 participate in projects and tasks
- 5. create a transitional strategy to accommodate personal changes and build personal values**
 - 5.1 identify short-term and long-term goals
 - 5.2 identify steps to achieve goals

COURSE ASA3415: FRAMES, SUSPENSION & STEERING LINKAGES

Level: First Period Apprenticeship, Group B

Prerequisite: ASA3400: Basic Tools & Materials

Description: Students develop the knowledge, skills and attitudes necessary to service and maintain vehicle frames, wheel hubs and tires, and suspension and linkage systems.

Parameters: Access to a materials work centre, complete with access to hand tools, specialized tools and related resources, and to instruction from an individual with journey person certification as an automotive service technician.

ILM Resources: Frames 090104a, Suspension and Steering Linkage Systems 090104b, Wheels, Hubs and Tires 090104c

Outcomes: The student will:

1. identify automotive frame damage

- 1.1 identify frame damage, using knowledge of frame construction, design features and frame types
- 1.2 perform frame checking procedures

2. service and repair suspension systems and steering linkages

- 2.1 describe the construction and design features of common suspension systems including:
 - 2.1.1 springs
 - 2.1.2 shock absorbers
 - 2.1.3 stabilizer bars
 - 2.1.4 control arms
 - 2.1.5 suspension bushings
 - 2.1.6 ball joints
 - 2.1.7 automotive suspension designs
- 2.2 explain the principles of operation of suspension systems
- 2.3 diagnose and service suspension systems including:
 - 2.3.1 suspension diagnosis
 - 2.3.2 suspension overhaul and repair
- 2.4 identify steering linkage types and explain their operation
- 2.5 diagnose and service steering linkages including:
 - 2.5.1 steering inspection and diagnosis
 - 2.5.2 steering linkage component replacement

3. diagnose and service wheels, tires and wheel bearings

- 3.1 explain the construction, sizing, rating and design features of tires and wheels
- 3.2 demonstrate the correct procedures for balancing and installing wheels and tires including:
 - 3.2.1 wheel balance
 - 3.2.2 wheel balancing methods
 - 3.2.3 tire rotation
 - 3.2.4 wheel fasteners
- 3.3 perform the correct inspection, cleaning and repacking of wheel bearings
- 3.4 demonstrate the correct procedures to install and adjust wheel bearings

- 3.5 diagnose problems related to servicing wheels, tires and wheel bearings including:
 - 3.5.1 tire wear
 - 3.5.2 tire replacement
 - 3.5.3 tire repair
- 4. demonstrate basic competencies**
 - 4.1 demonstrate fundamental skills to:
 - 4.1.1 communicate
 - 4.1.2 manage information
 - 4.1.3 use numbers
 - 4.1.4 think and solve problems
 - 4.2 demonstrate personal management skills to:
 - 4.2.1 demonstrate positive attitudes and behaviours
 - 4.2.2 be responsible
 - 4.2.3 be adaptable
 - 4.2.4 learn continuously
 - 4.2.5 work safely
 - 4.3 demonstrate teamwork skills to:
 - 4.3.1 work with others
 - 4.3.2 participate in projects and tasks
- 5. create a transitional strategy to accommodate personal changes and build personal values**
 - 5.1 identify short-term and long-term goals
 - 5.2 identify steps to achieve goals

COURSE ASA3420: MANUAL & POWER STEERING SYSTEMS

Level: First Period Apprenticeship, Group B

Prerequisites: ASA3400: Basic Tools & Materials
ASA3410: Electrical Circuits & Diagnosis

Description: Students develop the knowledge, skills and attitudes necessary to service and maintain manual and power steering systems.

Parameters: Access to a materials work centre, complete with access to hand tools, specialized tools and related resources, and to instruction from an individual with journeyperson certification as an automotive service technician.

