

COURSE MEC2010: VEHICLE DETAILING

Level: Intermediate

Prerequisite: None

Description: Students develop the skills required to restore and enhance the exterior finishes of a vehicle.

Parameters: Access to commercially available products and related resources.

Outcomes: The student will:

- 1. state personal and environmental hazards associated with the use of cleaning and waxing agents**
 - 1.1 demonstrate knowledge of and follow safety rules and procedures in the handling of dangerous cleaning agents
 - 1.2 demonstrate safe handling and application of volatile cleaners used for engine cleaning
 - 1.3 demonstrate knowledge of and follow procedures outlined to prevent damage to electrical or other parts when engine cleaning
 - 1.4 identify hazards that are present; e.g., acid powder
- 2. identify and describe materials available to enhance the appearance of a vehicle**
 - 2.1 identify surface flaws and solutions that could be used other than spray painting
 - 2.2 explain the value of using waxes to treat painted surfaces; e.g., longevity, monetary implications
- 3. demonstrate the correct cleaning and treatment of engine parts and exterior finishes including paint, glass, vinyl and rubber surfaces**
 - 3.1 use materials available to complete an engine clean and, if possible, apply enhancing materials such as paints or coatings
 - 3.2 describe the value of maintaining a clean and neat engine compartment
 - 3.3 identify and demonstrate the correct procedures when using cleaning and polishing/treatment agents on various surfaces
 - 3.4 explain the value of using methods to enhance the appearance of a vehicle without painting
- 4. install a trim or accessory part according to standard practice**
 - 4.1 identify common types of trim fasteners and tools
 - 4.2 list the precautions needed to prevent damage to trim or adjacent surfaces when removing and replacing trim parts
 - 4.3 show knowledge of and demonstrate the procedures and tools used to remove and replace trim parts
 - 4.4 demonstrate the application of decals, pinstriping and/or moulding as a method of enhancing vehicle appearance and value
 - 4.5 demonstrate the ability to follow installation instructions by completing an accessory installation project
- 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. identify possible life roles related to the skills and content of this cluster**
 - 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2020: VEHICLE MAINTENANCE

Level: Intermediate

Prerequisite: MEC1020: Vehicle Service & Care

Description: Students perform the basic service requirements necessary to ensure adequate maintenance of a motor vehicle.

Parameters: Access to vehicles, specialty tools, hand tools and related resources.

Note: Customer work is to be checked by a certified technician when work is performed on brakes, steering and suspension.

Outcomes: The student will:

- 1. demonstrate safe work practices when working with vehicles and follow established laboratory procedures**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
- 2. identify vehicle service requirements as per manufacturer's recommendations**
 - 2.1 identify the service requirements for a specific motor vehicle considering the odometer reading, conditions of operation and service history
- 3. conduct a motor vehicle inspection considering the age of the vehicle, distance travelled, service conditions and history**
 - 3.1 check tire condition
 - 3.2 mount and balance tires
 - 3.3 rotate tires to maximize wear life
 - 3.4 inspect steering and suspension system components
 - 3.5 inspect, repack and adjust wheel bearing
 - 3.6 lubricate steering and suspension system joints
 - 3.7 replenish fluids in power steering pump
 - 3.8 inspect and top-up brake fluid reservoir
 - 3.9 inspect and assess the wear characteristics of disc brake and drum brake components
 - 3.10 lubricate parking brake linkages
 - 3.11 inspect and service battery and battery clamps; renew clamps, if required
 - 3.12 adjust alternator belt tension, if necessary
 - 3.13 check the operation of all lights and replace bulbs, if required
 - 3.14 inspect fuse panel and renew inoperative fuses
 - 3.15 use a multimeter to test a charging system
 - 3.16 lubricate hinges on all opening panels and weatherstrips
 - 3.17 lubricate locks or lock plates, as required
 - 3.18 inspect and change windshield wiper blades, if necessary
 - 3.19 inspect for loose trim or mouldings
 - 3.20 identify and describe the condition of the camshaft timing belt or chain and recommend the appropriate service
 - 3.21 evaluate brake system fluid integrity and brake pedal feel and identify repair requirements

4. service and repair a motor vehicle according to vehicle condition and service schedule

- 4.1 demonstrate how to:
 - 4.1.1 inspect an engine for oil leaks
 - 4.1.2 renew engine gaskets or seals, where necessary
 - 4.1.3 change engine oil and filter
 - 4.1.4 service Positive Crankcase Ventilation (PCV) valve and breather
 - 4.1.5 inspect the condition of coolant, hoses, belts, fan and radiator; adjust belts, if required
 - 4.1.6 change or recondition the engine coolant and flush the cooling system, if required
 - 4.1.7 pressure test the cooling system
 - 4.1.8 replace the thermostat, if necessary
 - 4.1.9 locate and inspect the fuel filter; replace, if required
 - 4.1.10 replace the air filter, if required
 - 4.1.11 inspect and service throttle linkage
 - 4.1.12 inspect manifolds, pipes, catalytic converter, muffler and hangers for structural integrity; repair, as required
 - 4.1.13 inspect and service or replace spark plugs, distributor cap and rotor, and replace spark plug wires and boots, as required by the service schedule
 - 4.1.14 inspect and replace fuel purge canister filter, if required
 - 4.1.15 inspect and replace fluids, as required, in transmissions, transaxle transfer cases and differential assemblies
 - 4.1.16 inspect and recommend service for constant velocity joints, seals, drive shaft, drive axles and U-joints

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. identify possible life roles related to the skills and content of this cluster

- 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2030: LUBRICATION & COOLING

Level: Intermediate

Prerequisite: MEC1040: Engine Fundamentals

Description: Students diagnose, maintain and service the lubrication and cooling systems of a typical four-cycle gasoline engine.

Parameters: Access to a pressure tester, hand tools and related resources.

