

## **COURSE MEC3010: BUYING & SELLING VEHICLES**

**Level:** Advanced

**Prerequisite:** None

**Description:** Students develop the skills required to make an informed purchase or sale of a vehicle.

**Parameters:** Access to new and used vehicle reports and other related resources.

**Outcomes:** The student will:

### **1. investigate and determine the type of vehicle that best meets a defined need**

- 1.1 identify safety concerns when dealing with unfamiliar vehicles
- 1.2 identify the factors that affect the choice of a vehicle including:
  - 1.2.1 intended use and length of service
  - 1.2.2 required performance and economy
  - 1.2.3 funds or financing available
  - 1.2.4 emotional appeal
  - 1.2.5 consumer reports

### **2. evaluate and describe the condition of a vehicle**

- 2.1 identify the parts of a vehicle that can be inspected by:
  - 2.1.1 visual means
  - 2.1.2 road testing
  - 2.1.3 instrument checks
- 2.2 calculate the value of a vehicle by:
  - 2.2.1 having it appraised by more than one experienced individual
  - 2.2.2 comparing the appraisal to published prices
  - 2.2.3 calculating the value through depreciation
  - 2.2.4 comparing with the asking price of similar vehicles

### **3. plan a strategy to sell or buy a vehicle**

- 3.1 describe the advantages and disadvantages of purchasing a vehicle:
  - 3.1.1 privately
  - 3.1.2 by auction
  - 3.1.3 through dealers
  - 3.1.4 through lease agencies
  - 3.1.5 through rental agencies
  - 3.1.6 through government agencies
- 3.2 select or recommend a seller based on:
  - 3.2.1 the seller's reputation
  - 3.2.2 ability to service
  - 3.2.3 willingness to back the product
  - 3.2.4 number of vehicles to choose from
- 3.3 describe the advantages of selling a vehicle:
  - 3.3.1 on consignment
  - 3.3.2 privately
  - 3.3.3 on a trade

- 3.4 clean and restore the appearance of the vehicle to “next-to-new” standards
- 3.5 organize and prepare a record of the vehicle’s service and maintenance record
- 4. recognize the legal rights and responsibilities of both the seller and purchaser**
  - 4.1 identify legal steps when buying and selling a vehicle
  - 4.2 prepare an offer to purchase including:
    - 4.2.1 condition and age of the vehicle
    - 4.2.2 dealer cost
    - 4.2.3 profit level
    - 4.2.4 value of trade-in
    - 4.2.5 cost of financing
    - 4.2.6 ability to pay or make payment
    - 4.2.7 possible liens
- 5. identify safety concerns and regulations when buying and selling vehicles that have been repaired after an accident**
  - 5.1 research and identify safety concerns when:
    - 5.1.1 buying a vehicle
    - 5.1.2 selling a vehicle that has had extensive repairs due to an accident
  - 5.2 research and identify Internet sites providing vehicle information; e.g., vehicle information report from Alberta Transportation
- 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 MEC3020: VEHICLE VALUE APPRAISAL**

**Level:** Advanced

**Prerequisite:** MEC2020: Vehicle Maintenance

**Description:** Students demonstrate the procedures used by the vehicle repair industry to estimate the cost of a repair and the market value of a vehicle.

**Parameters:** Access to new and used vehicle reports and other related resources.

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures when inspecting vehicles**
  - 1.1 demonstrate knowledge of and follow predetermined shop guidelines when working on or around vehicles
- 2. inspect a vehicle to determine its overall condition and repair requirements**
  - 2.1 investigate and report on the condition of a vehicle using a comprehensive method, including owner interview and inspection report completion
  - 2.2 examine and report on the system(s) that require repair to determine the extent of reconditioning required to return the system(s) to serviceability
  - 2.3 construct a basis for vehicle valuation by determining the vehicle characteristics that would contribute to market value; e.g., year, make, model, options, mileage, relative condition, emotional appeal, popularity
  - 2.4 complete an evaluation checklist
  - 2.5 list probable and possible parts required to effect a complete repair using original equipment, aftermarket and used parts
  - 2.6 use accepted industry labour guides to calculate the correct labour charges for the required parts replacements, considering all modifications or options to the subject vehicle
- 3. apply standards used by the vehicle repair industry to appraise the condition and value of a vehicle**
  - 3.1 identify the wholesale value of a subject vehicle using the accepted wholesale reference guides
  - 3.2 calculate the market value of a subject vehicle by comparative pricing on three similar vehicles in the local marketplace
  - 3.3 identify the wholesale value of a subject vehicle using the accepted wholesale reference guides
  - 3.4 calculate the market value of a subject vehicle by comparative pricing on three similar vehicles in the local marketplace
- 4. outline the best business practices to follow when situations of uncertainty or conflicting interests occur relative to an appraisal**
  - 4.1 describe business practices when resolving conflicts related to estimations and evaluations
- 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 MEC3030: ENGINE DIAGNOSIS**

**Level:** Advanced

**Prerequisite:** MEC1040: Engine Fundamentals

**Description:** Students learn to diagnose the condition of an engine for worn or damaged parts and/or improper adjustments.

