

MODULE CURRICULUM AND ASSESSMENT STANDARDS

SECTION F: ADVANCED LEVEL

The following pages define the curriculum and assessment standards for the advanced level of Mechanics.

Advanced level modules demand a higher level of expertise and help prepare students for entry into the workplace or a related post-secondary program.

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MODULE MEC3010: BUYING & SELLING VEHICLES**Level:** Advanced**Theme:** Vehicle Design and Ownership**Prerequisite:** None**Module Description:** Students develop the skills required to make an informed purchase or sale of a vehicle.**Module Parameters:** Access to new and used vehicle reports and other related resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> investigate and determine the type of vehicle that best meets a defined need 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a report indicating: <ul style="list-style-type: none"> reasons for selecting a particular type of vehicle how vehicle will meet financial, emotional and service constraints. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Buying & Selling Vehicles, Part 1, MEC3010-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
<ul style="list-style-type: none"> evaluate and describe the condition of a vehicle 	<ul style="list-style-type: none"> inspection and comparison of selected vehicle to predetermined criteria. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Buying & Selling Vehicles, Part 2, MEC3010-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	35
<ul style="list-style-type: none"> plan a strategy to sell or buy a vehicle 	<ul style="list-style-type: none"> planned strategy: <ul style="list-style-type: none"> outlining steps in selling or buying a vehicle determining the value of the vehicle advertising for or promoting a vehicle. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Buying & Selling Vehicles, Part 3, MEC3010-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25

MODULE MEC3010: BUYING & SELLING VEHICLES (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • recognize the legal rights and responsibilities of both the seller and purchaser • identify safety concerns and regulations when buying and selling vehicles that have been repaired after an accident • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • investigation of legal implications/obligations involved in: <ul style="list-style-type: none"> – buying a vehicle – selling a vehicle. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Buying & Selling Vehicles, Part 4, MEC3010–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
	<ul style="list-style-type: none"> • identification of safety-related concerns when: <ul style="list-style-type: none"> – buying a vehicle – selling a vehicle that has had extensive repairs because of an accident. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Buying & Selling Vehicles, Part 5, MEC3010–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify safety concerns when dealing with unfamiliar vehicles. 	

MODULE MEC3010: BUYING & SELLING VEHICLES (continued)

Concept	Specific Learner Expectations	Notes
Consumer Awareness	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify the factors that affect the choice of a vehicle, such as: <ul style="list-style-type: none"> – intended use and length of service – required performance and economy – funds or financing available – emotional appeal – consumer reports • describe the advantages and disadvantages of purchasing a vehicle: <ul style="list-style-type: none"> – privately – by auction – through dealers – lease agencies – rental agencies – government agencies • identify the parts of a vehicle that can be inspected by: <ul style="list-style-type: none"> – visual means – road testing – instrument checks • prepare an offer to purchase including: <ul style="list-style-type: none"> – condition and age of the vehicle – dealer cost – profit level – value of trade in – cost of financing – ability to pay or make payment – possible liens • select or recommend a seller based on: <ul style="list-style-type: none"> – the seller’s reputation – ability to service – willingness to back the product – number of vehicles to choose from. 	<p>Consider engine, brakes, steering and body components.</p> <p>Read and discuss the conditions of sale commonly used in new and used vehicle dealerships.</p> <p>Discuss the legal implications of a lien on a vehicle.</p>
Inspect/Service	<ul style="list-style-type: none"> • clean and restore the appearance of the vehicle to next to new standards • organize and prepare a record of the vehicle’s service and maintenance record 	<p>Could be combined with MEC1020 Vehicle Service & Care and MEC2010 Vehicle Detailing.</p>

MODULE MEC3010: BUYING & SELLING VEHICLES (continued)

Concept	Specific Learner Expectations	Notes
Inspect/Service (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • calculate the value of a vehicle by: <ul style="list-style-type: none"> – having it appraised by more than one experienced individual – comparing the appraisal to published prices – calculating the value through depreciation – comparing the asking price of similar vehicles • describe the advantages of selling a vehicle: <ul style="list-style-type: none"> – on consignment – privately – on a trade • identify legal steps when buying and selling a vehicle. 	<p>Information can be gained from a new and used car dealer.</p> <p>The Blue Book is one of the published sources that provides a price guide.</p>
Careers	<ul style="list-style-type: none"> • identify career opportunities related to: <ul style="list-style-type: none"> – vehicle sales – appraisals – financing. 	

MODULE MEC3020: VEHICLE VALUE APPRAISAL**Level:** Advanced**Theme:** Vehicle Design and Ownership**Prerequisite:** MEC2020 Vehicle Maintenance**Module Description:** Students demonstrate the procedures used by industry to estimate the cost of a repair and the market value of a vehicle.**Module Parameters:** Access to new and used vehicle reports and other related resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safety and care procedures when inspecting vehicles 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in: <ul style="list-style-type: none"> following established shop/lab routines safety and care as related to vehicle inspections. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Vehicle Value Appraisal, Part 1, MEC3020-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> inspect a vehicle to determine its overall condition and repair requirements 	<ul style="list-style-type: none"> observed performance while completing an inspection: <ul style="list-style-type: none"> covering all systems reporting required service/repair estimating costs of required service/repair. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Vehicle Value Appraisal, Part 2, MEC3020-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	35
<ul style="list-style-type: none"> apply standards used by the vehicle repair industry to appraise the condition and value of a vehicle 	<ul style="list-style-type: none"> creation of vehicle appraisal using industry standards. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Vehicle Value Appraisal, Part 3, MEC3020-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	45

MODULE MEC3020: VEHICLE VALUE APPRAISAL (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • outline the best business practices to follow when situations of uncertainty or conflicting interests occur relative to an appraisal • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • outlining business practices to follow during problematic situations. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Vehicle Value Appraisal, Part 4, MEC3020-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p style="text-align: center;">10</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow predetermined shop guidelines when working on or around vehicles. 	
<p>Identify/Analyze</p>	<ul style="list-style-type: none"> • investigate and report on the condition of a vehicle using a comprehensive method, including owner interview and inspection report completion • examine and report on the system(s) that require repair to determine the extent of reconditioning required to return the system(s) to serviceability • 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 and popularity) • complete an evaluation checklist 	

MODULE MEC3020: VEHICLE VALUE APPRAISAL (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • list probable and possible parts required to effect a complete repair using original equipment (OEM), aftermarket and used parts • using accepted industry labour guide, calculate the correct labour charges for the required parts replacements, considering all modifications or options to the subject vehicle • identify the wholesale value of a subject vehicle using the accepted wholesale reference guides • calculate the market value of a subject vehicle by comparative pricing on three similar vehicles in the local marketplace • describe business practice when resolving conflicts related to estimations and evaluations. 	<p>Include the repair estimate of cost, any shop supply, taxes or other charges that would contribute to the total estimated price.</p> <p>Compare, Red Book, Black Book, Blue Book figures.</p> <p>Use Alberta Motor Association as resource.</p> <p>Explore linkages with auto industry.</p> <p>Use consumer guide.</p>
Inspect/Report	<ul style="list-style-type: none"> • describe the economics of repairing a vehicle considering all factors affecting market resale evaluation • prepare an estimation/evaluation summary for presentation to a vehicle owner • identify the best course of completing the requested repairs ensuring the profitability of the business enterprise. 	
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to vehicle value appraisal. 	