Outcomes: The student will:

1. demonstrate safe work practices when working with vehicle engine fluids

- 1.1 identify the hazards associated with ethylene glycol
- 1.2 demonstrate knowledge of and follow all safety procedures associated with hot fluids and fluids under pressure
- 1.3 collect and dispose of all hazardous fluids in the appropriate manner
- 1.4 remove all spills from work area

2. identify and describe functions and operations of engine cooling and lubrication system components

- 2.1 identify the multiple tasks performed by the lubrication system
- 2.2 describe the properties of engine oils intended for use in a late model engine
- 2.3 interpret the meaning of the American Petroleum Institute (API) and Society of Automotive Engineers (SAE) symbols and viscosity numbers used on oil containers
- 2.4 describe the design and operation of:
 - 2.4.1 a gear and rotor-type oil pump
 - 2.4.2 a pressure regulator or relief valve
 - 2.4.3 an oil pressure sensor gauge or indicator
 - 2.4.4 an oil level and change indicator
- 2.5 identify possible causes of low/high oil pressure and high levels of oil consumption under normal operating conditions
- 2.6 explain the function of the cooling system
- 2.7 describe the relationship between the percentage of antifreeze and water to the coolant's freezing and boiling points
- 2.8 identify the most appropriate percentage of antifreeze to meet local conditions
- 2.9 describe the design and operation of a:
 - 2.9.1 radiator and cap
 - 2.9.2 fan
 - 2.9.3 thermostat
 - 2.9.4 hose
 - 2.9.5 water pump
 - 2.9.6 recovery tank
 - 2.9.7 block heater
- 2.10 identify possible causes for engine overheating or running cold under normal operating conditions

- 3. diagnose and correct lubrication and cooling system faults**
 - 3.1 demonstrate how to:
 - 3.1.1 inspect engine for oil leaks owing to gasket/seal failure
 - 3.1.2 replace seal/gaskets, if necessary
 - 3.1.3 disassemble and inspect a gear or rotor pump for pitting and galling or abnormal wear
 - 3.1.4 test oil pressure sensor and gauge/light circuit; service, if necessary
 - 3.1.5 test temperature sensing system; service, if necessary
 - 3.1.6 inspect hoses for cracks, soft spots and leaks; replace, if necessary
 - 3.1.7 test thermostat; replace, if necessary
 - 3.1.8 inspect water pump for leaks and bearing condition
 - 3.1.9 inspect radiator fan
 - 3.1.10 inspect radiator for leaks and blockages; replace, if necessary
 - 3.1.11 check condition and tension of fan belt; replace, if necessary
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2040: FUEL & EXHAUST SYSTEMS

Level: Intermediate

Prerequisite: MEC1040: Engine Fundamentals

Description: Students diagnose, maintain and service the fuel and exhaust system of a typical four-cycle gasoline engine.

Parameters: Access to a ventilated area, a fuel pump vacuum/pressure tester and related resources, and to instruction from a certified technician when working on a customer vehicle.

Outcomes: The student will:

- 1. demonstrate safe work practices when working with volatile liquids and combustible gases**
 - 1.1 demonstrate knowledge of and follow all safety procedures associated with volatile liquids and exhaust gases
 - 1.2 demonstrate how to:
 - 1.2.1 store fuels and solvents in the appropriate manner
 - 1.2.2 maintain proper venting and air supply in the work area
- 2. identify and describe functions and operations of engine fuel and exhaust system components**
 - 2.1 describe the chemical composition of gasoline and the effects complete and incomplete combustion have on the environment and engine performance
 - 2.2 describe the characteristics of a quality gasoline in relation to its volatility and octane rating
 - 2.3 identify measures that are taken to:
 - 2.3.1 prevent the formation of gum deposits
 - 2.3.2 prevent the oxidation of metal parts
 - 2.3.3 retard icing
 - 2.3.4 aid in the identification of fuel types and grades
 - 2.4 describe the factors that affect combustion including:
 - 2.4.1 spark plug location
 - 2.4.2 combustion chamber size and shape
 - 2.4.3 compression ratio
 - 2.4.4 valve and combustion chamber design
 - 2.4.5 spark timing, duration and intensity
 - 2.4.6 air temperature and fuel ratio
 - 2.4.7 manifold pressures
 - 2.4.8 valve timing, valve lift and duration
 - 2.5 identify and describe the function of the major fuel system components
 - 2.6 explain the difference between a carburetor and a fuel injected system
 - 2.7 identify the common problems associated with carburetors and fuel injected systems
 - 2.8 locate and describe the function of the major exhaust system components

3. diagnose and correct fuel and exhaust system faults

- 3.1 inspect fuel filter/strainer and replace, if necessary
- 3.2 clean and adjust a typical carburetor on and off an engine
- 3.3 visually inspect and test a typical fuel injection system
- 3.4 test fuel pump pressure and capacity; repair or replace, if necessary
- 3.5 visually inspect and test for exhaust leaks or blockages; replace converters, pipes and mufflers, if necessary

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. identify possible life roles related to the skills and content of this cluster

- 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2050: ALTERNATIVE FUEL ENGINES

Level: Intermediate

Prerequisite: None

Description: Students determine alternative fuels used to power motor vehicles.

Parameters: Access to related resources and basic hand tools.