ILM Resources: Manual Steering 090104d, Power Steering 090104e

Outcomes: The student will:

1. diagnose, service and repair manual steering gear assemblies

- 1.1 explain the construction and design features of common manual steering gears including:
 - 1.1.1 steering gears
 - 1.1.2 function
 - 1.1.3 types of steering gears
- 1.2 adjust, repair and diagnose problems related to manual steering gears including:
 - 1.2.1 steering gear overhaul
 - 1.2.2 rack and pinion
 - 1.2.3 lubrication
 - 1.2.4 diagnosis
 - 1.2.5 vehicle wandering
 - 1.2.6 steering roughness

2. diagnose, service and repair power steering systems

- 2.1 explain the construction and design features of power steering gears
- 2.2 identify power steering pump types and explain their operation
- 2.3 explain the principles of operation of power steering systems
- 2.4 diagnose, service, repair and adjust non-rack and pinion power steering gears
- 2.5 diagnose, service, repair and adjust rack and pinion power steering gears
- 2.6 diagnose power steering problems

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely

- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks
- 4. create a transitional strategy to accommodate personal changes and build personal values**
 - 4.1 identify short-term and long-term goals
 - 4.2 identify steps to achieve goals

COURSE ASA3425: STEERING ANGLES, STEERING COLUMNS & RESTRAINT SYSTEMS

Level: First Period Apprenticeship, Group B

Prerequisites: ASA3400: Basic Tools & Materials
ASA3410: Electrical Circuits & Diagnosis
ASA3415: Frames, Suspension & Steering Linkages

Description: Students develop the necessary knowledge, skills and attitudes to describe steering angles, service and repair steering columns, and diagnose and service passive and active restraint systems.

Parameters: Access to a materials work centre, complete with access to steering columns, specialized tools, vehicles with safety systems and related resources, and to instruction from an individual with journey person certification as an automotive service technician.

ILM Resources: Steering Columns 090104h, Steering Angles 090104f,
Active Restraint Systems 090108a, Passive Restraint Systems 090108b

Outcomes: The student will:

1. service and repair steering columns and their related safety devices

- 1.1 explain the construction, design features and operation of steering column safety features
- 1.2 service and repair steering columns and related safety devices
- 1.3 safely disarm, remove, install and re-arm a steering column air bag

2. describe the common steering angles and how each affects vehicle handling

- 2.1 describe the function and effect of caster on vehicle operation including:
 - 2.1.1 purposes of caster
 - 2.1.2 measuring caster
 - 2.1.3 effects of incorrect caster
- 2.2 describe the function and effect of camber on vehicle operation including:
 - 2.2.1 purposes of camber
 - 2.2.2 measuring of camber
 - 2.2.3 effects of incorrect camber
- 2.3 describe the function and effect of steering axis inclination (SAI) on vehicle operation including:
 - 2.3.1 purposes of SAI
 - 2.3.2 measuring SAI
 - 2.3.3 effects of scrub radius
- 2.4 describe the function and effect of toe on vehicle operation including:
 - 2.4.1 purpose of toe
 - 2.4.2 measuring toe
 - 2.4.3 effects of incorrect toe
 - 2.4.4 toe change
 - 2.4.5 turning radius
 - 2.4.6 measuring turning radius
 - 2.4.7 effects of incorrect turning radius