MODULE MEC3030: ENGINE DIAGNOSIS**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC1040 Engine Fundamentals**Module Description:** Students learn to diagnose the condition of an engine for worn or damaged parts and/or improper adjustments.**Module Parameters:** Access to vehicle engine, diagnostic test equipment and related resources.**Supporting Modules:** MEC2030 Lubrication & Cooling
MEC2040 Fuel & Exhaust Systems
MEC2060 Ignition Systems
MEC2070 Emission Controls**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate safe working practices while conducting an engine performance diagnosis 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in: <ul style="list-style-type: none"> following safe lab practices recognizing and controlling potential hazards during engine diagnosis. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> diagnose the condition of an operating engine, using body senses (touch, sight, hearing), <ul style="list-style-type: none"> observed performance in demonstrating ability to diagnose engine faults by using: <ul style="list-style-type: none"> sense of touch sense of sight sense of hearing. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Diagnosis, Part 1, MEC3030-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25

MODULE MEC3030: ENGINE DIAGNOSIS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • assess engine conditions, using specialized test equipment and on-board diagnostic systems • provide a report that describes the condition of an engine • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance in using equipment to determine the condition of a given engines: <ul style="list-style-type: none"> – ignition systems – fuel system – cooling/exhaust system – emission control system – mechanical system. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Diagnosis, Part 2, MEC3030–1</i> <i>Laboratory Problem Solving, MECLPS</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • report generated to reflect the true condition of a given engine. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Diagnosis, Part 3, MEC3030–1</i> <i>Illustrative Example: Engine Diagnosis, MEC3030–2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p style="text-align: center;">50</p> <p style="text-align: center;">15</p> <p style="text-align: center;">Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate safety while diagnosing engines. 	

MODULE MEC3030: ENGINE DIAGNOSIS (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • list possible engine problems based on information provided • describe through listening, observing, touching a running and/or stopped engine, whether abnormalities exist. • identify engine type and manufacturer's specifications • show how to: <ul style="list-style-type: none"> – analyze intake manifold vacuum – check ignition timing and advance mechanisms – check for proper idle speeds – check engine oil pressure – check cylinder compression readings – check exhaust emissions • identify any abnormalities on the vehicle, using gauges and lights, including self-diagnostics • use an engine analyzer and/or computerized tester to describe the condition of various engine systems as per capability of the test unit • compile all information and generate a report for the customer outlining defects found and recommended corrections. 	<p>Owner complaints.</p> <p>For example, noises, blow-by, oil leaks, loose connections/parts, oil/coolant conditions, belts, hoses and filters.</p> <p>Students generate their own format.</p>
Careers	<ul style="list-style-type: none"> • identify further education and career opportunities related to engine performance and diagnosis. 	

MODULE MEC3040: ENGINE TUNE-UP**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC3030 Engine Diagnosis**Module Description:** Students diagnose, service and repair engine, fuel, ignition, charging and starting systems.**Module Parameters:** Access to engine diagnostic equipment and supporting resources.

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

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate safe work practices while performing an engine tune-up determine the mechanical condition of an engine 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in: <ul style="list-style-type: none"> following shop/lab established procedures recognizing and observing aspects that protect equipment and the vehicle. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> observed performance in the use of equipment and results obtained in determining mechanical condition of an engine. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Tune-up, Part 1, MEC3040-1</i> <i>Illustrative Example: Engine Tune-up Part 1 MEC3040-2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15

MODULE MEC3040: ENGINE TUNE-UP (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> check and service a carburetor and a fuel injection system use diagnostic equipment to check, interpret and service ignition, charging, starting, emission control and exhaust systems demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in servicing fuel systems including: <ul style="list-style-type: none"> carburetors fuel injectors related components. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Tune-Up, Part 2, MEC3040-1</i> <i>Illustrative Example: Engine Tune-Up Part 2 MEC3040-2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25
	<ul style="list-style-type: none"> observed performance in use of equipment to check, interpret and service engine ignition, charging, starting, emission and exhaust systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Tune-Up, Part 3, MEC3040-1</i> <i>Illustrative Example: Engine Tune-Up Part 3 MEC3040-2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	50
	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate knowledge of and follow lab safety procedures. 	Personal, property and environment.

MODULE MEC3040: ENGINE TUNE-UP (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • show how to: <ul style="list-style-type: none"> – perform a static and dynamic compression test to determine mechanical condition of an engine – do a leak down test • record and analyze results. 	
Inspect/Service and Repair	<ul style="list-style-type: none"> • identify whether a carburetor problem exists and document specific faults • demonstrate how to: <ul style="list-style-type: none"> – remove, clean and adjust a carburetor – check and/or replace filters – test fuel pump pressure and capacity – clean fuel injectors – use diagnostic equipment to diagnose ignition system – service spark plugs, wires, distributor cap, rotor, points, pick-up coil, spark advance – check and adjust ignition timing – operate starter and determine if problem exists (noises, drive engagement, speed, etc.) – check starter amperage draw and correct – check starter circuit voltage drops and correct – check battery condition, and service – do a visual check; i.e., wires, connections, belt condition/tension – check alternator for noise, vibration – check alternator output and voltage regulation and correct – check charging circuit voltage drops and correct faults – diagnose computer controlled systems and document faults 	<p>Diagnostic equipment required.</p>

MODULE MEC3040: ENGINE TUNE-UP (continued)

Concept	Specific Learner Expectations	Notes
Inspect/Service and Repair (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> – identify which emissions are being controlled – identify what emission control devices exist on vehicle – identify to what standards these devices control emissions – check if vehicle meets standards and correct – road test vehicle to determine engine performance and driveability – compile a report outlining test results, work done and present condition of engine and related parts/systems. 	<p>If equipment is available.</p> <p>Diagnostic printout.</p>
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to engine tune-ups. 	

MODULE MEC3050: ENGINE REPLACEMENT**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC1040 Engine Fundamentals**Module Description:** Students remove and install an engine in a chassis.**Module Parameters:** Access to an engine lift, tools/equipment and supporting instructions and resources.**Supporting Modules:** MEC3030 Engine Diagnosis
MEC3040 Engine Tune-up**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> use engine lifting equipment and related tools safely 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in: <ul style="list-style-type: none"> application and use of lifting tools and equipment safely removing and installing an engine following established shop/lab routines. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> identify steps involved to prepare a vehicle for engine removal 	<ul style="list-style-type: none"> determination of: <ul style="list-style-type: none"> how engine will be removed the order of steps to be taken to remove an engine. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Replacement, Part 1, MEC3050–1</i> <i>Illustrative Example: Replacement, MEC3050–2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
<ul style="list-style-type: none"> apply mechanical skills to remove and replace engine accessories 	<ul style="list-style-type: none"> removing and replacing engine accessories and related components for a given a vehicle. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Replacement, Part 2, MEC3050–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	20

MODULE MEC3050: ENGINE REPLACEMENT (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • apply mechanical skills to remove and install an engine in a chassis • perform post engine installation start-up and adjustment procedures • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance in removing and installing an engine. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Replacement, Part 3, MEC3050-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	30
	<ul style="list-style-type: none"> • observed performance in post-engine installation start-up and adjustments. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Replacement, Part 4, MEC3050-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25
	<ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the instructional period. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of types of lifting tools/equipment available for engines • demonstrate knowledge of where to attach devices • explain procedures to follow to remove and install an engine • describe and follow precautions when working with vehicle equipped with air conditioning. 	<p>Review hazards associated with lifting engines.</p> <p>Tool, bolt size, location and torque.</p>

MODULE MEC3050: ENGINE REPLACEMENT (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain how to prepare a vehicle for engine removal • identify all wiring, hoses, cables, pipes that require disconnecting • identify units and special fasteners that will be removed. 	<p>Pay attention to paint protection; scribing/ marking components.</p> <p>Masking, labelling and photographic techniques.</p> <p>With or without transmission, motor mounts.</p>
Inspect/Service	<ul style="list-style-type: none"> • disconnect and service battery • drain and dispose of lubricant and coolant • remove appropriate wires, hoses, cables, pipes, units • remove and/or install an engine • dismantle/assemble an engine • install lubricants/coolant • service and store battery • drain/store or dispose fluids • identify the most appropriate method and remove and replace the following: <ul style="list-style-type: none"> – wires – cables – hoses – pipes – accessories – cylinder head – cylinder block • adjust and service engine 	<p>Blocking fuel line; fasteners organized.</p> <p>Allow for rebuilt components to be used such as heads and short blocks assemblies.</p> <p>Have students be aware of gasoline removal and storage precautions.</p> <p>Organizing fasteners.</p> <p>Identification of disconnects for later connects.</p> <p>Depending on circumstance, engine may be removed as an assembly.</p>

MODULE MEC3050: ENGINE REPLACEMENT (continued)

Concept	Specific Learner Expectations	Notes
Inspect/Service (continued)	<i>The student should:</i> <ul style="list-style-type: none">• start engine and check for proper performance• perform post-engine installation vehicle clean-up for customer pick-up.	Module maybe combined with MEC3030 Engine Diagnosis, MEC3040 Engine Tune-ups, MEC3060 Engine Reconditioning 1 MEC3070 Engine Reconditioning 2.
Careers	<ul style="list-style-type: none">• identify further education and work opportunities related to engine removal and installation.	Consider trade related areas such as machinist and welder.