Outcomes: The student will:

1. demonstrate safe work practices when working with alternative fuel vehicles

- 1.1 demonstrate knowledge of and follow laboratory safety procedures
- 1.2 state how alternative fuels affect the environment

2. determine the type of fuel that is best suited to a particular use and type of vehicle

- 2.1 identify the typical alternative fuels; e.g., diesel, propane, methanol, natural gas, hydrogen
- 2.2 compare the heat-producing characteristics of each fuel
- 2.3 identify resources and methods of marketing different types of fuel
- 2.4 identify ways in which fuels are stored
- 2.5 describe the engine design modifications that are required to operate on:
 - 2.5.1 diesel
 - 2.5.2 propane
 - 2.5.3 methanol
 - 2.5.4 other
- 2.6 describe the advantages of using an alternative fuel by considering:
 - 2.6.1 fuel cost
 - 2.6.2 availability
 - 2.6.3 performance
 - 2.6.4 engine life
 - 2.6.5 environmental impact

3. service an alternative fuel vehicle, recognizing its unique maintenance requirements

- 3.1 describe the specific service requirement for an alternative fuel engine
- 3.2 complete a service and maintenance task according to the manufacturer's recommendations; e.g., change oil and fuel filters, engine lubricant, glow plugs and heaters

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. identify possible life roles related to the skills and content of this cluster

5.1 recognize and then analyze the opportunities and barriers in the immediate environment

5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2060: IGNITION SYSTEMS

Level: Intermediate

Prerequisite: None

Description: Students identify the basic components and parts of ignition systems used on internal combustion engines, and service and repair an ignition system.

Parameters: Access to a multimeter, a timing light, hand tools and related resources.

Supporting Courses: MEC1040: Engine Fundamentals
MEC1090: Electrical Fundamentals

Outcomes: The student will:

- 1. follow electrical safety guidelines by accurately interpreting and using instruction manuals**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 describe hazards involved when working with high voltages and currents
- 2. explain how a timed high voltage spark is achieved in magneto, point and electronic ignition systems**
 - 2.1 list and describe the three common types of ignition systems
 - 2.2 name the parts of the following ignition systems:
 - 2.2.1 magneto
 - 2.2.2 point type
 - 2.2.3 electronic
 - 2.2.4 computer-coil (distributorless)
- 3. recognize the drivability symptoms and use visual and instrument checks to diagnose ignition system faults**
 - 3.1 identify and describe symptoms produced by a typical ignition failure including:
 - 3.1.1 loose connection(s)
 - 3.1.2 faulty spark plug(s)
 - 3.1.3 faulty coil or wire
 - 3.1.4 bad distributor cap or rotor
 - 3.1.5 faulty points
 - 3.1.6 faulty pick-up coil
- 4. service and repair an ignition system**
 - 4.1 test the following:
 - 4.1.1 primary circuit voltage drop
 - 4.1.2 high tension lead resistance
 - 4.1.3 ignition coil
 - 4.1.4 ignition cap
 - 4.1.5 pick-up coil
 - 4.1.6 distributor points and condensor
 - 4.1.7 advance mechanisms
 - 4.2 show how to remove and analyze a spark plug to determine how well the engine is operating; e.g., oil consumption, fuel/air ratio and service/repair, if required
 - 4.3 lubricate distributor
 - 4.4 clean and tighten electrical leads and connections

- 4.5 complete the following according to the manufacturer's specifications:
 - 4.5.1 clean gap and/or replace with new spark plugs
 - 4.5.2 clean and/or replace with new contact points
 - 4.5.3 adjust contact points and pick-up coil gap
 - 4.5.4 adjust/repair advance mechanisms
 - 4.5.5 set ignition timing statically and check with a timing light

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. identify possible life roles related to the skills and content of this cluster

- 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2070: EMISSION CONTROLS

Level: Intermediate

Prerequisite: None

Description: Students describe the importance of controlling emissions and the technology applied to vehicles to meet prescribed standards.

Parameters: Access to specialized equipment and resources related to analyzing and testing emission control.

Supporting Courses: MEC2030: Lubrication & Cooling
MEC2040: Fuel & Exhaust Systems
MEC2060: Ignition Systems

Outcomes: The student will:

- 1. demonstrate safe work practices when working with emission control systems**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 describe effect of vehicle emissions on the environment and specifically on human life
- 2. list and describe vehicle pollutants and their effects on the environment**
 - 2.1 list types and where vehicle pollutants are created
 - 2.2 explain how these pollutants are created
 - 2.3 identify regulations that dictate maximum pollutant levels
- 3. describe types and characteristics of pre- and post-combustion emission systems**
 - 3.1 identify and demonstrate knowledge of the operation of the following pre-combustion control systems:
 - 3.1.1 crankcase ventilation system
 - 3.1.2 exhaust gas recirculation system
 - 3.1.3 ignition spark control systems
 - 3.1.4 computerized engine controls
 - 3.1.5 evaporative control systems
 - 3.1.6 engine design modifications; i.e., combustion chamber, piston, cylinder head, manifold and air induction design
- 4. identify emission control components**
 - 4.1 identify and demonstrate knowledge of the operation of the following post-combustion control systems on several different types of vehicles:
 - 4.1.1 air injection system
 - 4.1.2 air aspirator system
 - 4.1.3 catalytic converters
- 5. diagnose and service emission control systems**
 - 5.1 demonstrate how to:
 - 5.1.1 check and service positive crankcase ventilation system
 - 5.1.2 check and service evaporative control system
 - 5.1.3 check and service air injector system
 - 5.1.4 check and service exhaust gas recirculation system
 - 5.1.5 check catalytic converter
 - 5.1.6 check and adjust spark control system

- 5.1.7 check computerized engine controls
- 5.1.8 using exhaust gas analyzer, if available, check emissions for a given vehicle
- 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. identify possible life roles related to the skills and content of this cluster**
 - 7.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 7.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2090: ELECTRICAL COMPONENTS

Level: Intermediate

Prerequisite: MEC1090: Electrical Fundamentals

Description: Students identify and describe the basic use and testing of the electrical components of a typical motor vehicle.

Parameters: Access to a voltmeter, ohmmeter, ammeter, alternator, starter and related resources.