**Parameters:** Access to a vehicle engine, diagnostic test equipment and related resources.

**Supporting Courses:** MEC2030: Lubrication & Cooling  
MEC2040: Fuel & Exhaust Systems  
MEC2060: Ignition Systems  
MEC2070: Emission Controls

**Outcomes:** The student will:

- 1. demonstrate safe working practices while conducting an engine performance diagnosis**
  - 1.1 demonstrate safety while diagnosing engines
- 2. diagnose the condition of an operating engine, using body senses; e.g., touch, sight, hearing**
  - 2.1 list possible engine problems based on information provided
  - 2.2 describe through listening, observing and touching a running and/or stopped engine whether abnormalities exist
  - 2.3 identify engine type and manufacturer's specifications
- 3. assess engine conditions, using specialized test equipment and on-board diagnostic systems**
  - 3.1 demonstrate how to:
    - 3.1.1 analyze intake manifold vacuum
    - 3.1.2 check ignition timing and advance mechanisms
    - 3.1.3 check for proper idle speeds
    - 3.1.4 check engine oil pressure
    - 3.1.5 check cylinder compression readings
    - 3.1.6 check exhaust emissions
  - 3.2 identify any abnormalities on the vehicle using gauges and lights, including self-diagnostics
  - 3.3 use an engine analyzer and/or computerized tester to describe the condition of various engine systems as per capability of the test unit
- 4. provide a report that describes the condition of an engine**
  - 4.1 compile all information and generate a report for the customer outlining defects found and recommended corrections
- 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 MEC3040: ENGINE TUNE-UP**

**Level:** Advanced

**Prerequisite:** MEC3030: Engine Diagnosis

**Description:** Students diagnose, service and repair engine, fuel, ignition, charging and starting systems.

**Parameters:** Access to engine diagnostic equipment and supporting resources.

**Supporting Courses:** MEC2030: Lubrication & Cooling  
MEC2040: Fuel & Exhaust Systems  
MEC2060: Ignition Systems  
MEC2070: Emission Controls  
MEC2090: Electrical Components  
MEC3030: Engine Diagnosis

**Outcomes:** The student will:

- 1. demonstrate safe work practices while performing an engine tune-up**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
- 2. determine the mechanical condition of an engine**
  - 1.2 demonstrate how to:
    - 2.1.1 perform a static and dynamic compression test to determine the mechanical condition of an engine
    - 2.1.2 do a leakdown test
  - 2.2 record and analyze results
- 3. check and service a carburetor and a fuel injection system**
  - 3.1 identify whether a carburetor problem exists and document specific faults
  - 3.2 demonstrate how to:
    - 3.2.1 remove, clean and adjust a carburetor
    - 3.2.2 check and/or replace filters
    - 3.2.3 test fuel pump pressure and capacity
    - 3.2.4 clean fuel injectors
- 4. use diagnostic equipment to check, interpret and service an ignition, and to check charging, starting, emission control and exhaust systems**
  - 4.1. demonstrate how to:
    - 4.1.1 use diagnostic equipment to diagnose an ignition system
    - 4.1.2 service spark plugs, wires, a distributor cap, a rotor, points, a pick-up coil, a spark advance
    - 4.1.3 check and adjust ignition timing
    - 4.1.4 operate starter and determine if problem exists; e.g., noises, drive engagement, speed
    - 4.1.5 check starter amperage draw and correct
    - 4.1.6 check starter circuit voltage drops and correct
    - 4.1.7 check battery condition and service
    - 4.1.8 do a visual check; i.e., wires, connections, belt condition/tension
    - 4.1.9 check alternator for noise and vibrations
    - 4.1.10 check alternator output and voltage regulation and correct

- 4.1.11 check charging circuit voltage drops and correct faults
- 4.1.12 diagnose computer-controlled systems and document faults
- 4.1.13 identify which emissions are being controlled
- 4.1.14 identify what emission control devices exist on a vehicle
- 4.1.15 identify to what standards these devices control emissions
- 4.1.16 check if vehicle meets standards and correct
- 4.1.17 road test vehicle to determine engine performance and driveability
- 4.1.18 compile a report outlining test results, work done and present condition of engine and related parts/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. 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 MEC3050: ENGINE REPLACEMENT**

**Level:** Advanced

**Prerequisite:** MEC1040: Engine Fundamentals

**Description:** Students remove and install an engine in a chassis.

**Parameters:** Access to an engine lift, tools/equipment and supporting instructions and resources.

**Supporting Courses:** MEC3030: Engine Diagnosis  
MEC3040: Engine Tune-up

**Outcomes:** The student will:

- 1. use engine lifting equipment and related tools safely**
  - 1.1 demonstrate knowledge of types of lifting tools/equipment available for engines
  - 1.2 demonstrate knowledge of where to attach devices
  - 1.3 explain procedures to follow to remove and install an engine
  - 1.4 describe and follow precautions when working with a vehicle equipped with air conditioning
- 2. identify steps involved to prepare a vehicle for engine removal**
  - 2.1 explain how to prepare a vehicle for engine removal
  - 2.2 identify all wiring, hoses, cables and pipes that require disconnecting
  - 2.3 identify units and special fasteners that will be removed
- 3. apply mechanical skills to remove and replace engine accessories**
  - 3.1 identify the most appropriate method and remove and replace the following:
    - 3.1.1 wires
    - 3.1.2 cables
    - 3.1.3 hoses
    - 3.1.4 pipes
    - 3.1.5 accessories
- 4. apply mechanical skills to remove and install an engine in a chassis**
  - 4.1 disconnect and service battery
  - 4.2 drain and dispose of lubricant and coolant
  - 4.3 remove appropriate wires, hoses, cables, pipes and units
  - 4.4 remove and/or install an engine
  - 4.5 dismantle/assemble an engine
  - 4.6 install lubricants/coolant
  - 4.7 service and store a battery
  - 4.8 drain/store or dispose of fluids
  - 4.9 identify the most appropriate method and remove and replace the following:
    - 4.9.1 cylinder head
    - 4.9.2 cylinder block
- 5. perform post-engine installation start-up and adjustment procedures**
  - 5.1 adjust and service an engine
  - 5.2 start engine and check for proper performance
  - 5.3 perform post-engine installation vehicle clean-up for customer pick-up

**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 MEC3060: ENGINE RECONDITIONING – HEAD**

**Level:** Advanced

**Prerequisite:** MEC1040: Engine Fundamentals

**Description:** Students determine the need for service and perform the required service on the cylinder head and related components of an engine.