- 2.5 describe the effect of thrust angle on vehicle operation including:
 - 2.5.1 measuring thrust angle
 - 2.5.2 effects of incorrect thrust angle
- 2.6 describe the measurement procedures for each wheel alignment angle including:
 - 2.6.1 alignment measuring equipment
- 2.7 describe the adjustment procedures for each wheel alignment angle including:
 - 2.7.1 rear camber and toe adjustments
 - 2.7.2 front caster and camber adjustments
 - 2.7.3 front toe adjustment
- 3. describe the purpose, function and operation of active passenger restraint systems**
 - 3.1 explain the purpose of active restraint systems including:
 - 3.1.1 child safety seats
 - 3.1.2 head restraints
 - 3.2 identify the components of the following active restraint systems:
 - 3.2.1 front seat belt
 - 3.2.2 child safety seat
 - 3.2.3 rear seat belt
 - 3.3 identify seat belt service precautions
- 4. diagnose and service passive restraint systems**
 - 4.1 explain the purpose of passive restraint systems related to:
 - 4.1.1 a frontal collision
 - 4.1.2 stages of operation
 - 4.1.3 a front passenger air bag
 - 4.1.4 side collision
 - 4.2 identify components of a passive restraint system including:
 - 4.2.1 passenger air bag inflator module
 - 4.2.2 side impact air bag system
 - 4.2.3 seat belt pre-tensioners
 - 4.2.4 safety glass
 - 4.2.5 passive seat belts
 - 4.3 diagnose and service passive restraint systems by reviewing
 - 4.3.1 special handling precautions
 - 4.3.2 diagnostic procedures
 - 4.3.3 trouble codes
 - 4.3.4 system deactivation procedures
 - 4.3.5 system reactivation procedures
 - 4.3.6 the inspection required after a non-deployment collision
- 5. demonstrate basic competencies**
 - 5.1 demonstrate fundamental skills to:
 - 5.1.1 communicate
 - 5.1.2 manage information
 - 5.1.3 use numbers
 - 5.1.4 think and solve problems
 - 5.2 demonstrate personal management skills to:
 - 5.2.1 demonstrate positive attitudes and behaviours
 - 5.2.2 be responsible
 - 5.2.3 be adaptable
 - 5.2.4 learn continuously
 - 5.2.5 work safely

- 5.3 demonstrate teamwork skills to:
 - 5.3.1 work with others
 - 5.3.2 participate in projects and tasks
- 6. create a transitional strategy to accommodate personal changes and build personal values**
 - 6.1 identify short-term and long-term goals
 - 6.2 identify steps to achieve goals

COURSE ASA3430: WHEEL ALIGNMENT PROCEDURES

Level: First Period Apprenticeship, Group B

Prerequisites: ASA3400: Basic Tools & Materials
ASA3410: Electrical Circuits & Diagnosis
ASA3415: Frames, Suspension & Steering Linkages
ASA3420: Manual & Power Steering Systems

Description: Students develop the necessary knowledge, skills and attitudes to diagnose and correct suspension and steering problems and to perform wheel alignments.

Parameters: Access to a materials work centre, complete with access to steering and suspension systems, specialized tools and resources to perform a wheel alignment, and to instruction from an individual with journeyperson certification as an automotive service technician.

ILM Resources: Suspension and Steering Diagnosis 090104i, Alignment Procedures 090104g

Outcomes: The student will:

1. diagnose and correct suspension and steering problems

- 1.1 diagnose problems related to steering systems
- 1.2 diagnose problems related to suspension systems including:
 - 1.2.1 alignment diagnosis
- 1.3 choose the most appropriate repair methods to correct suspension and steering problems

2. perform a wheel alignment

- 2.1 perform a pre-alignment inspection to locate and identify faulty components
- 2.2 select the most appropriate alignment settings within specifications for a given vehicle type and load condition by:
 - 2.2.1 selecting angles
- 2.3 perform a wheel alignment to adjust the alignment angles according to guidelines
- 2.4 adjust steering linkage to establish the correct toe setting and properly centre the steering wheel
- 2.5 perform a road test of a vehicle to verify correct alignment or confirm alignment problems

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks

- 4. create a transitional strategy to accommodate personal changes and build personal values**
 - 4.1 identify short-term and long-term goals
 - 4.2 identify steps to achieve goals

COURSE ASA3435: BRAKING SYSTEMS 1

Level: First Period Apprenticeship, Group C

Prerequisite: ASA3400: Basic Tools & Materials

Description: Students develop the necessary knowledge, skills and attitudes concerning the basic construction of braking systems and the application of hydraulics to braking components.

Parameters: Access to a materials work centre, complete with braking and other hydraulic systems, basic hand tools, specialized brake tools and related resources, as well as to instruction from an individual with journeyman certification as an automotive service technician.