Outcomes: The student will:

1. demonstrate safe work practices when working with electrical components

- 1.1 demonstrate knowledge of and follow laboratory safety procedures with respect to electrical hazards, including:
 - 1.1.1 electrical shocks
 - 1.1.2 electrical burns
- 1.2 demonstrate how to avoid sparks and grounding
- 1.3 explain electrical polarity

2. describe the function and operation of a vehicle's electrical systems and components

- 2.1 locate the major electrical/electronic systems in a motor vehicle; e.g., lighting, charging, starting
- 2.2 explain the operation and function of each of the electrical/electronic systems
- 2.3 show how electrical/electronic systems interact with other vehicle systems; e.g., suspension and braking systems
- 2.4 identify and explain the purpose and basic component parts of charging, starting and lighting systems
- 2.5 identify and draw the symbols for common electrical components
- 2.6 identify and describe the ratings that are given to electrical components; e.g., resistance, voltage, amperage and power rating

3. identify electrical faults, by using standard diagnostic and testing procedures

- 3.1 identify and describe the purpose and functions of a:
 - 3.1.1 voltmeter
 - 3.1.2 ohmmeter
 - 3.1.3 ammeter
 - 3.1.4 multimeter
 - 3.1.5 load tester
 - 3.1.6 tack dwell meter
 - 3.1.7 growler
- 3.2 calibrate correctly, connect accurately and read the appropriate test equipment to determine:
 - 3.2.1 open and closed circuit
 - 3.2.2 load voltage and drop
 - 3.2.3 current draw
 - 3.2.4 component resistance

4. test and service electrical components

- 4.1 identify and correct faults associated with electrical components and instruments
- 4.2 overhaul a starter motor assembly
- 4.3 overhaul an alternator

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. identify possible life roles related to the skills and content of this cluster

- 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2100: POWER ASSIST ACCESSORIES

Level: Intermediate

Prerequisite: MEC1110: Pneumatics & Hydraulics

Description: Students identify and explain the function of components and parts of power assist accessories.

Parameters: Access to a multimeter, power assist accessories and related resources.

Note: Customer work must be checked by certified technician.

Supporting Course: MEC1090: Electrical Fundamentals

Outcomes: The student will:

- 1. demonstrate safe work practices when working on power assist accessories**
 - 1.1 demonstrate established laboratory safety procedures
 - 1.2 demonstrate practices that prevent damage to components
- 2. list components and state functions of power assist accessories**
 - 2.1 describe the types and basic functions of power assist accessories found on vehicles
 - 2.2 compare power assist accessories to the mechanical systems they have replaced
 - 2.3 evaluate current power assist accessories as a means of forecasting types of power assist accessories that may be used in future vehicles
- 3. describe and check major components, of power assist accessories**
 - 3.1 list the parts of selected power assist accessories
 - 3.2 describe the function of the major parts of selected power assist accessories
 - 3.3 trace the power path of selected power assist accessories
- 4. service and repair power assist accessories**
 - 4.1 demonstrate how to use shop manuals to diagnose power assist accessory faults specific to power assist accessories
 - 4.2 identify problems and faults in power assist accessories systems
- 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. identify possible life roles related to the skills and content of this cluster

- 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2110: BRAKING SYSTEMS

Level: Intermediate

Prerequisite: MEC1110: Pneumatics & Hydraulics

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 specialized brake tools and related resources.

Note: Customer work must be supervised by certified technician.

Outcomes: The student will:

- 1. demonstrate safe work practices when working on brakes**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 demonstrate proper disposal of brake dust
- 2. identify brake design and components, and parking brake systems**
 - 2.1 identify the parts of a hydraulic brake drum system
 - 2.2 compare the operating principles of duo-servo and non-servo brake systems
 - 2.3 identify the parts of a disc brake system
 - 2.4 compare the operating principles of fixed, floating and sliding calliper braking systems
 - 2.5 describe the operation of a combined disc and drum system
 - 2.6 identify the parts of a parking brake system
 - 2.7 compare the operating principles of a parking brake system on disc and drum brake applications
- 3. inspect and analyze disc and drum brake systems**
 - 3.1 demonstrate how to:
 - 3.1.1 prepare a work order, using appropriate questioning to determine brake problems
 - 3.1.2 check the master cylinder fluid level
 - 3.1.3 inspect drum and disc brake linings for wear
 - 3.1.4 inspect drum and rotor for service
 - 3.1.5 inspect drum brake backing plate for service
 - 3.1.6 inspect drum brake spring and hardware for service
 - 3.1.7 adjust a parking brake cable
- 4. interpret parts and service manuals to perform routine brake system service and maintenance**
 - 4.1 demonstrate how to:
 - 4.1.1 machine a brake drum and rotor according to the manufacturer's specifications
 - 4.1.2 remove and replace disc and drum brake shoes
 - 4.1.3 remove/replace and overhaul a master cylinder, wheel cylinder and calliper
 - 4.1.4 replace a flexible brake hose
 - 4.1.5 bleed and flush a brake system
 - 4.1.6 replace a parking brake cable
- 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. identify possible life roles related to the skills and content of this cluster**
 - 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2120: HYDRAULIC ACCESSORIES

Level: Intermediate

Prerequisite: MEC1110: Pneumatics & Hydraulics

Description: Students develop a basic knowledge of hydraulic components, applications and servicing techniques.

Parameters: Access to basic hand tools, hydraulic systems and related resources.

Outcomes The student will:

- 1. demonstrate safe work practices when working with hydraulic systems**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 explain hazards associated with pressure and heat build-up hydraulic systems
- 2. describe the functions of hydraulic components in a hydraulic system**
 - 2.1 describe the properties of hydraulic fluids in relation to:
 - 2.1.1 viscosity
 - 2.1.2 lubricating ability
 - 2.1.3 resistance to oxidation
 - 2.1.4 corrosion prevention
 - 2.2 identify the common types of connecting lines/hoses, fitting and seals
 - 2.3 describe the internal parts of a reservoir and state the purpose of filters, strainers and breathers
 - 2.4 describe the construction and operation of:
 - 2.4.1 cylinders
 - 2.4.2 gear and vane motors
 - 2.5 describe the function of:
 - 2.5.1 check and pressure control valves
 - 2.5.2 two- and four-way valves
 - 2.6 describe the construction and operation of gear, vane and piston pumps
 - 2.7 explain why and when accumulators are used in a hydraulic system
- 3. interpret parts and service manuals to provide appropriate maintenance and service procedures on a hydraulic system**
 - 3.1 identify and describe appropriate maintenance and service procedures on a hydraulic system
- 4. service hydraulic components**
 - 4.1 demonstrate how to:
 - 4.1.1 check fluid levels in reservoirs
 - 4.1.2 clean strainers
 - 4.1.3 replace system filters with the approved parts
 - 4.1.4 check seals for leaks and replace, if required
 - 4.1.5 replace a defective hose, line and fitting
 - 4.1.6 replace the hydraulic fluid in a system
- 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. identify possible life roles related to the skills and content of this cluster**
 - 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2130: DRIVE LINE