MODULE MEC3060: ENGINE RECONDITIONING 1**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC3050 Engine Replacement**Module Description:** Students determine the need for service, and perform the required service, on the cylinder head and related components of an engine.**Module Parameter:** Access to cylinder head rebuilding equipment measuring tools and related resources.**Supporting Modules:** MEC3030 Engine Diagnosis
MEC3040 Engine Tune-up**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate safe work procedures related to cylinder head work 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in following: <ul style="list-style-type: none"> precautions related to removal and installation of cylinder head(s) safe practices in reconditioning cylinder head(s). <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> determine the condition of a cylinder head before and after disassembly 	<ul style="list-style-type: none"> a diagnostic report that: <ul style="list-style-type: none"> describes the overall condition of a cylinder head repair work/reconditioning required. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Head Reconditioning, Part 1, MEC3060-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15

MODULE MEC3060: ENGINE RECONDITIONING 1 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • recondition a cylinder head and its related components 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance in: <ul style="list-style-type: none"> – disassembly of a cylinder head – checking/measuring to determine condition of cylinder head, valves, seats, guides, springs – reconditioning valves, seats and guides – assembly of cylinder head and required checks— valve spring and stem heights – checking condition of related components: <ul style="list-style-type: none"> • rocker arms (shafts) • push rods • camshaft • lifters • sprockets, gears, chains. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Head Reconditioning, Part 2, MEC3060–1</i> <i>Illustrative Example: Cylinder Head Reconditioning, MEC3060–2, Cylinder Head Assembly Measurement, MEC3060–3</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>60</p>
<ul style="list-style-type: none"> • reassemble and install a cylinder head 	<ul style="list-style-type: none"> • observed performance in: <ul style="list-style-type: none"> – reassembling a cylinder head according to manufacturer’s recommended procedures – installation of cylinder head and related components observing torque and sequence, head gasket positioning and other related gaskets – adjustments related to the work. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Head Reconditioning, Part 3, MEC3060–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p>
<ul style="list-style-type: none"> • demonstrate basic competencies. 	<ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

MODULE MEC3060: ENGINE RECONDITIONING 1 (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow lab safety procedures. 	
Identify/Analyze	<ul style="list-style-type: none"> • perform checks to determine condition of cylinder head and related parts • describe blue-printing procedures for cylinder heads • calculate costs of blue-printing. 	<p>Compression test, vacuum test, valve timing, oil pressure.</p> <p>Reference: <i>Step-By-Step Engine Blue Printing</i>, Rick Voegelin.</p>
Inspect/Service	<ul style="list-style-type: none"> • clean cylinder head and related parts • inspect parts for serviceability • machine parts • assemble cylinder head and check valve spring and stem height • service push rods, lifters, rocker arms, chain, gears and camshaft, pulleys, belts • install cylinder head and make adjustments • address unique concerns related to overhead camshaft engines • run engine and evaluate work done • adjust to specifications. 	<p>Field trips to machine shops.</p> <p>Cracks, warpage, guide, valve stem wear.</p> <p>Grind valves, seats, recondition guides.</p> <p>Torque, sequence, specification and techniques/valve adjustments.</p> <p>Stress importance of belt/chain tension and condition.</p>
Careers	<ul style="list-style-type: none"> • identify the demand for skills related to engine reconditioning. 	

MODULE MEC3070: ENGINE RECONDITIONING 2**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC3050 Engine Replacement**Module Description:** Students determine the need for service, and perform service, on a cylinder block assembly and related components of an engine.**Module Parameters:** Access to engine measuring tools, cylinder block reconditioning tools/equipment and related resources.**Supporting Modules:** MEC3030 Engine Diagnosis
MEC3040 Engine Tune-up
MEC3060 Engine Reconditioning 1**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate safe work procedures while reconditioning a cylinder block 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in: <ul style="list-style-type: none"> following established shop/lab routines safely using engine reconditioning tools/equipment. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> determine the condition of a cylinder block before and after disassembly <ul style="list-style-type: none"> the ability to determine: <ul style="list-style-type: none"> the need for work through inspection of cylinder block, pistons, rods, crankshaft, camshaft, bearings and other related components cost of repair. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Block Reconditioning, Part 1, MEC3070-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25

MODULE MEC3070: ENGINE RECONDITIONING 2 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> recondition a cylinder block and its related components reassemble a cylinder block assembly demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance in reconditioning: <ul style="list-style-type: none"> cylinder block connecting rods pistons. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Block Reconditioning, Part 2, MEC3070-1</i> <i>Illustrative Example: Cylinder Block Reconditioning, MEC3070-2,</i> <i>Illustrative Example: Piston and Cylinder Measurement, MEC3070-3, Crankshaft and Main Bearing Measurement, MEC3070-4</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	40
	<ul style="list-style-type: none"> observed performance in disassembly and assembly a cylinder block assembly. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Cylinder Block Reconditioning, Part 3, MEC3070-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25
	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate knowledge of and follow safety practices related to reconditioning cylinder blocks. 	Personal, property and environment.

MODULE MEC3070: ENGINE RECONDITIONING 2 (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • list possible engine problems based on information provided • describe blue-printing procedures for cylinder blocks • estimate costs. 	Refer to customer complaints and service bulletins.
Inspect/Service	<ul style="list-style-type: none"> • clean all engine block components • inspect the following components for serviceability: <ul style="list-style-type: none"> – block alignment, warpage and cracks – cylinder(s) size, taper, roundness and general condition – crankshaft bends, cracks, journal size, tapes, roundness and general condition – camshaft(s) bends, lobe/lift wear and journal size – piston(s) size, taper, clearance and condition of pin(s) and grooves – connecting rod(s) big/small end size and straightness – lifters base wear, rate of leak down – bearings size and wear – chains, sprockets, pulleys, belts – other • identify what servicing is required • machine/service components as required • assemble engine block observing proper tolerances. 	Deglaze, bore, hone, resize, replace. Combine with MEC3040 Engine Tune-ups, MEC3050 Engine Replacement, for installation and running.
Careers	<ul style="list-style-type: none"> • identify the demand for skills related to engine reconditioning. 	