**Parameters:** Access to cylinder head rebuilding equipment, measuring tools and related resources.

**Supporting Courses:** MEC3030: Engine Diagnosis  
MEC3040: Engine Tune-up

**Outcomes:** The student will:

- 1. demonstrate safe work procedures related to cylinder head work**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
- 2. determine the condition of a cylinder head before and after disassembly**
  - 2.1 perform checks to determine the condition of a cylinder head and related parts
  - 2.2 describe blueprinting procedures for cylinder heads
  - 2.3 calculate costs of blueprinting
- 3. recondition a cylinder head and its related components**
  - 3.1 clean a cylinder head and related parts
  - 3.2 inspect parts for serviceability
  - 3.3 machine parts
- 4. reassemble and install a cylinder head**
  - 4.1 assemble a cylinder head and check valve spring and stem height
  - 4.2 service push rods, lifters, rocker arms, chains, gears, a camshaft, pulleys and belts
  - 4.3 install a cylinder head and make adjustments
  - 4.4 address unique concerns related to overhead camshaft engines
- 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 MEC3070: ENGINE RECONDITIONING – BLOCK**

**Level:** Advanced

**Prerequisite:** MEC1040: Engine Fundamentals

**Description:** Students determine the need for service and perform service on a cylinder block assembly and related components of an engine.

**Parameters:** Access to engine measuring tools, cylinder block reconditioning tools/equipment and related resources.

**Supporting Courses:** MEC3030: Engine Diagnosis  
MEC3040: Engine Tune-up  
MEC3060: Engine Reconditioning – Head

**Outcomes:** The student will:

- 1. demonstrate safe work procedures while reconditioning a cylinder block**
  - 1.1 demonstrate knowledge of and follow safety practices related to reconditioning cylinder blocks
- 2. determine the condition of a cylinder block before and after disassembly**
  - 2.1 list possible engine problems based on information provided
  - 2.2 describe blueprinting procedures for cylinder blocks
  - 2.3 estimate costs
  - 2.4 clean all engine block components
  - 2.5 inspect the following components for serviceability:
    - 2.5.1 block alignment, warpage and cracks
    - 2.5.2 cylinder(s) size, taper, roundness and general condition
    - 2.5.3 crankshaft bends, cracks, journal size, tapes, roundness and general condition
    - 2.5.4 camshaft(s) bends, lobe/lift wear and journal size
    - 2.5.5 piston(s) size, taper, clearance and condition of pin(s) and grooves
    - 2.5.6 connecting rod(s) big/small-end size and straightness
    - 2.5.7 lifter(s) base wear, rate of leakdown
    - 2.5.8 bearing(s) size and wear
    - 2.5.9 chains, sprockets, pulleys and belts
    - 2.5.10 other
  - 2.6 identify what servicing is required
- 3. recondition a cylinder block and its related components**
  - 3.1 machine/service components, as required
- 4. reassemble a cylinder block assembly**
  - 4.1 assemble an engine block, observing proper tolerances
- 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 MEC3080: ALTERNATIVE ENERGY SYSTEMS**

**Level:** Advanced

**Prerequisite:** MEC2050: Alternative Fuel Engines

**Description:** Students describe why vehicle manufacturers continue to build the crank-piston internal combustion gasoline engine. Students also identify and describe future engine designs.

**Parameters:** Access to support resources.

**Supporting Course:** MEC1040: Engine Fundamentals

**Outcomes:** The student will:

- 1. research and describe the historical development of piston engine designs from Nicolaus Otto's engine to the present**
  - 1.1 prepare and present a report detailing the origin of the first working internal combustion engine, the major advances made in the design of internal combustion engines and the manufacturing process improvements that made those innovations possible over the history of engine design
  - 1.2 describe the development of and compare the relative efficacy of alternative contemporary design engines to the large-scale manufacture of motor vehicles
- 2. describe the use of different fuels and engine designs in modern vehicles**
  - 2.1 identify the rationale for change in engine design considering environmental and fuel supply issues
  - 2.2 prepare and present a study of initiatives for using alternative fuels in engines and the factors affecting these advancements
  - 2.3 examine and report on the present initiatives to build electric-powered cars and batteries of sufficient capacity to power them
- 3. identify and describe future developments in fuels and engine designs**
  - 3.1 identify which direction of alternative energy systems development promises to be most successful at this time
- 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 MEC3090: COMPUTER SYSTEMS**

**Level:** Advanced

**Prerequisite:** MEC2070: Emission Controls

**Description:** Students provide an overview of the applications of computer management systems used in modern vehicles.