Level: Intermediate

Prerequisite: MEC1130: Mechanical Systems

Description: Students identify the purpose, describe the operation and perform the servicing of a vehicle drive line.

Parameters: Access to drive line units, hand tools, specialized drive line tools and related resources.

Outcomes: The student will:

- 1. demonstrate safe work practices when working with vehicle drive lines**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 identify potential back problems associated with lifting heavy objects
- 2. identify the purpose and describe the function of the major drive line components**
 - 2.1 list and describe the function of component assemblies in a drive line
 - 2.2 identify the construction, design features, operation and function of common drive line components
 - 2.3 differentiate between the following:
 - 2.3.1 slip yokes
 - 2.3.2 fixed yokes
 - 2.3.3 conventional universal joints including:
 - 2.3.3.1 constant velocity (CV) joints
 - 2.3.3.2 drive shaft
- 3. execute inspection, diagnostic, service and repair procedures on specific drive line components**
 - 3.1 inspect drive line components including:
 - 3.1.1 joints
 - 3.1.2 straps
 - 3.1.3 boots
 - 3.1.4 drive shafts/half shafts
 - 3.1.5 centre support bearings
 - 3.1.6 yokes
 - 3.2 repair the coupling joint or shaft, as required, to return it to serviceability according to manufacturer's specifications
 - 3.3 inspect the drive line components for alignment, wear and looseness
 - 3.4 identify the cause of noise or vibration and repair or recommend required 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2140: TRANSMISSIONS/TRANSAXLES

Level: Intermediate

Prerequisite: MEC2130: Drive Line

Description: Students perform inspection service and repair procedures on manual transmissions, transaxles and clutch assemblies.

Parameters: Access to pilot shafts, specialized manual transmission tools, presses, pullers and related resources, and clutch, transmission and transaxle units.

Outcomes: The student will:

- 1. demonstrate safe work practices when working on transmissions and transaxles**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures
 - 1.2 identify back problems associated with lifting heavy objects
- 2. identify parts and trace power flow through a clutch, manual transmission and differential and manual transaxle assembly**
 - 2.1 describe the operation of a clutch assembly, a manual transmission and a manual transaxle during various modes of vehicle operation
 - 2.2 describe the relationship that the clutch and manual gear box have to other parts of the drive line
 - 2.3 identify the parts of the assemblies, using the proper technical terms
 - 2.4 for each gear, identify the path of power through transmission or transaxle and compare the gear ratio of each power routing, as well as the direction of rotation
- 3. inspect, diagnose, service and repair clutch, manual transmission or manual transaxle assemblies**
 - 3.1 demonstrate how to:
 - 3.1.1 check clutch pedal operation, travel and free play adjustment
 - 3.1.2 remove clutch inspection cover and check for wear to the clutch disc and pressure plate, as well as other visually available parts
 - 3.1.3 inspect clutch linkage for faults and/or wear
 - 3.1.4 inspect shifting linkages for any undue looseness or signs of wear
 - 3.1.5 check lubricant for level and type and recommended change interval
 - 3.1.6 inspect mounts, braces and isolator cushions for wear fatigue or damage
 - 3.1.7 inspect the assembly for leakage and note location and seal at fault
 - 3.1.8 prepare a repair cost estimate, prior to commencement of repairs, as identified during inspection or servicing
 - 3.2 formulate probable causes for typical problems that develop with clutches including:
 - 3.2.1 grabbing
 - 3.2.2 slipping
 - 3.2.3 failing to release
 - 3.2.4 noise when disengaged
 - 3.2.5 noise when engaging
 - 3.3 where possible, relate the hypothetical situation to a real vehicle condition
 - 3.4 formulate probable causes for typical problems that develop with manual gear boxes including:
 - 3.4.1 gears clashing
 - 3.4.2 hard shifting
 - 3.4.3 jumping out of gear

- 3.4.4 noises in specific gears
- 3.4.5 inability to engage gears
- 3.4.6 shifter noisy or loose
- 3.4.7 bearing noises
- 3.5 perform the clutch repairs, as identified and estimated to the teacher and agreed upon by the owner of the vehicle

AND/OR

- 3.6 remove and reinstall a clutch disc, pressure plate assembly, pilot bearing and throw-out bearing; check each part to confirm the continued serviceability of the assembly and clean each part before reassembly; adjust linkage to specified clearances
- 3.7 adjust clutch linkage for correct free play at pedal or, in the case of an automatic clutch adjuster, confirm the operation as being correct
- 3.8 follow through on agreed-upon transmission/transaxle repairs, identified and estimated to the teacher and the owner of the vehicle

AND/OR

- 3.9 disassemble, inspect and reassemble a three- or four-speed manual transmission with external linkage and constant mesh gearing
- 3.10 replace manual transmission lubricant with the specified type

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. identify possible life roles related to the skills and content of this cluster

- 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2150: SUSPENSION SYSTEMS

Level: Intermediate

Prerequisite: MEC1150: Ride & Control Systems

Description: Students develop the knowledge, skills and attitudes necessary to service and maintain vehicle suspension systems.

Parameters: Access to suspension systems, specialized suspension tools and related resources.