MODULE MEC3080: ALTERNATIVE ENERGY SYSTEMS**Level:** Advanced**Theme:** Propulsion Systems**Prerequisite:** MEC2050 Alternative Fuel Engines**Module Description:** Students describe why vehicle manufacturers continue to build the crank-piston internal combustion gasoline engine. Students also identify and describe future engine designs.**Module Parameters:** Access to support resources.**Supporting Module:** MEC1040 Engine Fundamentals**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> research and describe the historical development of piston engine designs from Nickolous Otto's engine to the present 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a report generated indicating: <ul style="list-style-type: none"> historical development of internal combustion engines engine manufacturing techniques. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Alternative Energy Systems, Part 1, MEC3080-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	20
<ul style="list-style-type: none"> describe the use of different fuels and engine designs in modern day vehicles 	<ul style="list-style-type: none"> a report with the following: <ul style="list-style-type: none"> engine design and how it relates to fuels (other than gasoline) alternative engine designs (other than conventional piston engine) including electric power state advantages and disadvantages of designs. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Alternative Energy Systems, Part 2, MEC3080-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	40
<ul style="list-style-type: none"> identify and describe future developments in fuels and engine designs 	<ul style="list-style-type: none"> identified opportunities for future development of alternative energy systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Alternative Energy Systems, Part 3, MEC3080-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	40

MODULE MEC3080: ALTERNATIVE ENERGY SYSTEMS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Identify/Analyze</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> 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 describe the development of and compare the relative efficacy of alternative contemporary design engines to the large-scale manufacture of motor vehicles identify the rationale for change in engine design considering environmental and fuel supply issues prepare and present a study of initiatives for using alternative fuels in engines and the factors affecting these advancements examine and report on the present initiatives to build electric-powered cars and batteries of sufficient capacity to power them identify which direction of alternative energy systems development promises to be most successful at this time. 	<p>The engines examined might include the following: Wankel, Gas Turbine, New Concept Rotary, Kauertz Rotary Vane, Rotorcam, Split-Cycle Mighty-Mite, Bricklin Rotary Vee, Reg Technologies Rand Cam Selwood Orbital and Stirling.</p>
<p>Careers</p>	<ul style="list-style-type: none"> predict the opportunity for career opportunities related to emerging technological development. 	

MODULE MEC3090: COMPUTER SYSTEMS**Level:** Advanced**Theme:** Guidance and Control Systems**Prerequisite:** MEC2070 Emission Controls**Module Description:** Students provide an overview of the applications of computer management systems used in modern vehicles.**Module Parameters:** Access to computer management system diagnostic equipment and related resources.**Supporting Module:** MEC2090 Electrical Components**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • demonstrate established safety and care procedures related to computer management systems • identify the principles that apply to all computer management systems 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – demonstrating compliance with safety and care of computer systems – care and safety in the use of tools, equipment and materials – antistatic precautions associated with the handling of a central processing unit (CPU). <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – identification of common principles shared by all computer management systems – comparisons between input devices and output devices used in vehicles and on personal computers (PCs). <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Computer Systems, Part 1, MEC3090-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p> <p>20</p>

MODULE MEC3090: COMPUTER SYSTEMS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • locate the components of selected computer management systems and describe their function • demonstrate how computer management systems operate • perform diagnostic analyses of selected computer management systems and make required repairs to or replacement of malfunctioning parts • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – location of the components of computer management systems – descriptions and location of components and their relationship to the total systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Computer Systems, Part 2, MEC3090–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • measured performance related to: <ul style="list-style-type: none"> – demonstrating how computer management systems obtain information, process information and make system adjustments – changing input values and predicting output values on a computer system or schematic. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Computer Systems, Part 3, MEC3090–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • measured performance related to: <ul style="list-style-type: none"> – correct diagnosis and analysis of computer management systems – procedures for repair or replacement of parts – accuracy and skill in performing task. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Computer Systems, Part 4, MEC3090–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>15</p> <p>20</p> <p>30</p> <p>Integrated throughout</p>

MODULE MEC3090: COMPUTER SYSTEMS (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow practices that promote safety for people and the environment. 	Be aware of procedures that can damage CPUs.
Identification/Function	<ul style="list-style-type: none"> • identify the different computer control systems that are now available on vehicles • explain the functions these computer control systems perform • state the ways in which these computer control systems replaced mechanical systems • demonstrate how selected computer control systems work compared to earlier mechanical systems • identify the principles and functions of computer control systems • locate and identify the parts of selected computer management systems • describe the function of the parts of a selected computer management system • forecast types of computer management systems that may be used on future vehicles. 	
Inspect/Service	<ul style="list-style-type: none"> • perform diagnostic analysis of selected computer management systems • replace parts or make necessary repairs to correct malfunctioning computer management systems. 	Note that faulty use of diagnostics equipment can damage the CPU.
Careers	<ul style="list-style-type: none"> • identify further education, working conditions and career opportunities. 	

MODULE MEC3100: SAFETY SYSTEMS**Level:** Advanced**Theme:** Guidance and Control Systems**Prerequisite:** MEC2100 Power Assist Accessories**Module Description:** Students describe how safety systems can be tested, diagnosed, replaced or repaired.**Module Parameters:** Access to related resources and vehicles with safety systems.
Note: Customer work must be checked by certified technician.**Supporting Module:** MEC2090 Electrical Components**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safety and care procedures while working with safety systems 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> appropriate use of equipment, tools and materials when working on safety systems specific procedures used when working on safety systems such as anti-lock braking system (ABS) and air bags. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> list and compare safety systems that protect vehicle occupants <ul style="list-style-type: none"> measured performance related to: <ul style="list-style-type: none"> need for the development of safety systems research of vehicle safety systems comparisons of types of safety systems predicting possible future safety systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Safety Systems, Part 1, MEC3100-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	40

MODULE MEC3100: SAFETY SYSTEMS (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function	<i>The student should:</i> <ul style="list-style-type: none">• identify safety systems in selected vehicles• list the parts of these safety systems• describe the function of these systems.	Discuss hazards associated with servicing safety systems.
Inspect/Service	<ul style="list-style-type: none">• diagnose the condition and any problems found on safety systems• replace parts or make repairs to malfunctioning parts of safety systems.	
Careers	<ul style="list-style-type: none">• identify further education, working conditions and career opportunities.	

MODULE MEC3110: CLIMATE CONTROL

Level: Advanced

Theme: Guidance and Control Systems

Prerequisite: MEC2030 Lubrication & Cooling

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

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

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

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">demonstrate established safety and care procedures when working with climate control systems	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">observed performance related to:<ul style="list-style-type: none">safety when working on climate control systemsprocedures followed when working with refrigerantssafety and care used with vehicles, equipment, tools and materials. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
<ul style="list-style-type: none">identify the purpose and describe the functions of heater and air conditioning system components	<ul style="list-style-type: none">measured performance related to:<ul style="list-style-type: none">identification of the parts/componentsdescription of the function of heater and air conditioningdescription of how the components combine their functions to produce hot or cold air. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Climate Control, Part 1, MEC3110-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25

MODULE MEC3110: CLIMATE CONTROL (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • perform inspection, diagnosis, service and repair procedures on heater and air conditioning systems • 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 • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – inspection of climate control systems as outlined in service manuals and shop procedures – accurate diagnosis of climate control systems performance – repairs to climate control systems as outlined in manuals and procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Climate Control, Part 2, MEC3110-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • measured performance related to: <ul style="list-style-type: none"> – research into the effect of refrigerants on the ecosystem – research into alternate refrigerants – understanding of recycling laws and procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Climate Control, Part 3, MEC3110-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>40</p> <p>20</p> <p>Integrated throughout</p>

MODULE MEC3110: CLIMATE CONTROL (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow lab safety procedures. • generate a list of safety concerns when working with refrigerants • outline the legal restrictions about the disposal and recycling of R-12 refrigerants • identify the safety and environmental concerns with R-12 and R-12 replacements. 	<p>Discuss legal restriction in disposal and reclaiming of R-12.</p> <p>Mixing refrigerants.</p> <p>Safety precautions when in contact with R-12 and when R-12 is in contact with open flame creating toxic gas.</p>
Identification/Function	<ul style="list-style-type: none"> • describe the operation of the heater: heat exchange, the operation of controls for fan speed, and air flow controls • identify components of an air conditioning system • describe refrigeration principles • describe air conditioning system operation. 	
Identify/Analyze	<ul style="list-style-type: none"> • 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 and speed abnormalities • show how to conduct a visual and tactile check of operation of the refrigerant system and assess the service needs. 	
Inspect/Service	<ul style="list-style-type: none"> • identify cause of malfunction in a climate control system and repair as required after consulting with the vehicle owner/teacher • pressure test the air conditioning refrigerant system and confirm the normalcy of system operation by comparing data with service manual • on A/C system, leak test, evacuate system, recharge, then leak test again. 	<p>In the case of equipment or facility shortage, a community partnership would be most helpful in delivering this module.</p> <p>Oil may need to be added.</p>
Careers	<ul style="list-style-type: none"> • identify and describe the demand for skills related to climate control systems. 	