**Parameters:** Access to computer management system diagnostic equipment and related resources.

**Supporting Course:** MEC2090: Electrical Components

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures related to computer management systems**
  - 1.1 demonstrate knowledge of and follow practices that promote safety for people and the environment
- 2. identify the principles that apply to all computer management systems**
  - 2.1 identify the different computer control systems that are now available on vehicles
  - 2.2 explain the functions these computer control systems perform
  - 2.3 state the ways in which these computer control systems replaced mechanical systems
  - 2.4 demonstrate how selected computer control systems work compared to earlier mechanical systems
  - 2.5 identify the principles and functions of computer control systems
- 3. locate the components of selected computer management systems and describe their function**
  - 3.1 locate and identify the parts of selected computer management systems
- 4. demonstrate how computer management systems operate**
  - 4.1 describe the function of the parts of a selected computer management system
  - 4.2 forecast types of computer management systems that may be used on future vehicles
- 5. perform diagnostic analyses of selected computer management systems and make required repairs to or replace malfunctioning parts**
  - 5.1 perform diagnostic analysis of selected computer management systems
  - 5.2 replace parts or make necessary repairs to correct malfunctioning computer management systems
- 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 MEC3100: SAFETY SYSTEMS**

**Level:** Advanced

**Prerequisite:** MEC2100: Power Assist Accessories

**Description:** Students describe how safety systems can be tested, diagnosed, replaced or repaired.

**Parameters:** Access to related resources and vehicles with safety systems.

**Note:** Customer work must be checked by a certified technician.

**Supporting Course:** MEC2090: Electrical Components

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures while working with safety systems**
  - 1.1 demonstrate knowledge of and follow established safety rules when working on safety systems
  - 1.2 demonstrate the use of safety procedures and precautions necessary to avoid damage to vehicle safety systems
- 2. list and compare safety systems that protect vehicle occupants**
  - 2.1 describe vehicle safety systems and indicate the types of systems and dates when various systems were introduced
  - 2.2 explain the effect various safety systems have had in reducing fatalities
  - 2.3 identify and describe which safety systems are most effective in terms of saving human lives, cost of manufacture and ease of use
- 3. diagnose and service vehicle safety systems**
  - 3.1 identify safety systems in selected vehicles
  - 3.2 list the parts of these safety systems
  - 3.3 describe the function of these safety systems
  - 3.4 diagnose the condition and any problems found on safety systems
  - 3.5 replace parts or make repairs to malfunctioning parts of safety systems
- 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 MEC3110: CLIMATE CONTROL**

**Level:** Advanced

**Prerequisite:** MEC2030: Lubrication & Cooling

**Description:** Students expand their knowledge of the purpose, operation and servicing of standard heating and air conditioning systems.

**Parameters:** Access to air conditioning test equipment and related resources.

**Note:** Work must be supervised and checked by a certified technician when student is working with refrigerants.

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures when working with climate control systems**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
  - 1.2 generate a list of safety concerns when working with refrigerants
  - 1.3 outline the legal restrictions about the disposal and recycling of R12 refrigerants
  - 1.4 identify the safety and environmental concerns with R12 and R12 replacements
- 2. identify the purpose and describe the functions of heater and air conditioning system components**
  - 2.1 describe the operation of a heater; e.g., heat exchange, the operation of controls for fan speed, air flow controls
  - 2.2 identify components of an air conditioning system
  - 2.3 describe refrigeration principles
  - 2.4 describe air conditioning system operation
- 3. perform inspection, diagnosis, service and repair procedures on heater and air conditioning systems**
  - 3.1 identify the causes and repair procedures for standard heater operation malfunctions; e.g., blocked or leaking heater core, temperature cable adjustment, fan motor noise, vibration, speed abnormalities
  - 3.2 show how to conduct a visual and tactile check of the operation of the refrigerant system and assess the service needs
  - 3.3 identify the cause of malfunction in a climate control system and repair, as required, after consulting with the vehicle owner/teacher
  - 3.4 pressure test the air conditioning refrigerant system and confirm the normalcy of system operation by comparing data with the service manual
  - 3.5 on the air conditioning system, perform a leak test, evacuate system, recharge, then perform leak test again
- 4. identify global concerns about the release of refrigerants into the atmosphere as well as the alternatives to standard refrigerants, and identify the required recycling procedures**
  - 4.1 research the effect of refrigerants on the ecosystem
  - 4.2 research alternate refrigerants

**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 MEC3120: POWER ASSISTING**

**Level:** Advanced

**Prerequisite:** MEC2100: Power Assist Accessories

**Description:** Students further develop their knowledge of the purpose, operation, service and repair of pneumatic, hydraulic and electric power assist devices.

**Parameters:** Access to vacuum/pressure gauges, electrical test equipment and related resources.

**Supporting Course:** MEC2120: Hydraulic Accessories

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures when working with power assists**
  - 1.1 demonstrate knowledge of and follow established laboratory procedures
- 2. identify applications of power assist components to various vehicle systems and determine the rationale for each application**
  - 2.1 describe situations in vehicle system design where power assist mechanisms are used
  - 2.2 define the advantages of power assist over manual control and identify the type of power assist most appropriate for use in a particular situation such as steering or braking
- 3. perform service and repair procedures to pneumatic, hydraulic and electric power assist devices according to manufacturer's recommendations**
  - 3.1 complete an inspection of a hydraulic power assist device using manufacturer's prescribed diagnostic procedures
  - 3.2 estimate the repair costs for a defective or broken hydraulic assist and confer with the teacher or vehicle owner regarding the repair requirements
  - 3.3 complete an inspection of a pneumatic assist device or system using prescribed diagnostic procedures
  - 3.4 prepare an estimate of the repair requirements of a pneumatic assist and confer with the teacher or vehicle owner regarding the repair needs
  - 3.5 complete an inspection of an electric assist device using a prescribed diagnostic procedure
  - 3.6 prepare an estimate of the repair requirements for an electric assist device and confer with the teacher or vehicle owner regarding the required repairs
  - 3.7 complete a repair procedure on an electric assist device or system
  - 3.8 complete a repair procedure on a hydraulic assist unit
  - 3.9 complete a repair procedure on a pneumatic assist unit or system
- 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