Note: Customer work must be checked by certified technician.

Outcomes: The student will:

- 1. demonstrate safe work practices when working on suspension systems**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures when working on suspension components
- 2. identify the purpose and function of suspension parts**
 - 2.1 describe the basic types of front and rear suspensions used on motor vehicles; e.g., short, long arm suspension and MacPherson strut
 - 2.2 compare the advantages and disadvantages of using separate and integral frames in relation to suspension design, repair and servicing
 - 2.3 explain the advantage of using a:
 - 2.3.1 solid “I” beam
 - 2.3.2 split “I” beam
 - 2.3.3 independent front suspension and a:
 - 2.3.3.1 rigid suspension
 - 2.3.3.2 independent rear suspension
 - 2.4 explain why it is important to reduce the amount of unsprung weight
 - 2.5 list the positive and negative features of using coil, leaf, torsion, rubber biscuit and air springs
 - 2.6 explain the meaning of spring rate and travel
 - 2.7 list basic types and describe the operation of shock absorbers, mounting techniques and methods of testing
- 3. identify worn or defective suspension parts**
 - 3.1 describe typical wheel bearing faults; e.g., bent cage, etching, overheating, worn seal
 - 3.2 repack a front or rear wheel bearing
 - 3.3 lubricate suspension joints, where necessary
 - 3.4 inspect suspension components for damage and wear
 - 3.5 explain how ball joints are checked for wear
- 4. service a suspension system**
 - 4.1 remove and replace a:
 - 4.1.1 shock absorber
 - 4.1.2 coil spring
 - 4.1.3 ball joint
 - 4.1.4 strut
 - 4.2 identify the appropriate lifting and towing procedures relative to electronically controlled suspension systems

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. identify possible life roles related to the skills and content of this cluster

- 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2160: STEERING SYSTEMS

Level: Intermediate

Prerequisite: MEC1150: Ride & Control Systems

Description: Students develop the knowledge, skills and attitudes necessary to maintain a steering system.

Parameters: Access to steering systems, specialized steering tools and related resources.

Note: Customer work must be checked by certified technician.

Outcomes: The student will:

- 1. demonstrate safe work practices when working on steering systems**
 - 1.1 demonstrate knowledge of and follow laboratory safety procedures when working on steering systems, and explain the importance of proper adjustments and torques
- 2. identify different steering system designs and applications**
 - 2.1 identify common types of steering gears used to create the necessary mechanical advantages to overcome tire resistance; e.g., recirculating ball, rack and pinion
 - 2.2 identify and compare the operation of two or more steering boxes
 - 2.3 identify and compare the operation of common types of power steering pumps; e.g., roller, vane, slipper, gear
- 3. diagnose problems related to manual and power steering systems**
 - 3.1 demonstrate how to:
 - 3.1.1 overhaul and adjust a recirculating ball and rack and pinion steering gear
 - 3.1.2 diagnose power steering problems including:
 - 3.1.2.1 pressure testing
 - 3.1.2.2 flow testing
 - 3.1.2.3 electrical tests
- 4. service/repair a vehicle steering system**
 - 4.1 clean and inspect steering linkage for wear and replace, if necessary
 - 4.2 inspect steering joints, bushings and replace, if necessary
 - 4.3 inspect and service power steering components
- 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. identify possible life roles related to the skills and content of this cluster**
 - 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2170: METAL REPAIR & FINISHING

Level: Intermediate

Prerequisite: MEC1170: Metal Forming & Finishing

Description: Students analyze and repair metal damage.

Parameters: Access to Gas Metal Arc Welding (GMAW) and Oxyacetylene Welding (OAW) welders, basic auto body hand/power tools and related resources.

Outcomes: The student will:

- 1. demonstrate safe work practices when metal forming and finishing metal damage**
 - 1.1 demonstrate safe practices in relation to the:
 - 1.1.1 use of welding equipment
 - 1.1.2 use of solder and soldering equipment
 - 1.1.3 sheet metal straightening system
- 2. identify different damage conditions and repair procedures for metal damage**
 - 2.1 identify and describe the type/extent of minor sheet metal damage
 - 2.2 list sequence of repair
 - 2.3 identify and describe major sheet metal impact damage conditions including:
 - 2.3.1 direct
 - 2.3.2 indirect
 - 2.4 list sequence of repair
- 3. repair metal damage to a vehicle**
 - 3.1 demonstrate how to:
 - 3.1.1 perform metal straightening
 - 3.1.2 perform metal replacement work
 - 3.1.3 repair damaged aluminum panel
 - 3.1.4 repair a panel using body solder
 - 3.1.5 complete a large rust out 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2180: TRIM REPLACEMENT

Level: Intermediate

Prerequisite: None

Description: Students demonstrate the removal and repair of trim parts, with an emphasis on removal and installation without damage.

Parameters: Access to specialized trim tools and related resources.

Supporting Course: MEC1190: Surface Preparation 1

Outcomes: The student will:

- 1. demonstrate the safe use of tools and chemicals for trim replacement**
 - 1.1 identify hazards when working with trim
- 2. investigate interior and exterior trim systems used to enhance appearances**
 - 2.1 identify the materials used for interior trim and the fastening system for each, and describe the correct method of removal
 - 2.2 describe the methods to remove and install interior trim
 - 2.3 describe precautions to be adhered to when removing and installing trim
 - 2.4 describe methods used to attach trim accessories, door locks, mirrors, etc.
 - 2.5 explain how to remove and replace specified trim
 - 2.6 identify fasteners specific to exterior trim, including clips and adhesives
 - 2.7 explain the inherent value of decals, vinyl and overlays
 - 2.8 describe procedures for the removal of decals, vinyl and overlays
 - 2.9 describe the function of weather stripping
 - 2.10 identify two or three different methods of weather stripping and explain the significance of the differences
 - 2.11 identify two or three procedures needed to remove accessories and implications for repair or replacement
- 3. remove and install trim and weather stripping**
 - 3.1 demonstrate correct procedures and use of tools used in the removal of mouldings, emblems and accessories
 - 3.2 install selected exterior trim
 - 3.3 successfully remove and install a door seal, test seal and adjust hardware accordingly
- 4. analyze and install enhancement trim e.g., locks, mirrors, lights**
- 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. identify possible life roles related to the skills and content of this cluster**
 - 6.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 6.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2190: SURFACE PREPARATION 2

Level: Intermediate

Prerequisite: MEC1190: Surface Preparation 1

Description: Students perform advanced surface preparations.