MODULE MEC3120: POWER ASSISTING**Level:** Advanced**Theme:** Guidance and Control Systems**Prerequisite:** MEC2100 Power Assist Accessories**Module Description:** Students further develop their knowledge of the purpose, operation, service and repair of pneumatic, hydraulic and electric power assist devices.**Module Parameters:** Access to vacuum/pressure gauges, electrical test equipment and related resources.**Supporting Module:** MEC2120 Hydraulic Accessories**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safety and care procedures when working with power assists 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> personal safety when working with power assist systems safe use of equipment and tools safety and care of vehicles, parts, equipment and materials clean-up and workstation organization. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> identify applications of power assist components to various vehicle systems and determine the rationale for each application 	<ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> identification of power assist systems such as pressure pumps, vacuum and electric motors identification of components of power assist systems analysis of the purpose and rationale for using power assist systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Power Assisting, Part 1, MEC3120-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	20

MODULE MEC3120: POWER ASSISTING (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> perform service and repair procedures to pneumatic, hydraulic and electric power assist devices according to manufacturers' recommendations demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> measured performance related to: <ul style="list-style-type: none"> service and repair to pneumatic, hydraulic and electric components following recommended servicing/repairing procedures making accurate measurements. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Power Assisting, Part 2, 3, 4, MEC3120-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>70</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate knowledge of and follow established lab procedures. 	
Identification/Function	<ul style="list-style-type: none"> describe situations in vehicle system design where power assist mechanisms are used 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 brakes. 	
Identify/Analyze	<ul style="list-style-type: none"> complete an inspection of a hydraulic power assist device using manufacturer's prescribed diagnostic procedures estimate the repair costs for a defective or broken hydraulic assist and confer with the teacher or vehicle owner regarding the repair requirements 	Consider a steering, braking system.

MODULE MEC3120: POWER ASSISTING (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • complete an inspection of a pneumatic assist device or system using prescribed diagnostic procedures • prepare an estimate of the repair requirements of a pneumatic assist and confer with the teacher or vehicle owner regarding the repair needs • complete an inspection of an electric assist device using a prescribe diagnostic procedure • prepare an estimate of the repair requirements for an electric assist device and confer with the teacher or vehicle owner regarding the required repairs. 	<p>Vacuum assist brakes.</p> <p>Consider load levelling devices.</p>
Inspect/Repair	<ul style="list-style-type: none"> • complete a repair procedure to an electric assist device or system • complete a repair procedure on a hydraulic assist unit • complete a repair procedure on a pneumatic assist unit or system. 	<p>This could be a seal, hose, pump, reservoir or valve repair.</p> <p>Repairs could include any aspect of the system or device.</p>
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to power assist devices. 	

MODULE MEC3130: AUTOMATIC TRANSMISSIONS

Level: Advanced

Theme: Guidance and Control Systems

Prerequisite: MEC1110 Pneumatics & Hydraulics

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

Module Parameters: Access to automatic transmission diagnostic tools, support resources.
Note: Customer work must be supervised and checked by certified technician.

Supporting Module: MEC2140 Transmissions/Transaxles

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • demonstrate established safety and care procedures when working with automatic transmissions and transaxles • 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 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – personal safety procedures – safety and care when working with equipment, tools and materials – following safety procedures specific to automatic transmissions and transaxles – clean-up and workstation organization. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance related to correct: <ul style="list-style-type: none"> – description of parts – identification of the power flow – explanation of shift controls. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Automatic Transmissions, Part 1, MEC3130–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p> <p>20</p>

MODULE MEC3130: AUTOMATIC TRANSMISSIONS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • inspect, diagnose, service and complete a minor repair to an automatic transmission and transaxle assembly • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – procedures followed during inspection, diagnosis, service and repair to automatic transmissions and transaxles – analysis of conditions that caused wear/malfunctions to automatic transmissions and/or transaxles. <p><i>Assessment Tool</i> <i>Assessment Checklist: Automatic Transmissions, Part 2, MEC3130–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p style="text-align: center;">65</p> <p style="text-align: right;">Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow established lab procedures. 	
<p>Identification/Function</p>	<ul style="list-style-type: none"> • describe the operation of a torque converter • compare the internal structure of a lock-up converter and non-lock-up converter • identify the parts of a transmission assembly by naming pieces on a diagram or parts of a disassembled unit • using a hydraulic flow diagram, explain the unit engaged and shift process for each gear position 	

MODULE MEC3130: AUTOMATIC TRANSMISSIONS (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • interpret shifting characteristics resulting from differentiated inputs; e.g., high road speed, pulling heavy loads, throttle valve position. 	
Inspect/Service	<ul style="list-style-type: none"> • use service manuals and road test to determine probable causes of noted conditions • 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 • perform a stall test according to manufacturer's specifications • list parts for required repairs • inspect transmission/transaxle oil level and develop an assessment of its odor and colour • change transmission fluid and filter as described in the appropriate service manual • check unit for oil leakage and determine a cause for loss of oil • repair a fluid leak • evaluate the condition and adjustment of linkage • locate and correct a transmission linkage or band adjustment where required • remove, clean and reinstall a transmission valve body assembly. 	<p>For example, oil pan and/or valve body removal.</p> <p>Cost estimate including labour may be done.</p>
Inspect/Repair	<ul style="list-style-type: none"> • remove and repair or replace an automatic transmission assembly. 	<p>May require Career Transitions module to replace/repair a transmission on a customer vehicle.</p>
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to automatic transmissions. 	

MODULE MEC3140: DRIVE TRAIN REPAIR**Level:** Advanced**Theme:** Guidance and Control Systems**Prerequisite:** MEC2130 Drive Trains**Module Description:** Students perform overhauls on clutch, transmission and differential assemblies.**Module Parameters:** Access to specialized drive train tools, drive train units and related resources.**Supporting Module:** MEC2140 Transmissions/Transaxles**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safe work practices, and follow established lab procedures 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> safe practices when servicing/repairing drive train components. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> replace a clutch assembly 	<ul style="list-style-type: none"> measured performance related to clutch: <ul style="list-style-type: none"> following shop procedures following procedures in shop manuals accuracy and quality of clutch repairs/replacement work. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Drive Train Repair, Part 1, MEC3140-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
<ul style="list-style-type: none"> remove, overhaul and replace a manual transmission/transaxle 	<ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> following shop procedures following procedures in shop manuals accuracy and quality of transmission repairs/replacement work. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Drive Train Repair, Part 2, MEC3140-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	35

MODULE MEC3140: DRIVE TRAIN REPAIR (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> measure and adjust a differential assembly overhaul a drive axle assembly demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> finding and following manufacturer's specifications accurate measurements accurate adjustments to differentials information retrieval. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Drive Train Repair, Part 3, MEC3140-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
	<ul style="list-style-type: none"> measured performance related to drive axles: <ul style="list-style-type: none"> following shop procedures accurate removal and overhaul of parts including constant velocity (CV) joints. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Drive Train Repair, Part 4, MEC3140-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25
	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate knowledge of and follow established lab procedures. 	Refer to asbestos hazards.

MODULE MEC3140: DRIVE TRAIN REPAIR (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain the operation and power flow in various transmissions and transaxles • describe drive axle operation and components of four-wheel, front-wheel and rear-wheel drive vehicles • describe types of differential assemblies and explain operation of the following: <ul style="list-style-type: none"> – full floating – semi-floating – hunting – non-hunting • describe the operation of a limited slip differential assembly. 	
Inspect/Service and Repair	<ul style="list-style-type: none"> • remove and replace a clutch assembly • identify the serviceability of each part • adjust linkage to specified clearance • remove and replace specified transmission and overhaul to manufacturer's specifications • overhaul constant velocity joints • measure and adjust a differential assembly. 	
Careers	<ul style="list-style-type: none"> • identify further education, working conditions and career opportunities. 	