ILM Resources: Brake System Fundamentals 090105a, Hydraulic System Components 090105b

Outcomes: The student will:

1. apply scientific principles to explain brake system operation

1.1 explain the principles of operating of brake systems including:

1.1.1 the purpose of a brake system

1.1.2 work, torque and power

1.1.3 energy

1.2 state Pascal's law and its implications for brake systems including:

1.2.1 hydraulics

1.3 choose the correct brake fluid for a given application based on purpose, function and characteristics of brake fluids including:

1.3.1 brake fluid requirements

1.3.2 rubber compatibility of brake fluid

1.3.3 composition of brake fluid

2. service and repair brake system hydraulic components

2.1 explain the principles of operation, construction and design features of common types of brake master cylinders

2.2 explain the principles of operation, construction and design features of wheel cylinders and disc brake callipers used in disc brake systems

2.3 explain the construction and design features of brake hoses and lines including:

2.3.1 fluid lines

2.4 explain the purpose and operation of the metering, proportioning and pressure differential valves

2.5 describe the operation of the hydraulic components when used as a system

2.6 diagnose, service, adjust and repair brake system hydraulic components including:

2.6.1 master cylinder

2.6.2 wheel cylinders

2.6.3 fluid lines

- 3. demonstrate basic competencies**
 - 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 think and solve problems
 - 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
 - 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks
- 4. create a transitional strategy to accommodate personal changes and build personal values**
 - 4.1 identify short-term and long-term goals
 - 4.2 identify steps to achieve goals

COURSE ASA3440: BRAKING SYSTEMS 2

Level: First Period Apprenticeship, Group C

Prerequisites: ASA3400: Basic Tools & Materials
ASA3435: Braking Systems 1

Description: Students develop the necessary knowledge, skills and attitudes to diagnose, service and maintain a braking system according to accepted trade practices.

Parameters: Access to a materials work centre, complete with specialized brake tools and related resources, and to instruction from an individual with journey person certification as an automotive service technician.

ILM Resources: Drum Brake Systems 090105c, Disc Brake Systems 090105d

Outcomes: The student will:

1. service and repair drum brake systems

- 1.1 explain the construction, design features and operation of drum brake system components including:
 - 1.1.1 design and basic operation
 - 1.1.2 terminology
 - 1.1.3 drum brake components
- 1.2 service, adjust and repair drum brake systems
 - 1.2.1 service a brake drum
 - 1.2.2 service wheel cylinders
 - 1.2.3 service the backing plate
 - 1.2.4 inspect and/or replace brake shoes
 - 1.2.5 inspect and/or replace springs and hardware
 - 1.2.6 reassemble brakes
 - 1.2.7 install the drums
- 1.3 explain the construction, design features and operation of drum-type parking brake systems
- 1.4 service, adjust and repair drum-type parking brake systems

2. service and repair disc brake systems

- 2.1 explain the construction, operation and design features of disc brake systems including:
 - 2.1.1 advantages
 - 2.1.2 design
 - 2.1.3 operation
 - 2.1.4 components
- 2.2 service and repair disc brake systems
 - 2.2.1 inspect all components
 - 2.2.2 remove callipers and pads
 - 2.2.3 inspect and repair callipers and pads
 - 2.2.4 inspect and repair disc
- 2.3 explain the construction and operation of disc-type parking brake systems including:
 - 2.3.1 drum-in-hat
 - 2.3.2 integral

- 2.4 service, adjust and repair disc-type parking brake systems including:
 - 2.4.1 drum-in-hat
 - 2.4.2 mechanical calliper
- 3. demonstrate basic competencies**
 - 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
 - 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
 - 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks
- 4. create a transitional strategy to accommodate personal changes and build personal values**
 - 4.1 identify short-term and long-term goals
 - 4.2 identify steps to achieve goals

COURSE ASA3445: BRAKING SYSTEMS 3

Level: First Period Apprenticeship, Group C

Prerequisites: ASA3400: Basic Tools & Materials
ASA3410: Electrical Circuits & Diagnosis
ASA3435: Braking Systems 1
ASA3440: Braking Systems 2

ILM Resources: Power Brakes 090105e, Brake System Diagnosis and Service 090105f, Antilock Brake Systems 090105g

Description: Students develop the necessary knowledge, skills and attitudes to identify, diagnose, service and maintain power brake and anti-lock braking system (ABS) components, as well as perform routine maintenance to the brake system according to accepted trade practices.