Parameters: Access to auto body hand/power tools and related resources.

Outcomes: The student will:

- 1. demonstrate safe practices when performing advanced surface preparations**
 - 1.1 demonstrate safe practices in relation to chemicals
- 2. explain materials and practices for performing advanced surface preparations**
 - 2.1 identify specific metal treatments including:
 - 2.1.1 aluminum
 - 2.1.2 plymetal
 - 2.1.3 galvanized
 - 2.1.4 other
 - 2.2 identify equipment, materials and accepted procedures in compounding surfaces
 - 2.3 match adhesion promoters to the type of plastic being finished
 - 2.4 use correct cleaning agent to match plastics and product used
 - 2.5 identify and describe custom masking methods
- 3. carry out an advanced surface preparation**
 - 3.1 demonstrate how to:
 - 3.1.1 prepare bare metal
 - 3.1.2 clean and treat surface rust as conditions dictate
 - 3.1.3 compound surfaces
 - 3.1.4 prime plastic and metal components
 - 3.1.5 custom mask a small project
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2200: REFINISHING 1

Level: Intermediate

Prerequisite: MEC2190: Surface Preparation 2

Description: Students demonstrate metal surface refinishing procedures.

Parameters: Access to spray equipment and related resources.

Outcomes: The student will:

- 1. demonstrate safe practices and follow all warnings identified by product manufacturers, Workplace Hazardous Materials Information System (WHMIS), and Occupational Health and Safety**
 - 1.1 demonstrate knowledge of health hazards and environmental impacts of products used
 - 1.2 demonstrate use of personal protective equipment, as recommended by manufacturer
- 2. identify and describe refinishing products and equipment**
 - 2.1 identify types of topcoats, solvents and additives
 - 2.2 identify and select colour and type of paint on a given vehicle
 - 2.3 demonstrate knowledge of proper procedure in paint preparation
 - 2.4 inspect pre-paint project and determine deficiencies
 - 2.5 identify basic spray gun types
 - 2.6 show how to troubleshoot spray gun
 - 2.7 demonstrate knowledge of refinishing equipment accessories
 - 2.8 demonstrate knowledge of proper topcoat application techniques
 - 2.9 show how to troubleshoot basic application problems
- 3. demonstrate proper refinishing application**
 - 3.1 prepare booth for spraying
 - 3.2 prepare and apply topcoat
 - 3.3 demonstrate knowledge of and perform the cleaning of spray guns
 - 3.4 perform final detailing by:
 - 3.4.1 removing masking tape
 - 3.4.2 checking and correcting surface defects
 - 3.4.3 completing the final cleaning and inspection
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2210: TOUCH-UP & FINISHING

Level: Intermediate

Prerequisite: MEC2200: Refinishing 1

Description: Students determine and use the appropriate materials, tools and processes for minor surface repairs.

Parameters: Access to spray equipment and related resources.

Supporting Course: MEC1160: Structures & Materials

Outcomes: The student will:

- 1. practice safe handling, use and disposal of hazardous touch-up and finishing products**
 - 1.1 demonstrate knowledge of the safety precautions required for:
 - 1.1.1 feather edging with dual action orbital sanders
 - 1.1.2 handling of primer products and putties
 - 1.1.3 spraying primers
- 2. identify the techniques and products required to complete a minor surface repair**
 - 2.1 identify the imperfections in paint or freshly prepared surfaces; e.g., sand scratches, runs, dry spray, orange peel, bull's eye, sags, chips
 - 2.2 demonstrate the spot repair concepts, as required by industry, including colour matching concepts of two types of paint including:
 - 2.2.1 solids
 - 2.2.2 metallics
 - 2.3 describe the advantages of the base/clear system of paint in colour matching
- 3. demonstrate the skills required to prepare and refinish a spot repair**
 - 3.1 perform a surface flaw repair of a painted panel, using sandpaper and compounds without repainting
 - 3.2 prepare a panel for a spot repair and follow appropriate instructions in the application of primer and paint
 - 3.3 show proper procedures in the application and sanding of putties
- 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. identify possible life roles related to the skills and content of this cluster

- 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2220: INTERIOR REPAIRS

Level: Intermediate

Prerequisite: MEC1160: Structures & Materials

Description: Students search for and use the appropriate products and techniques to maintain vehicle interior surface materials.

Parameters: Access to interior materials, products, tools, equipment and related resources.

Outcomes: The student will:

- 1. practice safe handling, use and disposal of hazardous cleaning and repair products**
 - 1.1 demonstrate knowledge of and follow safety rules and procedures for the products used for interior care
 - 1.2 identify hazards associated with the improper use of certain volatile chemicals
- 2. analyze type of repair or restoration required, and identify the techniques/products necessary to repair and/or restore an interior surface**
 - 2.1 identify cleaners for the following materials:
 - 2.1.1 leather
 - 2.1.2 cloth
 - 2.1.3 vinyl
 - 2.1.4 rubber
 - 2.1.5 plastic
 - 2.1.6 polyurethane foam
 - 2.2 describe the correct procedures and products that can safely be used for cleaning and maintenance; e.g., volatile cleaners, neutral soaps, specialty products
 - 2.3 compile an identification of interior parts and clean the parts to “like-new” condition or “best as can be expected,” depending on the condition; include glass in the cleaning
 - 2.4 identify and describe the nature of stains; e.g., soil, grease, oil, tar, blood, wax, chocolate, non-chocolate candy
 - 2.5 identify correct procedures for the removal of three of the above
 - 2.6 compile a chart showing the stain removal procedures, including special products, if required
- 3. clean and/or repair an interior surface**
 - 3.1 replace the vinyl or cloth covering on a door rest
 - 3.2 complete a vinyl or plastic repair of a crack or hole in an interior part and refinish
 - 3.3 successfully remove and replace weather stripping in either a door glass area or door opening
 - 3.4 identify signs of poor sealing by weather stripping and adjust, if possible
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2910: MEC PROJECT B