MODULE MEC3150: WHEEL ALIGNMENT**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC2150 Suspension Systems**Module Description:** Students develop the knowledge, skills and attitudes necessary for repairing and aligning various vehicle steering systems.**Module Parameters:** Access to wheel alignment equipment and supporting resources.**Note:** Customer work must be supervised and checked by a certified technician.**Supporting Module:** MEC2160 Steering Systems**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> follow established safe work procedures 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to personal safety and vehicle care. <p><i>Assessment Tool</i> <i>Assessment Checklist: Health and Safety, MECH&S</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> investigate and determine the condition of various components that affect wheel alignment and tracking 	<ul style="list-style-type: none"> measured performance related to pre-alignment: <ul style="list-style-type: none"> determining the condition of steering components determining the condition of suspension components applying recommended procedures and practices. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Wheel Alignment, Part 1, MEC3150-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25

MODULE MEC3150: WHEEL ALIGNMENT (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<ul style="list-style-type: none"> identify measurements and angles used to check and adjust suspension and steering systems 	<ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> identifying and measuring angles identifying methods of angle adjustments indicating effects of incorrect angles on vehicle handling and component life. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Wheel Alignment, Part 2, MEC3150-1</i> <i>Illustrative Example: Wheel Alignment, MEC3150-2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	25
<ul style="list-style-type: none"> use specialized alignment equipment to check and adjust alignment angles on various suspension types to manufacturers' specifications 	<ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> information retrieval accurate measurements correct use of special tools/equipment correct alignment adjustments. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Wheel Alignment, Part 3, MEC3150-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	30
<ul style="list-style-type: none"> use road test information to determine the quality of service work performed 	<ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> assessment of the work done analysis of driving symptoms report on vehicle status to customer. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Wheel Alignment, Part 4, MEC3150-1</i> <i>Illustrative Example: Wheel Alignment, MEC3150-2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE MEC3150: WHEEL ALIGNMENT (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow lab safety procedures. 	
Identification/Function	<ul style="list-style-type: none"> • define and explain camber, caster, toe, steering axis inclination, toe-out on turns and tracking. 	
Identify/Analyze	<ul style="list-style-type: none"> • solve common steering and suspension problems such as: <ul style="list-style-type: none"> – loose steering – hard steering – vehicle wander – pulling to one side – wheel shimmy – wheel tramp – improper tire wear. 	
Inspect/Service	<ul style="list-style-type: none"> • demonstrate how to: <ul style="list-style-type: none"> – check and correct tire pressures and determine reason for abnormal tire wear – check and adjust wheel bearings – check and adjust wheel/tire run out – check and correct tire balance – check and correct steering linkage problems – check and adjust steering gear – check and correct shock absorber problems – check and correct riding height – check vehicle tracking – check alignment angles for a given vehicle using the appropriate alignment equipment – adjust alignment angles to manufacturer’s specifications on at least two different suspension types 	
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to wheel alignment. 	

MODULE MEC3160: BODY REPAIR ESTIMATION**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC1160 Structures & Materials**Module Description:** Students apply knowledge in estimating, including close attention to detail in determining the cost of a repair.**Module Parameters:** Access to supporting resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> state the role of insurance in the body repair industry and legal obligations involved in estimating 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> explanation of four of the following terms: <ul style="list-style-type: none"> insurance liability waiver write-off premium/deductible. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Body Repair Estimation, Part 1, MEC3160-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> identify and describe types of body damage 	<ul style="list-style-type: none"> presentation of a report that defines/determines: <ul style="list-style-type: none"> collision damage (direct) hidden damage accessory parts parts sources and prices (original equipment manufacturer versus aftermarket) damage owing to collision. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Body Repair Estimation, Part 2, MEC3160-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	20

MODULE MEC3160: BODY REPAIR ESTIMATION (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • outline skills needed to successfully estimate collision damage • complete an estimate by determining what parts/components are to be replaced or repaired and their subsequent costs • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • identification of skills required for estimating collision damage, including: <ul style="list-style-type: none"> – visual analysis of frame and body damage – part identification and location – accurate calculation of costs including time required and supplies. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Body Repair Estimation, Part 3, MEC3160–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • demonstration of estimating skills including: <ul style="list-style-type: none"> – problem-solving ability in determining cost of repair – knowledge of vehicle value versus repair cost – estimate of repair including parts, labour costs, shop costs, miscellaneous costs according to industrial standards. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Body Repair Estimation, Part 4, MEC3160–1</i> <i>Illustrative Example: Body Repair Estimation, MEC3160–2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>25</p> <p>45</p> <p>Integrated throughout</p>

MODULE MEC3160: BODY REPAIR ESTIMATION (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow lab safety procedures. • identify mechanical and electrical components often damaged in collision, and state appropriate safety precautions in dealing with gasoline, oil, air conditioning gas and battery acid hazards. 	
Identify/Analyze	<ul style="list-style-type: none"> • list and describe the terms used in the appraisal industry • describe vehicle construction systems (unibody and framed) and safety requirements • examine the effects of collision on vehicle structure, parts and passenger safety equipment • demonstrate the effects of forces on metal and show how manufacturing techniques are used to absorb collision energy • define the terms primary damage, secondary damage and hidden damage • identify related damaged parts • investigate and describe collision damage to: <ul style="list-style-type: none"> – determine direction of damage – identify parts damaged (including hidden damage) – list signs of hidden damage • conduct tests to determine mechanical and/or electrical functions in order to properly estimate cost of collision damage • estimate cost including parts, labour and miscellaneous • calculate the cost of original equipment (OEM), aftermarket and used parts that could be used in a repair • complete a replacement parts list for a given collision, including “cost,” “extended cost” and “contracted” costs 	

MODULE MEC3160: BODY REPAIR ESTIMATION (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • list examples of hidden and “other” costs that must be included in an estimate of collision damage • describe the responsibility of the shop to the customer, the insurer and legal parties in doing an estimate; e.g., safety of vehicle • define write-off and explain when a vehicle is considered a write-off and non-repairable • explain the advantages of having a knowledge of vehicle structure and repair procedures when completing an estimate for repair. 	
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to body repair estimation. 	

MODULE MEC3170: DAMAGE ANALYSIS**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC2170 Metal Repair & Finishing**Module Description:** Students identify and examine physical damage caused by collisions, and learn cost estimating procedures.**Module Parameters:** Access to damaged vehicle, measuring gauges and related resources.**Supporting Modules:** 2150 Suspension Systems
2160 Steering Systems**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safe work procedures identify types and signs of collision damage 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> safe positioning of vehicle jacks and jack stands following shop routines in removal of parts. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Analysis, Part 1, MEC3170-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> presentation of a report describing: <ul style="list-style-type: none"> vehicle construction and safety features preventing collision damage frame types and related damage signs of secondary and hidden damage methods used to determine damage. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Analysis, Part 2, MEC3170-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15

MODULE MEC3170: DAMAGE ANALYSIS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • examine and use measurements to determine extent of vehicle damage • prepare a repair strategy for a given vehicle • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • calculate measurements to show: <ul style="list-style-type: none"> – direction and extent of damage – possible suspension problems through direct and indirect damage to a vehicle. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Analysis, Part 3, MEC3170-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • demonstration of: <ul style="list-style-type: none"> – problem-solving ability in determining cost of repair – knowledge of vehicle value versus repair costs – industry standards of repair including parts, labour and shop cost estimates. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Analysis, Part 4, MEC3170-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>30</p> <p>45</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow established lab procedures. 	