## **MODULE MEC3130: AUTOMATIC TRANSMISSIONS**

**Level:** Advanced

**Prerequisite:** MEC1110: Pneumatics & Hydraulics

**Description:** Students develop knowledge of automatic transmissions and transaxles and skills in diagnosing and executing minor automatic transmission and transaxle repair requirements.

**Parameters:** Access to automatic transmission diagnostic tools and support resources.

**Note:** Customer work must be supervised and checked by a certified technician.

**Supporting Course:** MEC2140: Transmissions/Transaxles

**Outcomes:** The student will:

- 1. demonstrate established safety and care procedures when working with automatic transmissions and transaxles**
  - 1.1 demonstrate knowledge of and follow established laboratory procedures
- 2. identify the parts of a torque converter and automatic transmission or transaxle, and determine the path of power and the shifting control operation in each gear setting**
  - 2.1 describe the operation of a torque converter
  - 2.2 compare the internal structure of a lock-up converter and nonlock-up converter
  - 2.3 identify the parts of a transmission assembly by naming pieces on a diagram or parts of a disassembled unit
  - 2.4 using a hydraulic flow diagram, explain the unit engaged and shift process for each gear position
  - 2.5 interpret shifting characteristics resulting from differentiated inputs; e.g., high road speed, pulling heavy loads, throttle valve position
- 3. inspect, diagnose, service and complete a minor repair to an automatic transmission and transaxle assembly**
  - 3.1 use the service manual and a road test to determine probable causes of noted conditions
  - 3.2 complete diagnostic procedures developed from service inquiry, which may include linkage adjustments, pressure testing and further road testing as well as partial disassembly of the transmission
  - 3.3 perform a stall test according to manufacturer's specifications
  - 3.4 list parts for required repairs
  - 3.5 inspect transmission/transaxle oil level and develop an assessment of its odour and colour
  - 3.6 change transmission fluid and filter as described in the appropriate service manual
  - 3.7 check unit for oil leakage and determine a cause for loss of oil
  - 3.8 repair a fluid leak
  - 3.9 evaluate the condition and adjustment of linkage
  - 3.10 locate and correct a transmission linkage or band adjustment, where required
  - 3.11 remove, clean and reinstall a transmission valve body assembly
- 4. perform a service and repair procedure on an automatic transmission**
  - 4.1 remove, repair or replace an automatic transmission assembly

**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 MEC3140: DRIVE TRAIN REPAIR**

**Level:** Advanced

**Prerequisite:** MEC2130: Drive Line

**Description:** Students perform overhauls on clutch, transmission and differential assemblies.

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

**Supporting Course:** MEC2140: Transmissions/Transaxles

**Outcomes:** The student will:

- 1. demonstrate established safe work practices and follow established laboratory procedures**
  - 1.1 demonstrate knowledge of and follow established laboratory procedures
- 2. replace a clutch assembly**
  - 2.1 remove and replace a clutch assembly
  - 2.2 identify the serviceability of each part
  - 2.3 adjust linkage to specified clearance
- 3. explain the operation, removal, overhaul and replacement of a manual transmission/transaxle**
  - 3.1 explain the operation and power flow in various transmissions and transaxles
  - 3.2 remove and replace specified transmission and overhaul to manufacturer's specifications
- 4. describe, measure and adjust a differential assembly**
  - 4.1 describe types of differential assemblies and explain the operation of the following:
    - 4.1.1 full-floating
    - 4.1.2 semi-floating
    - 4.1.3 hunting
    - 4.1.4 non-hunting
  - 4.2 describe the operation of a limited slip differential assembly
  - 4.3 measure and adjust a differential assembly
- 5. describe and overhaul a drive axle assembly**
  - 5.1 describe drive axle operation and components of four-wheel, front-wheel and rear-wheel drive vehicles
  - 5.2 overhaul constant velocity joints
- 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 MEC3150: WHEEL ALIGNMENT**

**Level:** Advanced

**Prerequisite:** MEC2150: Suspension Systems

**Description:** Students develop the knowledge, skills and attitudes necessary for repairing and aligning various vehicle steering systems.