Level: Intermediate

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Intermediate project courses must connect with a minimum of two CTS courses, one of which must be at the intermediate level and be in the same occupational area as the project course. The other CTS course(s) can be at any level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

- 1. identify the connection between this project course and two or more CTS courses**
 - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
 - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
- 2. propose the project and/or performance**
 - 2.1 identify the project and/or performance by:
 - 2.1.1 preparing a plan
 - 2.1.2 clarifying the purposes
 - 2.1.3 defining the deliverables
 - 2.1.4 specifying time lines
 - 2.1.5 explaining terminology, tools and processes
 - 2.1.6 defining resources; e.g., materials, costs, staffing
 - 2.2 identify and comply with all related health and safety standards
 - 2.3 define assessment standards (indicators for success)
 - 2.4 present the proposal and obtain necessary approvals

The student will:

- 3. meet goals as defined within the plan**
 - 3.1 complete the project and/or performance as outlined
 - 3.2 monitor the project and/or performance and make necessary adjustments
 - 3.3 present the project and/or performance, indicating the:
 - 3.3.1 outcomes attained
 - 3.3.2 relationship of outcomes to goals originally set

- 3.4 evaluate the project and/or performance, indicating the:
 - 3.4.1 processes and strategies used
 - 3.4.2 recommendations on how the project and/or performance could have been improved
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2920: MEC PROJECT C

Level: Intermediate

Prerequisite: None

Description: Students develop project design and management skills to extend and enhance competencies and skills in other CTS courses through contexts that are personally relevant.

Parameters: Intermediate project courses must connect with a minimum of two CTS courses, one of which must be at the intermediate level and be in the same occupational area as the project course. The other CTS course(s) can be at any level from any occupational area.

Project courses cannot be connected to other project courses or practicum courses.

All projects and/or performances, whether teacher- or student-led, must include a course outline or student proposal.

Outcomes:

The teacher/student will:

- 1. identify the connection between this project course and two or more CTS courses**
 - 1.1 identify the outcome(s) from each identified CTS course that support the project and/or performance deliverables
 - 1.2 explain how these outcomes are being connected to the project and/or performance deliverables
- 2. propose the project and/or performance**
 - 2.1 identify the project and/or performance by:
 - 2.1.1 preparing a plan
 - 2.1.2 clarifying the purposes
 - 2.1.3 defining the deliverables
 - 2.1.4 specifying time lines
 - 2.1.5 explaining terminology, tools and processes
 - 2.1.6 defining resources; e.g., materials, costs, staffing
 - 2.2 identify and comply with all related health and safety standards
 - 2.3 define assessment standards (indicators for success)
 - 2.4 present the proposal and obtain necessary approvals

The student will:

- 3. meet goals as defined within the plan**
 - 3.1 complete the project and/or performance as outlined
 - 3.2 monitor the project and/or performance and make necessary adjustments
 - 3.3 present the project and/or performance, indicating the:
 - 3.3.1 outcomes attained
 - 3.3.2 relationship of outcomes to goals originally set

- 3.4 evaluate the project and/or performance, indicating the:
 - 3.4.1 processes and strategies used
 - 3.4.2 recommendations on how the project and/or performance could have been improved
- 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. identify possible life roles related to the skills and content of this cluster**
 - 5.1 recognize and then analyze the opportunities and barriers in the immediate environment
 - 5.2 identify potential resources to minimize barriers and maximize opportunities

COURSE MEC2950: MEC INTERMEDIATE PRACTICUM

Level: Intermediate

Prerequisite: None

Description: Students apply prior learning and demonstrate the attitudes, skills and knowledge required by an external organization to achieve a credential/credentials or an articulation.

Parameters: This practicum course, which may be delivered on- or off-campus, should be accessed only by students continuing to work toward attaining a recognized credential/credentials or an articulation offered by an external organization. This course must be connected to at least one CTS course from the same occupational area and cannot be used in conjunction with any advanced (3XXX) level course. A practicum course cannot be delivered as a stand-alone course, cannot be combined with a CTS project course and cannot be used in conjunction with the Registered Apprenticeship Program or the Green Certificate Program.

Outcomes: The student will:

- 1. perform assigned tasks and responsibilities, as required by the organization granting the credential(s) or articulation**
 - 1.1 identify regulations and regulatory bodies related to the credential(s) or articulation
 - 1.2 describe personal roles and responsibilities, including:
 - 1.2.1 key responsibilities
 - 1.2.2 support functions/responsibilities/expectations
 - 1.2.3 code of ethics and/or conduct
 - 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
 - 1.4 demonstrate basic employability skills and perform assigned tasks and responsibilities related to the credential(s) or articulation
- 2. analyze personal performance in relation to established standards**
 - 2.1 evaluate application of the attitudes, skills and knowledge 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 adherence to workplace legislation related to health and safety
 - 2.4 evaluate the performance requirements of an individual who is trained, experienced and employed in a related occupation in terms of:
 - 2.4.1 training and certification
 - 2.4.2 interpersonal skills
 - 2.4.3 technical skills
 - 2.4.4 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

4. identify possible life roles related to the skills and content of this cluster

- 4.1 recognize and then analyze the opportunities and barriers in the immediate environment
- 4.2 identify potential resources to minimize barriers and maximize opportunities