MODULE MEC3170: DAMAGE ANALYSIS (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe manufacturer’s methods used in vehicle construction and define the terms used to identify vehicle body parts • describe methods used in vehicle construction to control damage through energy transfer and differences in structural strength • identify the specific occupant safety features built into the vehicle as required by law or provided as a vehicle option. 	
Inspect/Report	<ul style="list-style-type: none"> • demonstrate basic principles of estimating damage repair and apply to a specific situation • estimate repair or replacement of safety equipment damaged in a collision • identify the basic frame structures used in auto construction, and describe the measurement charts used to determine misalignment • calculate frame alignment measurements to determine extent of misalignment and explain the results of the measurements • use frame gauges and charts • analyze measurements and determine repair procedure • explain the value of using used, after market or OEM parts in any given repair • complete a damage analysis for a given vehicle • prepare strategy plan showing correct repair sequence. 	<p>ABS, air bag, suspension and personal restraint systems.</p>
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to structural damage analysis. 	

MODULE MEC3180: DAMAGE REPAIR 1**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC2170 Metal Repair & Finishing**Module Description:** Students examine the methods used to complete a repair involving removing, replacing and aligning of body parts.**Module Parameters:** Access to specialized body tools, hand tools and related resources.**Note:** The student must have access to instruction from an individual with journeyman qualifications if students are involved in customer work.**Supporting Module:** MEC3170 Damage Analysis**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • demonstrate established safety procedures • follow an approved sequence of repairs involving removing and replacing damaged external parts 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to the safe handling and use of tools and equipment. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 1, Part 1, MEC3180-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance in: <ul style="list-style-type: none"> – organizing work and work-site – analyzing correct repair sequence – removal of parts and accessories required. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 1, Part 2, MEC3180-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>10</p> <p>25</p>

MODULE MEC3180: DAMAGE REPAIR 1 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • align parts used to repair and prepare components for painting or priming • remove, repair or replace trim parts as required • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to the ability to: <ul style="list-style-type: none"> – repair parts that can be repaired – replace parts and correctly align showing knowledge of alignment principles. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 1, Part 3, MEC3180–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance in: <ul style="list-style-type: none"> – using problem-solving skill to assess and repair damage – listing parts and/or repairs required – estimating cost of repair and making cost effective decision – replacing or repairing trim. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 1, Part 4, MEC3180–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>40</p> <p>25</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow established lab procedures • demonstrate approved safety procedures in the use of jacks, jack stands, impact wrenches, torches, plasma arc and abrasive cutters to remove or replace parts 	<p>Consideration must be given to techniques that prevent damage to adjacent surfaces or parts.</p>

MODULE MEC3180: DAMAGE REPAIR 1 (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge, skills and attitudes in the safe use of hand tools. 	
Inspect/Report	<ul style="list-style-type: none"> • examine damage to external parts and identify appropriate repair sequence • complete a list of required parts and show cost-effectiveness of using aftermarket or used parts • list methods used in the manufacture of vehicles to align adjacent parts, including shims, slotted holes and bending • examine the bumper shock system and explain the effects of collision to “bumper shocks” and their alignment • describe the importance of correct alignment of body parts and the effects of “misalignment,” both aesthetically and physically • explain the function of trim • identify methods of trim fastening. 	
Inspect/Repair	<ul style="list-style-type: none"> • successfully remove trim and damaged parts, showing knowledge of tools and care for property • demonstrate knowledge and skill in the preparation of existing flanges, edges and mounting points used for replacement of new parts • safely remove and replace a door, hood and/or trunk lid • replace and align a fender • install new or original trim and recognize the value of using OEM trim parts. 	
Careers	<ul style="list-style-type: none"> • identify further education and work opportunities related to structural damage repair. 	

MODULE MEC3190: DAMAGE REPAIR 2**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC3180 Damage Repair 1**Module Description:** Students examine methods used to complete a collision repair involving unibody parts replacement and frame correction.**Module Parameters:** Access to hydraulic push/pull equipment, GMAW and cutting equipment, basic body tools and related resources.**Note:** The students must have access to instruction from an individual with journeyman qualifications if they are involved in customer work.**Supporting Modules:** MEC2150 Suspension Systems
MEC2160 Steering Systems
MEC2170 Metal Repair Finishing
MEC2190 Surface Preparation**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate established safe work procedures 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to the safe handling of vehicles in repair using GMAW and oxy-acetylene equipment <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 1, MEC3190-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> describe construction features and materials used in vehicle bodies and methods of repair 	<ul style="list-style-type: none"> presentation of a report describing vehicle construction, showing knowledge of: <ul style="list-style-type: none"> high strength steel (HSS)/high strength low alloy (HSLA) metals unibody construction frame construction methods used to repair vehicle bodies. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 2, MEC3190-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10

MODULE MEC3190: DAMAGE REPAIR 2 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • use a “bench” frame straightening system and related measurements to straighten/align a component • identify misalignment of frame and suspension parts and components • correct frame/body alignment involving replacement of unibody panels and use of hydraulic jacks and welders • explain the importance of proper frame and suspension alignment, including legal implications 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance in using “frame” equipment, including knowledge of “measurement” charts and parts terminology. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 3, MEC3190–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance given a damaged vehicle, demonstrating: <ul style="list-style-type: none"> – problem solving/analyzing existing misalignment – selecting resources to assist in repair analysis – understanding of suspension geometry. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 4, MEC3190–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – use of hydraulic push/pull equipment – unibody panel replacement – welding and cutting tool use – alignment and fabrication of damaged parts. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 5, MEC3190–1</i> <i>Illustrative Example: Damage Repair 2, MEC3190–2</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • ability to identify suspension parts and problems incurred by misalignment owing to collision. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Damage Repair 2, Part 6, MEC3190–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p> <p>25</p> <p>25</p> <p>15</p>

MODULE MEC3190: DAMAGE REPAIR 2 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate knowledge of and follow lab safety procedures. demonstrate safety procedures required in the use of hydraulic jacks, GMAW welding and oxy-acetylene and/or plasma arc cutting equipment list the safety implications of collision damage causing suspension misalignment, including legal implications. 	
<p>Identification/Function</p>	<ul style="list-style-type: none"> identify and describe three kinds of frame structures, giving the advantages and applications of each define the terms HSS and HSLA, and explain the need for these metals in unibody construction describe the “bench system” used by professional auto repair shops in unibody collision repair describe and use measurements and measurement charts to determine the degree of misalignment define the terms twist, sag, sway and diamond describe measurements that will indicate each of the above conditions. 	

MODULE MEC3190: DAMAGE REPAIR 2 (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none">• describe the correct procedure used to repair a unibody frame that shows misalignment• demonstrate how to use hydraulic jacking systems in the repair of collision damage• identify three kinds of suspension systems used by auto makers• define the terms toe-in, camber and castor, and explain how each affects car tracking and drive ability.	
Inspect/Repair	<ul style="list-style-type: none">• use a bench (or equivalent) frame-straightening system to correct alignment• align and fabricate damaged parts.	
Careers	<ul style="list-style-type: none">• identify further education, working conditions and career opportunities.	