**Parameters:** Access to wheel alignment equipment and supporting resources.

**Note:** Customer work must be supervised and checked by a certified technician.

**Supporting Course:** MEC2160: Steering Systems

**Outcomes:** The student will:

- 1. follow established safe work procedures**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
- 2. investigate and determine the condition of various components that affect wheel alignment and tracking**
  - 2.1 solve common steering and suspension problems including:
    - 2.1.1 loose steering
    - 2.1.2 hard steering
    - 2.1.3 vehicle wander
    - 2.1.4 pulling to one side
    - 2.1.5 wheel shimmy
    - 2.1.6 wheel tramp
    - 2.1.7 improper tire wear
- 3. identify measurements and angles used to check and adjust suspension and steering systems**
  - 3.1 define and explain camber, caster, toe, steering axis inclination, toe-out on turns and tracking
- 4. use specialized alignment equipment to check and adjust alignment angles on various suspension types to manufacturer's specifications**
  - 4.1 demonstrate how to:
    - 4.1.1 check and correct tire pressures and determine reason for abnormal tire wear
    - 4.1.2 check and adjust wheel bearings
    - 4.1.3 check and adjust wheel/tire runout
    - 4.1.4 check and correct tire balance
    - 4.1.5 check and correct steering linkage problems
    - 4.1.6 check and adjust steering gear
    - 4.1.7 check and correct shock absorber problems
    - 4.1.8 check and correct riding height
    - 4.1.9 check vehicle tracking
  - 4.2 check alignment angles for a given vehicle using the appropriate alignment equipment
  - 4.3 adjust alignment angles to manufacturer's specifications on at least two different suspension types

**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 MEC3160: BODY REPAIR ESTIMATION**

**Level:** Advanced

**Prerequisite:** MEC1160: Structures & Materials

**Description:** Students apply knowledge in estimating, including paying close attention to detail in determining the cost of a repair.

**Parameters:** Access to supporting resources.

**Outcomes:** The student will:

- 1. demonstrate established laboratory procedures and safe work practices**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
  - 1.2 identify mechanical and electrical components often damaged in collision, and state appropriate safety precautions in dealing with gasoline, oil, air conditioning and battery acid hazards
- 2. identify and describe types of body damage**
  - 2.1 list and describe the terms used in the appraisal industry
  - 2.2 describe vehicle construction systems, e.g., unibody, framed, and safety requirements
  - 2.3 examine the effects of collision on vehicle structure, parts and passenger safety equipment
  - 2.4 demonstrate the effects of forces on metal and show how manufacturing techniques are used to absorb collision energy
  - 2.5 define the terms “primary damage,” “secondary damage” and “hidden damage”
- 3. outline skills needed to successfully estimate collision damage**
  - 3.1 identify related damaged parts
  - 3.2 investigate and describe collision damage to determine direction of damage, identify parts damaged, including hidden damage, and list signs of hidden damage
  - 3.3 conduct tests to determine mechanical and/or electrical functions in order to properly estimate cost of collision damage
- 4. complete an estimate by determining what parts/components are to be replaced or repaired and their subsequent costs**
  - 4.1 estimate cost including parts, labour and miscellaneous
  - 4.2 calculate the cost of original equipment, aftermarket and used parts that could be used in a repair
  - 4.3 complete a replacement parts list for a given collision, including cost, extended cost and contracted costs
  - 4.4 list examples of hidden and other costs that must be included in an estimate of collision damage
  - 4.5 describe the responsibility of the shop to the customer, the insurer and legal parties in doing an estimate; e.g., safety of vehicle
  - 4.6 define write-off and explain when a vehicle is considered a write-off and non-repairable
  - 4.7 explain the advantages of having knowledge of vehicle structure and repair procedures when completing an estimate for repair
- 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 MEC3170: DAMAGE ANALYSIS**

**Level:** Advanced

**Prerequisite:** MEC2170: Metal Repair & Finishing

**Description:** Students identify and examine physical damage caused by collisions and learn cost estimating procedures.

**Parameters:** Access to a damaged vehicle, measuring gauges and related resources.

**Supporting Courses:** MEC2150: Suspension Systems  
MEC2160: Steering Systems

**Outcomes:** The student will:

- 1. demonstrate established safe work procedures**
  - 1.1 demonstrate knowledge of and follow established laboratory procedures
- 2. identify types and signs of collision damage**
  - 2.1 describe manufacturer's methods used in vehicle construction and define the terms used to identify vehicle body parts
  - 2.2 describe methods used in vehicle construction to control damage through energy transfer and differences in structural strength
  - 2.3 identify the specific occupant safety features built into the vehicle as required by law or provided as a vehicle option
  - 2.4 demonstrate basic principles of estimating damage repair and apply to a specific situation
  - 2.5 estimate the repair or replacement of safety equipment damaged in a collision
  - 2.6 identify the basic frame structures used in auto construction, and describe the measurement charts used to determine misalignment
- 3. examine and use measurements to determine the extent of vehicle damage**
  - 3.1 calculate frame alignment measurements to determine the extent of misalignment and explain the results of the measurements
  - 3.2 use frame gauges and charts
  - 3.3 analyze measurements and determine repair procedure
- 4. prepare a repair strategy for a given vehicle**
  - 4.1 explain the value of using used, aftermarket or original equipment parts in any given repair
  - 4.2 complete a damage analysis for a given vehicle
  - 4.3 prepare a strategy plan showing correct repair sequence
- 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 MEC3180: DAMAGE REPAIR 1**

**Level:** Advanced

**Prerequisite:** MEC2170: Metal Repair & Finishing

**Description:** Students examine the methods used to complete a repair involving removing, replacing and aligning body parts.

**Parameters:** Access to specialized auto body tools, hand tools and related resources.

**Note:** The student must have access to instruction from an individual with journeyperson qualifications if students are involved in customer work.