Parameters: Access to a materials work centre, complete with specialized brake tools and related resources, and to instruction from an individual with journey person certification as an automotive service technician.

Outcomes: The student will:

1. diagnose and service power brakes

- 1.1 describe the operation of vacuum-operated power brake units including:
 - 1.1.1 vacuum brake booster operation
- 1.2 describe the operation of hydraulically operated power brake units including:
 - 1.2.1 hydraulic brake booster operation
- 1.3 demonstrate a procedure for testing a power brake unit including:
 - 1.3.1 testing vacuum-assist power brake units
 - 1.3.2 testing hydraulic-assist power brake units
- 1.4 diagnose problems related to a power brake including:
 - 1.4.1 troubleshooting vacuum-assist power brake units
 - 1.4.2 troubleshooting hydraulic-assist power brake units

2. service, repair and diagnose problems related to brake systems

- 2.1 demonstrate brake flushing and bleeding procedures on brake systems including:
 - 2.1.1 fluid service
 - 2.1.2 service methods
- 2.2 diagnose problems related to brake systems

3. diagnose and service ABS

- 3.1 identify basic ABS fundamentals and components
- 3.2 explain the operation of an ABS system including:
 - 3.2.1 system self-test
 - 3.2.2 normal stop
 - 3.2.3 stops requiring ABS action
 - 3.2.4 traction control operation
- 3.3 demonstrate brake bleeding and flushing procedures of an ABS system
- 3.4 demonstrate a diagnostic procedure for an ABS system including:
 - 3.4.1 diagnostic pre-checks

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:

- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:

- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:

- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals

5.2 identify steps to achieve goals

COURSE ASA3450: DRIVELINES & INTRODUCTORY WELDING

Level: First Period Apprenticeship, Group A

Prerequisite: ASA3400: Basic Tools & Materials

Description: Students develop the necessary knowledge, skills and attitudes to identify the purpose, describe the operation and perform the servicing of a vehicle driveline. Students develop the necessary knowledge, skills, and attitudes to heat, cut (using oxyacetylene) and weld (using Gas Metal Arc Welding [GMAW]).

Parameters: Access to a materials work centre, complete with access to driveline units, hand tools, specialized driveline tools, oxyacetylene, GMAW equipment and related resources, and to instruction from an individual with journey person certification.

ILM Resources: Drivelines 090103a, Oxyacetylene Heating and Cutting 090102a, Gas Metal Arc Welding (GMAW) (MIG Welding) 090102b

Outcomes: The student will:

- 1. diagnose, service and repair drivelines, universal joints and constant velocity joints**
 - 1.1 explain the construction, design features, operation and function of common driveline components
 - 1.2 service and repair driveshaft assemblies
 - 1.3 service and repair common types of universal and constant velocity joints including:
 - 1.3.1 cross and roller universal joint service
 - 1.4 diagnose and repair driveline vibration problems
- 2. perform metal heating and cutting operations safely, using oxyacetylene equipment**
 - 2.1 demonstrate the use of personal protective equipment to ensure welding safety
 - 2.2 describe the characteristics and handling procedures for oxygen and acetylene (C₂H₂) including:
 - 2.2.1 handling cylinders
 - 2.3 demonstrate handling procedures for:
 - 2.3.1 regulators
 - 2.3.2 hoses
 - 2.3.3 check valves
 - 2.4 demonstrate the use, care and maintenance of torches and tips including:
 - 2.4.1 set-up prior to use
 - 2.4.2 heating and welding tips
 - 2.4.3 cutting attachment
 - 2.5 perform basic cutting operations including:
 - 2.5.1 cutting preparation
 - 2.5.2 the cut
- 3. perform nonstructural welding, using GMAW equipment**
 - 3.1 describe the principles of operation of GMAW including:
 - 3.1.1 metal transfer
 - 3.1.2 short-circuiting metal transfer
 - 3.1.3 globular transfer
 - 3.1.4 spray transfer