MODULE MEC3200: REFINISHING 2**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC2200 Refinishing 1**Module Description:** Students demonstrate finishing skills and techniques related to the preparation and application of metallic paints.**Module Parameters:** Access to spray equipment and related resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • demonstrate safe work practices and follow all warnings identified by product manufacturers, Workplace Hazardous Materials Information System (WHMIS), and Occupational Health and Safety • describe top coats, solvents and additives used in surface finishes 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – health hazards involved in refinishing – adherence to warnings as outlined in WHMIS bulletins – following proper personal and shop safety routines. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 2, Part 1, MEC3200–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • presentation of a report identifying and describing: <ul style="list-style-type: none"> – top coats – solvents – additives. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 2, Part 2, MEC3200–1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p> <p>20</p>

MODULE MEC3200: REFINISHING 2 (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • apply metallic, turtone and/or base/clear coat and acrylic enamel finishes • apply problem-solving techniques to paint and equipment problems • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – proper use of paint products – following specific procedures in the application of acrylic enamels and base/clear coat systems. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 2, Part 3, MEC3200-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	55
	<ul style="list-style-type: none"> • observed performance related to solving spray problems related to application methods and equipment malfunction. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 2, Part 4, MEC3200-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> • observations of individual effort and interpersonal exploration during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Safety and Environmental Concerns	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of health hazards and environmental impacts of products used • demonstrate use of personal protective equipment as recommended by manufacturer. 	<p>WHMIS; product information. MSDS Sheets available.</p> <p>Respirators; gloves, coveralls.</p>
Identify/Analyze	<ul style="list-style-type: none"> • identify three types of top coats and describe characteristics showing similarities and differences 	

MODULE MEC3200: REFINISHING 2 (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none">• demonstrate and explain correct procedures in preparing top coats for application including correct selection of solvents and additives• identify and select colour and type of paint for a given vehicle identification plates and code books• identify differences in spray gun types and uses• describe refinishing equipment accessories.	
Inspect/Repair	<ul style="list-style-type: none">• select, mix and apply two or more of the following finishes:<ul style="list-style-type: none">– acrylic enamel– metallic– tutone– base/clear coat• complete a vehicle re-coat• solve paint and equipment problems observed during application.	
Careers	<ul style="list-style-type: none">• identify further education, working conditions and career opportunities.	

MODULE MEC3210: PLASTIC & FIBREGLASS**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC1160 Structures & Materials**Module Description:** Students determine the types of plastic and fibreglass materials required for repairs, and perform appropriate repair procedures.**Module Parameters:** Access to plastic welding equipment and related materials and resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify hazards and safety precautions to be observed when working with plastics 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> use of plastic repair materials personal safety requirements following established shop procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Plastic & Fibreglass, Part 1, MEC3210-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> describe types of plastics, welding equipment and bonding processes used to repair plastics parts 	<ul style="list-style-type: none"> preparation of a chart or other visual presentation indicating: <ul style="list-style-type: none"> plastic types repairability materials required for repair. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Plastic & Fibreglass, Part 2, MEC3210-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
<ul style="list-style-type: none"> apply plastic welding and/or bonding techniques to repair a plastic component 	<ul style="list-style-type: none"> observed performance in completion of a plastic repair. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Plastic & Fibreglass, Part 3, MEC3210-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	30

MODULE MEC3210: PLASTIC & FIBREGLASS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • identify types of fibreglass materials and repair procedures • perform a fibreglass repair on a component • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • ability to identify three kinds of fibreglass material, related resins/hardeners and repair procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Plastic & Fibreglass, Part 4, MEC3210-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observed performance in the completion of a repair: <ul style="list-style-type: none"> – using safe handling techniques – using proper preparation of repair area – using correct application of material – following approved finishing steps. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Plastic & Fibreglass, Part 5, MEC3210-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>35</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow accepted safety practices when working with hot liquids, plastic solvents, resins and equipment. 	<p>Consider WHMIS regulations and ventilation requirements.</p>

MODULE MEC3210: PLASTIC & FIBREGLASS (continued)

Concept	Specific Learner Expectations	Notes
Identify/Analyze	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and state characteristics of plastics used in vehicle manufacture • identify plastics that can be repaired by welding and bonding • explain the types of plastic welding equipment available and when this repair process should be used • identify welding rods • explain which bonding agents are available and their application • identify type of plastic, and decide whether to weld or bond • state why a particular process was chosen. 	<p>CAUTION: Bonding agents can be very toxic. Follow all the manufacturer's safety requirements.</p>
Inspect/Repair	<ul style="list-style-type: none"> • identify correct layout • prepare "witness lines" for repeat layout • prepare/clean plastic material as per instructions for process used • create a solid lay-up • weld/bond materials • prepare damaged area • prepare material • apply material. 	<p>Bonding processes are becoming more prevalent than welding.</p>
Careers	<ul style="list-style-type: none"> • describe how prevalent plastic repairs are in industry. 	

MODULE MEC3220: GLASS REPLACEMENT**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC2180 Trim Replacement**Module Description:** Students demonstrate knowledge, skills and practice related to vehicle glass installation and adjustment.**Module Parameters:** Access to glass removal tools, related materials/resources and glazed vehicles.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> handle glass and related materials safely identify glass types and glass retaining systems demonstrate knowledge of tools and procedures used by glass technicians 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> clean-up/disposal of damaged glass safety procedures required proper handling and installation of materials. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Glass Replacement, Part 1, MEC3220-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> presentation of a report describing: <ul style="list-style-type: none"> glass retaining systems moldings and seals glass types and their functions. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Glass Replacement, Part 2, MEC3220-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15
	<ul style="list-style-type: none"> observed performance related: <ul style="list-style-type: none"> identification and use of tools following instructions as given by specific manufacturer's manuals proper installation and testing procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Glass Replacement, Part 3, MEC3220-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	20

MODULE MEC3220: GLASS REPLACEMENT (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • complete glass removal installations and adjustments • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance in completion of: <ul style="list-style-type: none"> – front or rear glass removal/replacement – side glass removal/installation adjustment – sealing and testing installation performed. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Glass Replacement, Part 4, MEC3220-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p style="text-align: center;">55</p> <p style="text-align: right;">Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health/Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify safety concerns when working with glass • show knowledge of safety procedures needed in glass removal • identify installation product safety concerns in the glass industry. 	
<p>Identification/Function</p>	<ul style="list-style-type: none"> • identify types of glass and retaining systems used in auto industry • outline the removal procedures required for two different systems • show knowledge of trim parts used around glass • identify molding retainers, glass seal products and procedures for installation • identify door glass adjustment methods. 	

MODULE MEC3220: GLASS REPLACEMENT (continued)

Concept	Specific Learner Expectations	Notes
Inspect/Repair	<p><i>The student should:</i></p> <ul style="list-style-type: none">• remove front or rear glass following safety guidelines• install several glass systems, including door glass and side lights• adjust door glass on several different systems.	Refer to manufacturer's specifications for front and rear glass installations to provide vehicle integrity.
Careers	<ul style="list-style-type: none">• identify further education and work opportunities related to vehicle glass removal and installation.	

MODULE MEC3230: REFINISHING 3**Level:** Advanced**Theme:** Suspension and Structural Systems**Prerequisite:** MEC3200 Refinishing 2**Module Description:** Students demonstrate knowledge and skills of advanced finishing techniques, including custom painting, mixing, tinting, colour and texture matching.**Module Parameters:** Access to spray equipment, surface repair equipment and related resources.**Curriculum and Assessment Standards**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • 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 • investigate and describe advanced products, techniques and equipment used to achieve an acceptable original equipment manufacturer finish 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – safe handling of chemicals and paint products – knowledge of potential dangers with improper use of products – proper use of resources (WHMIS/MSDS) – following shop routines for painting. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 3, Part 1, MEC3230-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> • presentation of a report demonstrating knowledge of: <ul style="list-style-type: none"> – plastic coatings – colour matching using colour-code references – tinting systems for mixing procedures. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Refinishing 3, Part 2, MEC3230-1</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	<p>15</p> <p>25</p>

MODULE MEC3230: REFINISHING 3 (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • analyze colour/texture and identify the following: <ul style="list-style-type: none"> – lightness/darkness – cast – brightness • describe how colours are matched • explain how to create a textured finishes • describe various paint mixing/tinting procedures. 	<p>Matching colours and metallics.</p> <p>Rock guard, spatter finishes.</p>
Inspect/Repair	<ul style="list-style-type: none"> • demonstrate advanced top coat application techniques • identify styles and techniques of custom painting • apply a custom paint job • perform advanced troubleshooting of application/equipment problems • demonstrate proper selection and application of colour coats for plastic and vinyls. 	<p>Application consistency, improved gun control.</p> <p><u>CAUTION:</u> Use only recommended cleaners on plastics and urethanes.</p> <p>Bumper paint, vinyl roofs.</p>
Careers	<ul style="list-style-type: none"> • identify further education, working conditions and career opportunities. 	