**Supporting Course:** MEC3170: Damage Analysis

**Outcomes:** The student will:

### **1. demonstrate established safety procedures**

- 1.1 demonstrate knowledge of and follow established laboratory procedures
- 1.2 demonstrate approved safety procedures in the use of jacks, jack stands, impact wrenches, torches, plasma arc and abrasive cutters to remove or replace parts
- 1.3 demonstrate knowledge, skills and attitudes in the safe use of hand tools

### **2. follow an approved sequence of repairs involving removing and replacing damaged external parts**

- 2.1 examine damage to external parts and identify appropriate repair sequence
- 2.2 complete a list of required parts and show cost effectiveness of using aftermarket or used parts
- 2.3 list methods used in the manufacture of vehicles to align adjacent parts, including shims, slotted holes and bending
- 2.4 examine the bumper shock system and explain the effects of collision to bumper shocks and their alignment
- 2.5 describe the importance of correct alignment of body parts and the effects of misalignment, both aesthetically and physically

### **3. align parts used to repair and prepare components for painting or priming**

- 3.1 demonstrate knowledge and skill in the preparation of existing flanges, edges and mounting points used for the replacement of new parts
- 3.2 safely remove and replace a door, hood and/or trunk lid
- 3.3 replace and align a fender

### **4. remove, repair or replace trim parts, as required**

- 4.1 explain the function of trim
- 4.2 identify methods of trim fastening
- 4.3 successfully remove trim and damaged parts, showing knowledge of tools and care for property
- 4.4 install new or original trim and recognize the value of using original equipment trim parts

### **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 MEC3190: DAMAGE REPAIR 2**

**Level:** Advanced

**Prerequisite:** MEC3180: Damage Repair 1

**Description:** Students examine methods used to complete a collision repair involving unibody parts replacement and frame correction.

**Parameters:** Access to hydraulic push/pull equipment, Gas Metal Arc Welding (GMAW) and cutting equipment, basic auto body tools and related resources.

**Note:** The students must have access to instruction from an individual with journeyperson qualifications if they are involved in customer work.

**Supporting Courses:** MEC2150: Suspension Systems  
MEC2160: Steering Systems  
MEC2170: Metal Repair & Finishing  
MEC2190: Surface Preparation 2

**Outcomes:** The student will:

- 1. demonstrate established safe work procedures**
  - 1.1 demonstrate knowledge of and follow laboratory safety procedures
  - 1.2 demonstrate safety procedures required in the use of hydraulic jacks, GMAW welding and oxyacetylene and/or plasma arc cutting equipment
  - 1.3 list the safety implications of collision damage causing suspension misalignment, including legal implications
- 2. describe construction features and materials used in vehicle bodies and methods of repair**
  - 2.1 identify and describe three kinds of frame structures, giving the advantages and applications of each
  - 2.2 define the terms high strength steel (HSS) and high strength low alloy (HSLA) steel, and explain the need for these metals in unibody construction
  - 2.3 describe the bench system used by professional auto repair shops in unibody collision repair
- 3. identify misalignment of frame and suspension parts and components**
  - 3.1 describe and use measurements and measurement charts to determine the degree of misalignment
  - 3.2 define the terms “twist,” “sag,” “sway” and “diamond”
  - 3.3 describe measurements that will indicate each of the above conditions
- 4. use a bench frame-straightening system and related measurements to straighten/align a component**
  - 4.1 use a bench, or equivalent, frame-straightening system to correct alignment
  - 4.2 align and fabricate damaged parts
- 5. correct frame/body alignment involving replacement of unibody panels and use of hydraulic jacks and welders**
  - 5.1 describe the correct procedure used to repair a unibody frame that shows misalignment
  - 5.2 demonstrate how to use hydraulic jacking systems in the repair of collision damage

- 6. explain the importance of proper frame and suspension alignment, including legal implications**
  - 6.1 identify three kinds of suspension systems used by automakers
  - 6.2 define the terms toe-in, camber and castor, and explain how each affects car tracking and driveability
- 7. demonstrate basic competencies**
  - 7.1 demonstrate fundamental skills to:
    - 7.1.1 communicate
    - 7.1.2 manage information
    - 7.1.3 use numbers
    - 7.1.4 think and solve problems
  - 7.2 demonstrate personal management skills to:
    - 7.2.1 demonstrate positive attitudes and behaviours
    - 7.2.2 be responsible
    - 7.2.3 be adaptable
    - 7.2.4 learn continuously
    - 7.2.5 work safely
  - 7.3 demonstrate teamwork skills to:
    - 7.3.1 work with others
    - 7.3.2 participate in projects and tasks
- 8. create a transitional strategy to accommodate personal changes and build personal values**
  - 8.1 identify short-term and long-term goals
  - 8.2 identify steps to achieve goals

## **COURSE MEC3200: REFINISHING 2**

**Level:** Advanced

**Prerequisite:** MEC2200: Refinishing 1

**Description:** Students demonstrate finishing skills and techniques related to the preparation and application of metallic paints.

**Parameters:** Access to spray equipment and related resources.

**Outcomes:** The student will:

- 1. demonstrate safe work 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. describe topcoats, solvents and additives used in surface finishes**
  - 2.1 identify three types of topcoats and describe characteristics showing similarities and differences
  - 2.2 demonstrate and explain correct procedures in preparing topcoats for application including correct selection of solvents and additives
- 3. apply metallic, tutone, base/clear coat and acrylic enamel finishes**
  - 3.1 identify and select colour and type of paint for given vehicle identification plates and code books
  - 3.2 identify differences in spray gun types and uses
  - 3.3 describe refinishing equipment accessories
  - 3.4 select, mix and apply two or more of the following finishes:
    - 3.4.1 acrylic enamel
    - 3.4.2 metallic
    - 3.4.3 tutone
    - 3.4.4 base/clear coat
  - 3.5 complete a vehicle recoat
- 4. apply problem-solving techniques to paint and equipment problems**
  - 4.1 solve paint and equipment problems observed during application
- 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 MEC3210: PLASTIC & FIBREGLASS**

**Level:** Advanced

**Prerequisite:** MEC1160: Structures & Materials

**Description:** Students determine the types of plastic and fibreglass materials required for repairs and perform appropriate repair procedures.