- 3.2 identify the components of a basic GMAW set-up including:
 - 3.2.1 equipment for GMAW
 - 3.2.2 power sources
 - 3.2.3 wire feeder
 - 3.2.4 electrode holders and cable assembly
 - 3.2.5 spooled filler wire
 - 3.2.6 shielding gas
 - 3.2.7 regulators/flowmeters
- 3.3 diagnose and demonstrate corrective measures for malfunctioning GMAW equipment including:
 - 3.3.1 corrective measures with welding techniques
 - 3.3.2 corrective measures with wire feed equipment
 - 3.3.3 troubleshooting wire feed equipment
 - 3.3.4 weld defects
- 3.4 identify the precautions against electrical shock, toxic fumes and radiant energy associated with GMAW including:
 - 3.4.1 safety
 - 3.4.2 electrical hazards
 - 3.4.3 toxic fumes
 - 3.4.4 personal protection
- 4. demonstrate basic competencies**
 - 4.1 demonstrate fundamental skills to:
 - 4.1.1 communicate
 - 4.1.2 manage information
 - 4.1.3 use numbers
 - 4.1.4 think and solve problems
 - 4.2 demonstrate personal management skills to:
 - 4.2.1 demonstrate positive attitudes and behaviours
 - 4.2.2 be responsible
 - 4.2.3 be adaptable
 - 4.2.4 learn continuously
 - 4.2.5 work safely
 - 4.3 demonstrate teamwork skills to:
 - 4.3.1 work with others
 - 4.3.2 participate in projects and tasks
- 5. create a transitional strategy to accommodate personal changes and build personal values**
 - 5.1 identify short-term and long-term goals
 - 5.2 identify steps to achieve goals

COURSE ASA3455: ASA PRACTICUM COURSE A

Level: Advanced

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher or an experienced professional, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

- 1. perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
 - 1.1 identify regulations and regulatory bodies related to the credential
 - 1.2 describe personal roles and responsibilities including:
 - 1.2.1 key responsibilities
 - 1.2.2 support functions/responsibilities
 - 1.2.3 code of ethics
 - 1.3 describe personal work responsibilities and categorize them as:
 - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
 - 1.3.2 non-routine tasks; e.g., emergencies
 - 1.3.3 tasks requiring personal judgement
 - 1.3.4 tasks requiring approval of a supervisor
- 2. analyze personal performance in relation to established standards**
 - 2.1 evaluate his or her application of competencies developed in related CTS courses
 - 2.2 evaluate standards of performance in terms of:
 - 2.2.1 quality of work
 - 2.2.2 quantity of work
 - 2.3 evaluate his or her adherence to workplace policies and procedures related to health and safety
 - 2.4 evaluate the work environment in terms of:
 - 2.4.1 location
 - 2.4.2 floor plan of work area
 - 2.4.3 analysis of work flow patterns

- 2.5 evaluate a professional in a related occupation in terms of:
 - 2.5.1 training and certification
 - 2.5.2 interpersonal skills
 - 2.5.3 technical skills
 - 2.5.4 professional ethics

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks

COURSE ASA3460: ASA PRACTICUM COURSE B

Level: Advanced

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher or an experienced professional, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