**Parameters:** Access to plastic welding equipment and related materials and resources.

**Outcomes:** The student will:

- 1. identify hazards and safety precautions to be observed when working with plastics**
  - 1.1 demonstrate knowledge of and follow accepted safety practices when working with hot liquids, plastic solvents, resins and equipment
- 2. describe types of plastics, welding equipment and bonding processes used to repair plastic parts**
  - 2.1 identify and state characteristics of plastics used in vehicle manufacture
  - 2.2 identify plastics that can be repaired by welding and bonding
  - 2.3 explain the types of plastic welding equipment available and when this repair process should be used
  - 2.4 identify welding rods
  - 2.5 explain which bonding agents are available and their application
  - 2.6 identify types of plastic and decide whether to weld or bond
  - 2.7 state why a particular process was chosen
- 3. apply plastic welding and/or bonding techniques to repair a plastic component**
  - 3.1 identify correct layout
  - 3.2 prepare “witness lines” for repeat layout
  - 3.3 prepare/clean plastic material as per instructions for process used
  - 3.4 create a solid lay-up
  - 3.5 weld/bond materials
  - 3.6 prepare damaged area
  - 3.7 prepare material
  - 3.8 apply material
- 4. identify types of fibreglass materials and repair procedures**
  - 4.1 identify three kinds of fibreglass material
  - 4.2 identify and describe related resin/hardeners and repair procedures
- 5. perform a fibreglass repair on a component**
  - 5.1 using safe handling techniques and prepare damaged area
  - 5.2 demonstrate correct application of material
  - 5.3 demonstrate approved finishing steps
- 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 MEC3220: GLASS REPLACEMENT**

**Level:** Advanced

**Prerequisite:** MEC2180: Trim Replacement

**Description:** Students demonstrate knowledge, skills and practice related to vehicle glass installation and adjustment.

**Parameters:** Access to glass removal tools, related materials/resources and glazed vehicles.

**Outcomes:** The student will:

**1. handle glass and related materials safely**

- 1.1 identify safety concerns when working with glass
- 1.2 show knowledge of safety procedures needed in glass removal
- 1.3 identify installation product safety concerns in the glass industry

**2. identify glass types and glass retaining systems**

- 2.1 identify types of glass and retaining systems used in the auto industry
- 2.2 outline the removal procedures required for two different systems
- 2.3 show knowledge of trim parts used around glass

**3. demonstrate knowledge of tools and procedures used by glass technicians**

- 3.1 identify moulding retainers, glass seal products and procedures for installation
- 3.2 identify door glass adjustment methods

**4. complete glass removal installations and adjustments**

- 4.1 remove front or rear glass following safety guidelines
- 4.2 install several glass systems, including door glass and side lights
- 4.3 adjust door glass on several different 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. 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 MEC3230: REFINISHING 3**

**Level:** Advanced

**Prerequisite:** MEC3200: Refinishing 2

**Description:** Students demonstrate knowledge and skills of advanced finishing techniques, including custom painting, mixing, tinting, colour and texture matching.

**Parameters:** Access to spray equipment, surface repair equipment and related resources.

**Outcomes:** The student will:

- 1. demonstrate safe work practices, and follow all product warnings and labels identified by the 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 knowledge of special procedures in the preparation of plastic and vinyl parts
- 2. investigate and describe advanced products, techniques and equipment used to achieve an acceptable original equipment manufacturer finish**
  - 2.1 explain alternative spray equipment
  - 2.2 describe types and uses of spray booths
  - 2.3 explain compressors and drying systems
  - 2.4 identify styles and techniques of custom painting
  - 2.5 explain mixing and tinting systems
  - 2.6 analyze colour/texture and identify the following:
    - 2.6.1 lightness/darkness
    - 2.6.2 cast
    - 2.6.3 brightness
  - 2.7 describe how colours are matched
  - 2.8 explain how to create textured finishes
  - 2.9 describe various paint mixing/tinting procedures
- 3. apply an advanced level finish**
  - 3.1 demonstrate advanced topcoat application techniques
  - 3.2 identify styles and techniques of custom painting
  - 3.3 apply a custom paint job
  - 3.4 perform advanced troubleshooting of application/equipment problems
  - 3.5 demonstrate proper selection and application of colour coats for plastic and vinyl
- 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 MEC3910: MEC PROJECT D**

**Level:** Advanced

**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:** Advanced project courses must connect with a minimum of two CTS courses, one of which must be at the advanced level and be in the same occupational area as the project course. The other CTS course(s) must be at least at the intermediate 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. 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 MEC3920: MEC PROJECT E**

**Level:** Advanced

**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:** Advanced project courses must connect with a minimum of two CTS courses, one of which must be at the advanced level and be in the same occupational area as the project course. The other CTS course(s) must be at least at the intermediate 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. 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 MEC3950: MEC ADVANCED PRACTICUM**

**Level:** Advanced

**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 introductory (1XXX) 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. 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