- 1. perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
 - 1.1 identify regulations and regulatory bodies related to the credential
 - 1.2 describe personal roles and responsibilities including:
 - 1.2.1 key responsibilities
 - 1.2.2 support functions/responsibilities
 - 1.2.3 code of ethics
 - 1.3 describe personal work responsibilities and categorize them as:
 - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
 - 1.3.2 non-routine tasks; e.g., emergencies
 - 1.3.3 tasks requiring personal judgement
 - 1.3.4 tasks requiring approval of a supervisor
- 2. analyze personal performance in relation to established standards**
 - 2.1 evaluate his or her application of competencies developed in related CTS courses
 - 2.2 evaluate standards of performance in terms of:
 - 2.2.1 quality of work
 - 2.2.2 quantity of work
 - 2.3 evaluate his or her adherence to workplace policies and procedures related to health and safety
 - 2.4 evaluate the work environment in terms of:
 - 2.4.1 location
 - 2.4.2 floor plan of work area
 - 2.4.3 analysis of work flow patterns

- 2.5 evaluate a professional in a related occupation in terms of:
 - 2.5.1 training and certification
 - 2.5.2 interpersonal skills
 - 2.5.3 technical skills
 - 2.5.4 professional ethics

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks

COURSE ASA3465: ASA PRACTICUM COURSE C

Level: Advanced

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher or an experienced professional, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

- 1. perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
 - 1.1 identify regulations and regulatory bodies related to the credential
 - 1.2 describe personal roles and responsibilities including:
 - 1.2.1 key responsibilities
 - 1.2.2 support functions/responsibilities
 - 1.2.3 code of ethics
 - 1.3 describe personal work responsibilities and categorize them as:
 - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
 - 1.3.2 non-routine tasks; e.g., emergencies
 - 1.3.3 tasks requiring personal judgement
 - 1.3.4 tasks requiring approval of a supervisor
- 2. analyze personal performance in relation to established standards**
 - 2.1 evaluate his or her application of competencies developed in related CTS courses
 - 2.2 evaluate standards of performance in terms of:
 - 2.2.1 quality of work
 - 2.2.2 quantity of work
 - 2.3 evaluate his or her adherence to workplace policies and procedures related to health and safety
 - 2.4 evaluate the work environment in terms of:
 - 2.4.1 location
 - 2.4.2 floor plan of work area
 - 2.4.3 analysis of work flow patterns

- 2.5 evaluate a professional in a related occupation in terms of:
 - 2.5.1 training and certification
 - 2.5.2 interpersonal skills
 - 2.5.3 technical skills
 - 2.5.4 professional ethics

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks

COURSE ASA3470: ASA PRACTICUM COURSE D

Level: Advanced

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher or an experienced professional, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

- 1. perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
 - 1.1 identify regulations and regulatory bodies related to the credential
 - 1.2 describe personal roles and responsibilities including:
 - 1.2.1 key responsibilities
 - 1.2.2 support functions/responsibilities
 - 1.2.3 code of ethics
 - 1.3 describe personal work responsibilities and categorize them as:
 - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
 - 1.3.2 non-routine tasks; e.g., emergencies
 - 1.3.3 tasks requiring personal judgement
 - 1.3.4 tasks requiring approval of a supervisor
- 2. analyze personal performance in relation to established standards**
 - 2.1 evaluate his or her application of competencies developed in related CTS courses
 - 2.2 evaluate standards of performance in terms of:
 - 2.2.1 quality of work
 - 2.2.2 quantity of work
 - 2.3 evaluate his or her adherence to workplace policies and procedures related to health and safety
 - 2.4 evaluate the work environment in terms of:
 - 2.4.1 location
 - 2.4.2 floor plan of work area
 - 2.4.3 analysis of work flow patterns

- 2.5 evaluate a professional in a related occupation in terms of:
 - 2.5.1 training and certification
 - 2.5.2 interpersonal skills
 - 2.5.3 technical skills
 - 2.5.4 professional ethics

3. demonstrate basic competencies

- 3.1 demonstrate fundamental skills to:
 - 3.1.1 communicate
 - 3.1.2 manage information
 - 3.1.3 use numbers
 - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
 - 3.2.1 demonstrate positive attitudes and behaviours
 - 3.2.2 be responsible
 - 3.2.3 be adaptable
 - 3.2.4 learn continuously
 - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
 - 3.3.1 work with others
 - 3.3.2 participate in projects and tasks